

Lars Andersson

Annual report 2013



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1. Exceptional events

- Record-long, storm-free period (594 days) broken at the end of October.
- Accumulated outflow from the Baltic in March highest since 1977.
- Low salinities in the Eastern Gotland Basin during fall
- Oxygen conditions were extremely bad in the deep water of the central and northern Baltic Proper. About 15% of the bottom area in the Baltic Proper was affected by anoxia.
- Due to problems with permits to sample in foreign Exclusive Economic Zone (EEZ) fewer stations than originally planned, in the Baltic Proper, were sampled during 2013.

2. Meteorological conditions

During the first months of the year there were wide variations in the winter weather, with large temperature fluctuations between cold and warm periods. During March the temperature was several degrees below normal in the whole country and in areas around the Baltic, it was the coldest March since 1987. However, the cold during this period was to some extent compensated by a lot of sun, and also by very dry weather. The cold weather continued during the beginning of April. But a warmer finish gave an average temperature around the normal for the month. In May, the warmth came with record high temperatures. June was very wet, but during July there was a distinct change in the weather with a lot of sunshine and, mainly in the south, very dry conditions. Locally, in the southern parts, it was the driest July for over 100 years. Mean temperatures were above normal but there was no real heat wave. August showed typical Swedish summer weather with a mixture of sun and rain. Some places, in the southern part, were hit by cloudbursts and flooding. During September a lot of rain fell over the northern parts, while in the south it was very dry. A record-long period (594 days) without any storms was broken at the end of October when the storm Simone hit the country. In mid-November there was another storm, Hilde, which mainly affected the northern parts. December was very mild and another two storms hit Sweden. The first, Sven, mainly affected the southern parts, while the other, Ivar, swept over the northern parts.

As a whole, the yearly mean temperature 2013 was about 1°C above the long term mean (1961-1990). The northern parts of Sweden had more precipitation than normal during 2013, while the southern parts had less.

The ice season 2012/2013

The ice season 2012/2013 can be considered as normal. It started in late November and in the end of December most of the Bay of Bothnia was ice covered. Around New Year windy conditions and high temperatures broke up the ice cover and the main part of the Bay of Bothnia was again ice free. After the windy period, the ice again started to grow and in mid-January the Bay of Bothnia and the Quark was ice covered. The ice growth continued in the Bothnian Sea, the Gulf of Finland and in the archipelagos of the Baltic Proper and on the west coast. Due to strong winds the ice cover was temporarily broken up again at the end of February. During the unusually cold March ice cover again grew and the maximum extent, 176 000 km², was reached as late as March 29, which is a record. In the beginning of May warm air came in from the east, and the ice started to melt quickly, and in the end of the month the ice season was over.

3. Hydrological conditions

Discharge

In the beginning of the year runoff was above normal levels in the main part of the country. During February, March and the beginning of April the discharge was normal or below normal. In the middle of April the weather became warmer, this together with a lot of rain led to a quick increase in the runoff in the main part of the country. In the northernmost parts, however, the snow did not start to melt until the middle of May and the discharge in these areas became high or very high. Generally, during the period from May to November, the southern parts had runoff below normal. In the north the runoff was normal during the period from June to August and also in October and November, while it due to a lot of rain increased to very high during September. In December runoff was slightly above normal in the whole country.

4. Hydrographic conditions

Sea water levels

As a result of strong southwesterly winds at the end of 2012, high sea water levels prevailed during the beginning of 2013. In February there was a change in weather to a high pressure situation with northeasterly winds, and the water levels along the Swedish coast fell. This situation continued until April when the high pressure moved away and water levels again became normal. During summer, due to stable air pressure and weak winds, water levels were normal. A stable, high pressure, situation during the beginning of autumn caused relatively low water levels. On October 28 the storm Simone hit the west coast and water levels rose quickly to high above normal. Southwesterly winds prevailed during autumn which caused the water levels to rise along the Swedish coast. High water levels prevailed at the end of the year. However, the long period during late winter/early spring, with high pressure situation and northeasterly winds, caused the means of sea levels for 2013 to be somewhat below normal at all stations, despite the stormy end of the year with high water levels.

Inflows to the Baltic

A minor inflow of 20 km³, through the Sound, to the Baltic took place in January. This inflow improved, to some extent, the oxygen conditions in the deep water of the southern Baltic Proper. Thereafter there was a continuous outflow, caused by long-lasting high pressure and north-easterly winds. The accumulated outflow in March was the highest since 1977. At the end of August there was another inflow of 15 km³ through the Sound. During the storm Simone, at the end of October, and during the following weeks 40 km³

came in through the Sound. This was followed by a smaller inflow in the beginning of December, 29 km³. However, these inflows were too small to improve the oxygen conditions in the central Baltic Proper and only minor improvements were seen in the southern parts. Inflows have to exceed 100 km³ through the Sound, while at the same time approximately 200 km³ has to enter through the Belts, to be considered as major. The latest major inflow occurred during the winter 2003-2004 and before that during the winter 1993.

The cumulative inflow to the Baltic Sea in 2013 was 301 km³, while the cumulative outflow was 618 km³, both somewhat less than normal.

a. Skagerrak, Kattegat and the Sound

Surface water temperatures in Skagerrak and Kattegat were normal for most of the year, except for the spring months when it was well below normal. The low temperatures were linked to very low surface salinities. These low temperatures and salinities were due to the large outflow of Baltic water during spring, as mentioned above. Otherwise, surface salinities were normal in both Skagerrak and Kattegat for the rest of the year.

During the first months, in connection with the large Baltic outflow, both phosphate and silicate showed clearly enhanced values, but for the rest of the year all nutrients were at normal levels.

The lowest oxygen concentration in the bottom water was measured in the end of September, at the station Anholt E in the southern part of Kattegat, 2.18 ml/l, corresponding to a saturation of 33%. In the open Skagerrak there is normally no shortage of oxygen in the deep water. The lowest value in 2013 was found at the station Släggö, in the mouth of the Gullmar fjord, where concentrations fell to 3.24 ml/l in the beginning of December.

At most of the coastal stations in Kattegat, spring bloom occurred between the two sample occasions in March and April. The spring bloom in the open sea was, however, caught at the national stations Anholt E and N14 Falkenberg.

In the Skagerrak fjords, Koljöfjord and Havstensfjord, the spring bloom was ongoing during March and quite large amounts of diatoms and consequently high chlorophyll *a* concentrations were found. Usually spring blooms begins earlier at the more exposed Skagerrak stations and thereafter follow at the more sheltered fjord stations, but this year it seems to have been the other way around.

Low amounts of phytoplankton were observed throughout the year until autumn when a bloom of the dinoflagellate genus *Ceratium* occurred at all stations in the Kattegat and Skagerrak areas.

Toxic species

The findings of toxic species were scarce during 2013 and in the Kattegat none of the species with warning limits exceeded them. In the Skagerrak, the dinoflagellate genus *Dinophysis* exceeded the warning limits a few times. AST (Amnesic Shellfish Toxin) was detected for the first time in Swedish blue mussels during spring 2014.

b. Baltic Proper

Due to problems with permits to sample in foreign EEZ some stations were moved into Swedish waters and fewer visits than originally planned were made at the standard stations. Also, some station visits had to be cancelled due to Coast Guard rescue operations.

Surface water temperatures were at normal levels during the main part of the year, excluding the spring when they were slightly below mean for the season. Salinities in the surface layer were also normal, for most of the year. However, there was a freshening in the Eastern Gotland Basin during fall.

The concentrations of inorganic nitrogen were at typical levels throughout the year in the whole area. In the Arkona and Bornholm Basins, phosphate and silicate showed clearly elevated levels during the first months of the year. Also, there was a clear drop in silicate in November in these areas. For the rest of the year these nutrients were at normal levels. In the remainder of the Baltic Proper phosphate and silicate were at normal levels during the whole year.

Hydrogen sulphide was present in the bottom water of the Eastern-, Northern- and Western Gotland Basins throughout the year. Acute oxygen deficiency (<2ml/l) were measured in the bottom water of the Arkona Basin in late summer, in the Bornholm Basin from June to October and also, in the Hanö Bight and the south-eastern parts, for most of the year. As a result of the inflow in January, the oxygen concentration in the deep-water of the Arkona and Bornholm Basins was high in March and April. This inflow could also be seen in the south-east in June, when oxygen in the bottom water was as high as 4.62 ml/l. The inflow in October could be seen in the Arkona and Bornholm Basins during the two last months of the year.

The extreme oxygen condition in the Baltic Proper continues undiminished during 2013. The areal extent and the volume of anoxia have since the regime shift in 1999 been constantly elevated and there are no signs that inflows, weakening of the stratification or other factors have improved the oxygen conditions in the central deeper parts. Anoxic conditions affected ~15 % of the bottom areas in the Baltic Proper, including the Gulf of Finland and the Gulf of Riga, and ~30% suffered from hypoxia during the autumn of 2013. The largest areas of anoxic conditions, ~20 % were found in 2011.

The spring bloom occurred somewhat later than usual in the Southern Baltic, in most of the other areas the spring bloom took place between two samplings occasions. In May the surface nutrients were more or less consumed.

Cyanobacteria

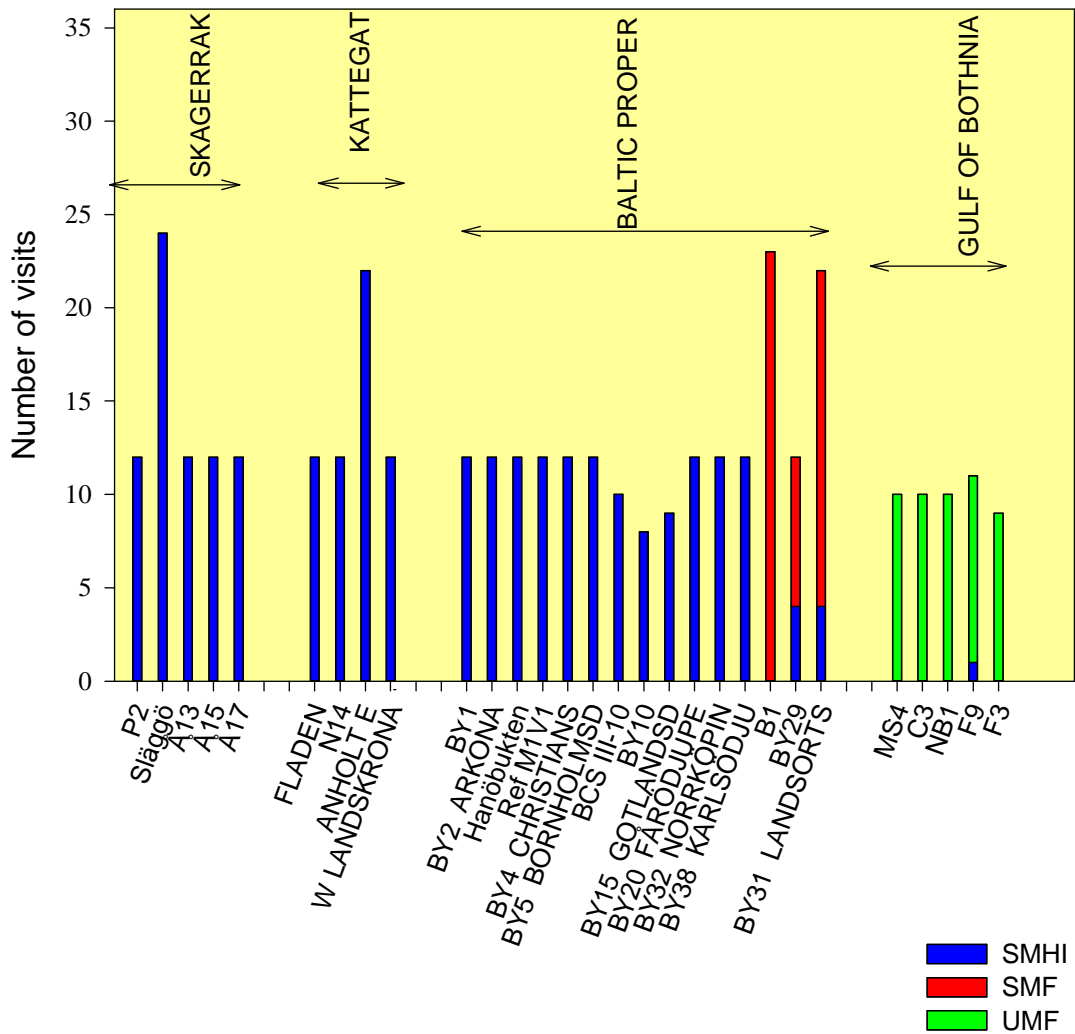
The mostly sunny weather with moderate winds in the Baltic region was favourable for the formation of surface blooms. The blooms started early and lasted throughout the summer. In all, the densest blooms were observed in the Bornholm Basin and west of the islands Dagö and Ösel.

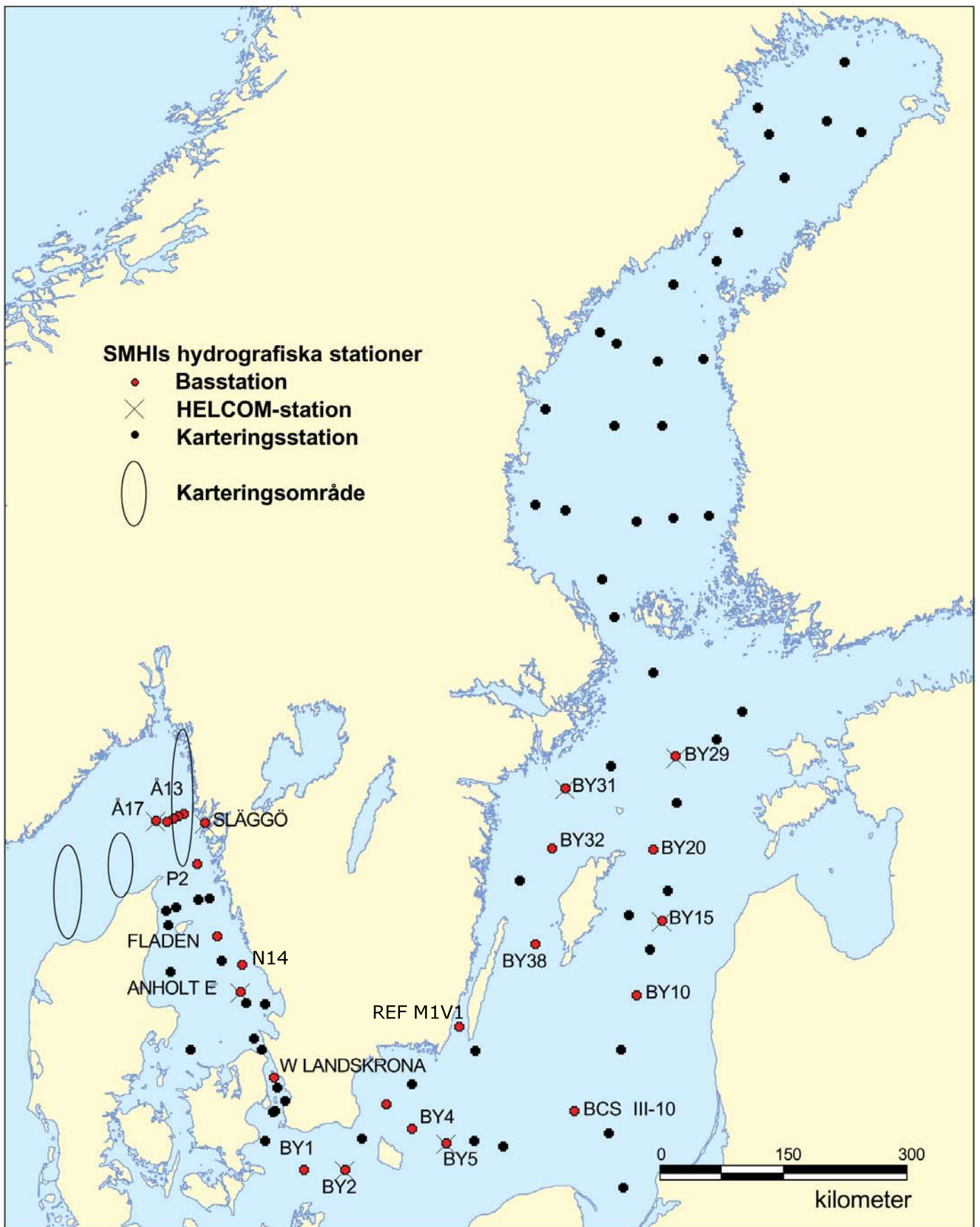
The sunny start of the summer gave a sea surface temperature of 16 °C by the end of June. The first surface blooms of cyanobacteria were observed in the eastern Bornholm Basin on June 21, by the end of the month satellite data showed extensive surface blooms in the Bornholm Basin and the Eastern Gotland Basin. The blooms developed rapidly, and covered large parts of the southern half of the Baltic Proper one week into July. The blooms also reached westwards to the western part of the Arkona Basin, which is rather unusual. Throughout July, surface blooms were observed in the Bornholm Basin and the Eastern Gotland Basin.

In the later part of July, blooms were established in the western Gulf of Finland and the central part of the Bothnian Sea. This is also where the blooms were most prominent in the first half of August, whereas the blooms in the south decreased. The bloom intensity diminished in the last two weeks of August, but cyanobacterial surface blooms were seen in the eastern part of the Northern Baltic Proper until August 30.

Number of visits at standard frequent stations

Standard frequent stations 2013

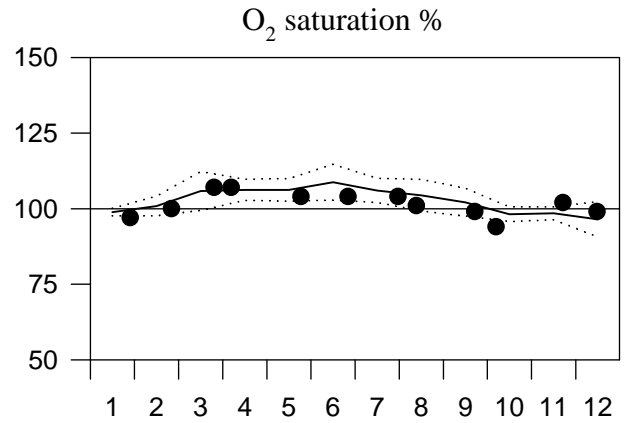
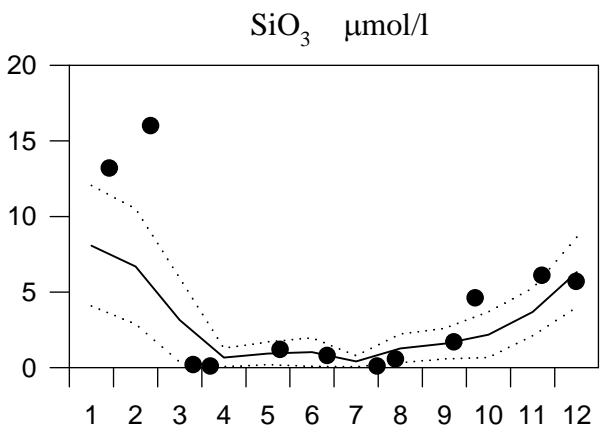
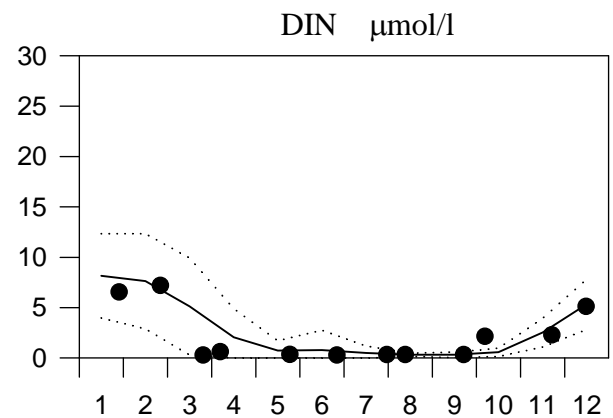
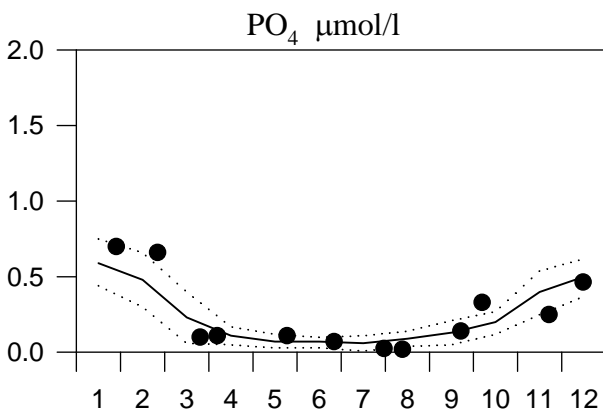
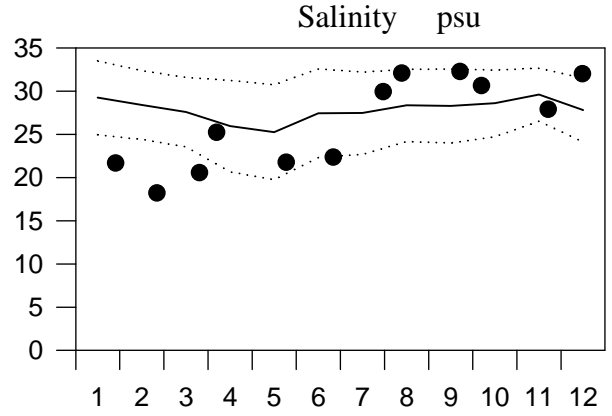
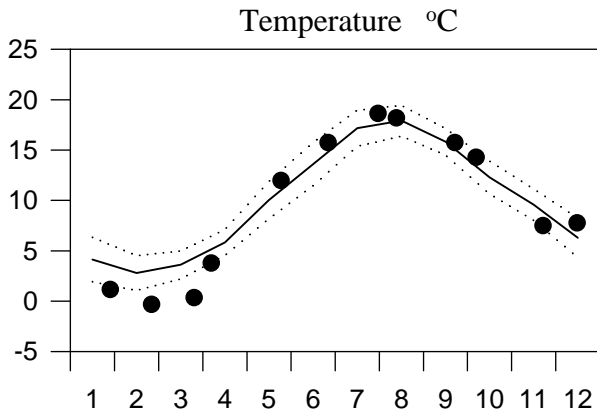




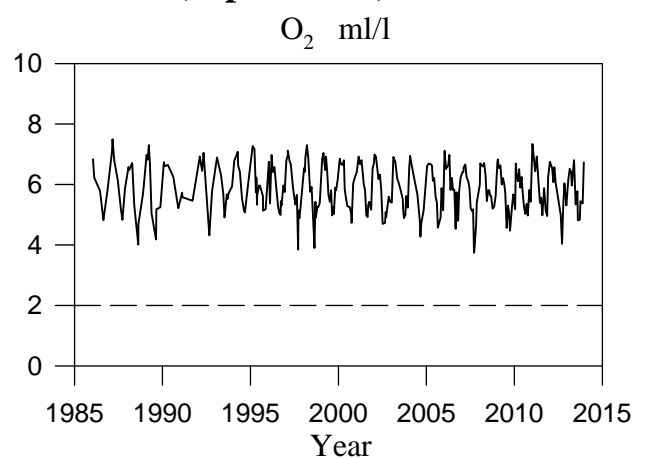
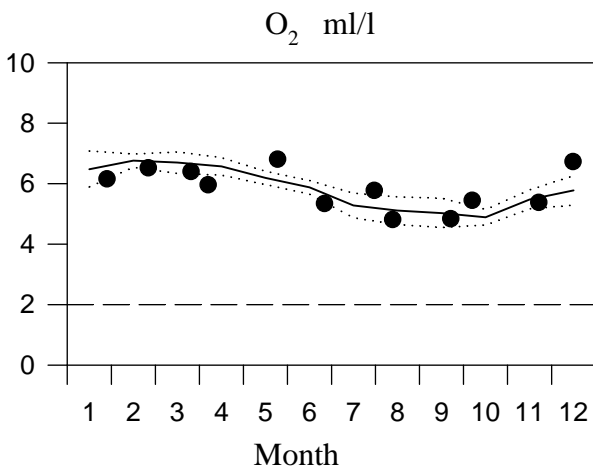
STATION P2 SURFACE WATER

Annual Cycles

— Mean 1996-2010 ····· St.Dev. ● 2013

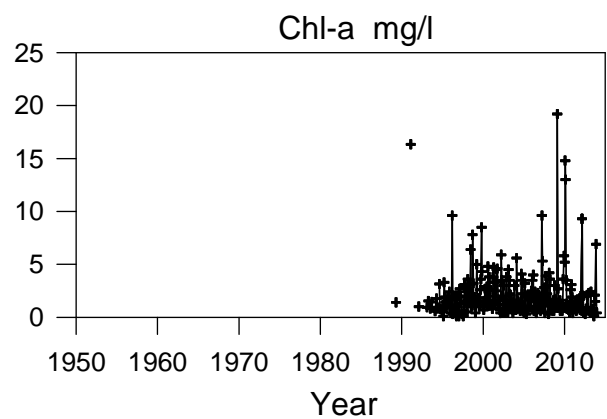
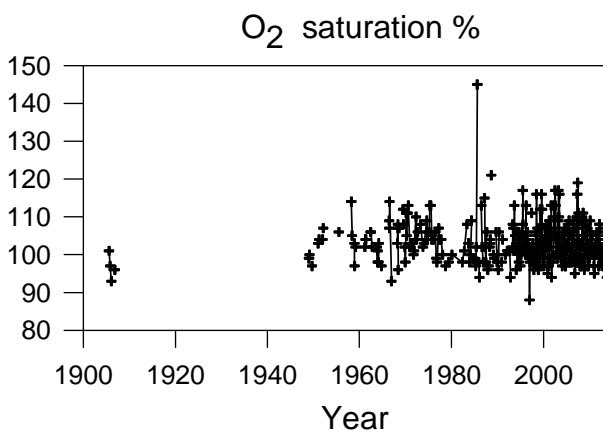
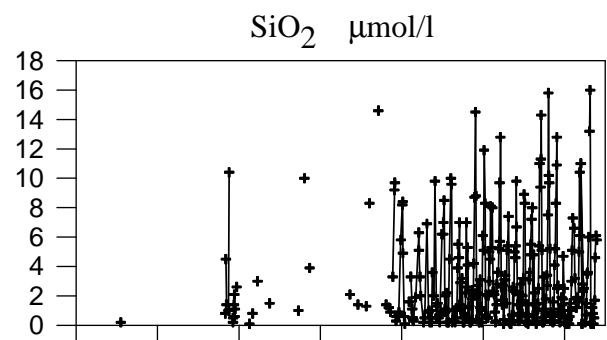
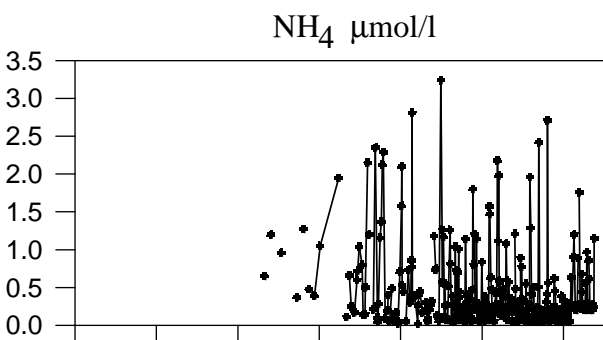
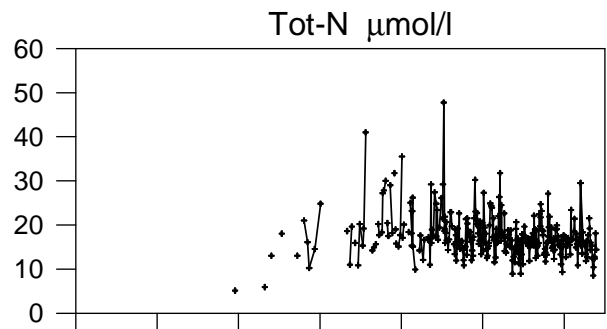
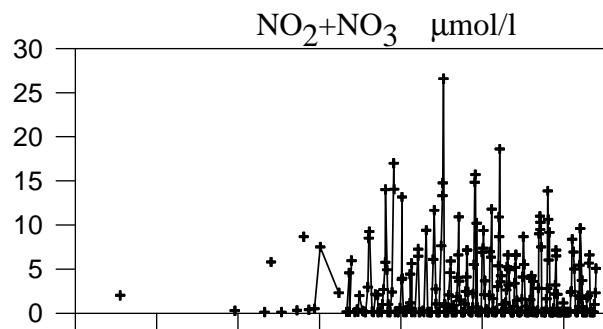
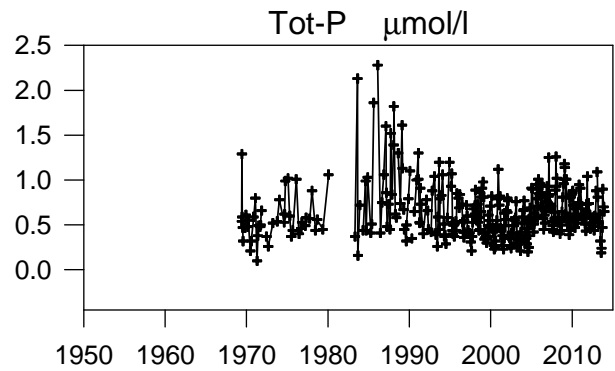
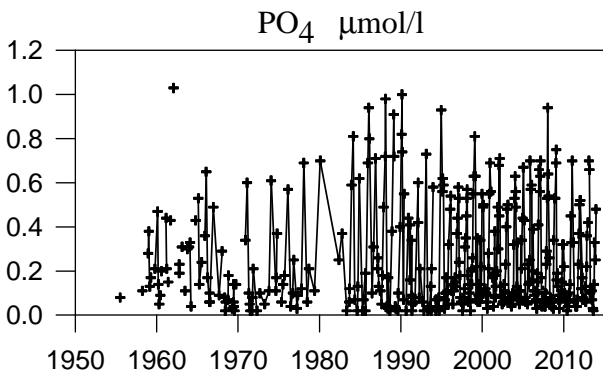
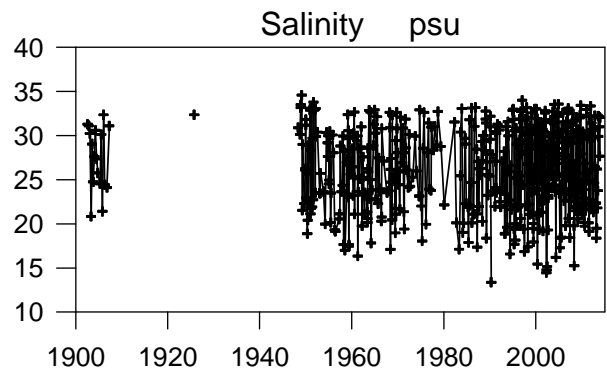
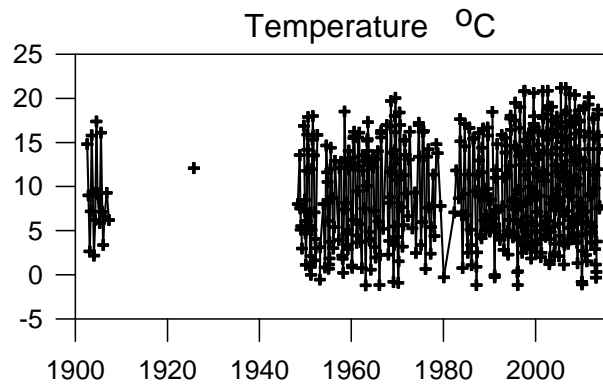


OXYGEN IN BOTTOM WATER (depth >75m)



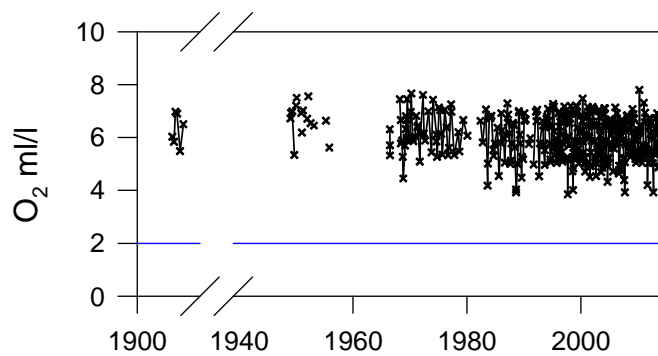
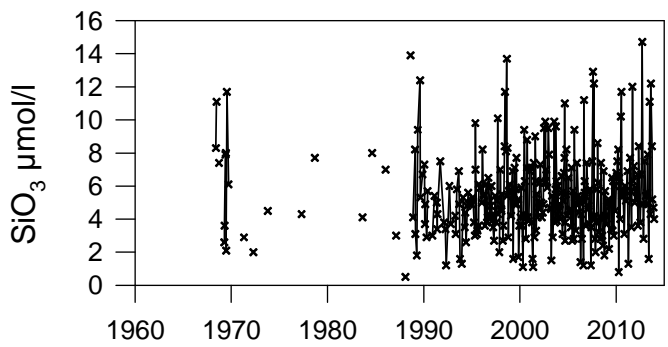
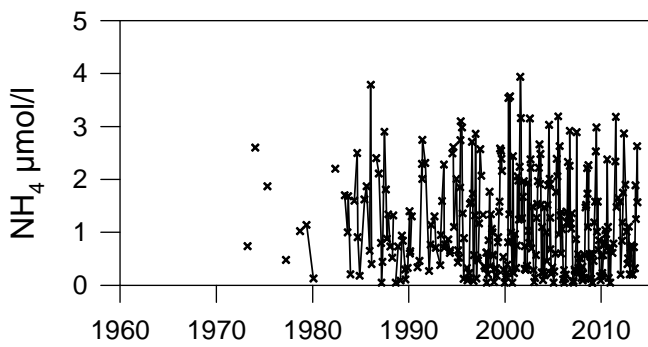
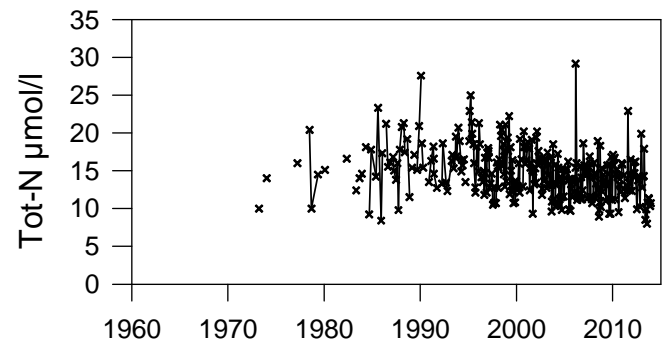
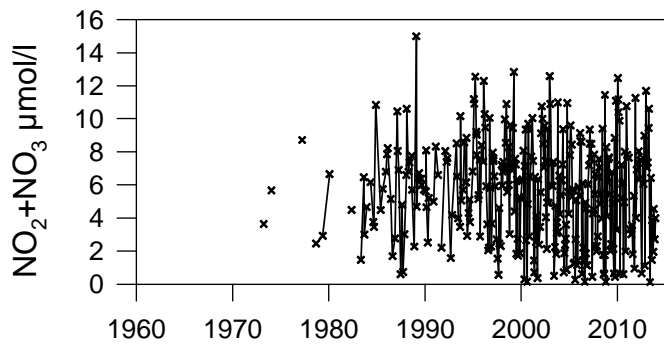
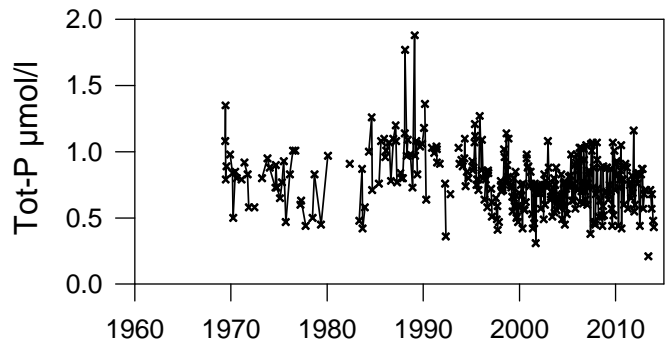
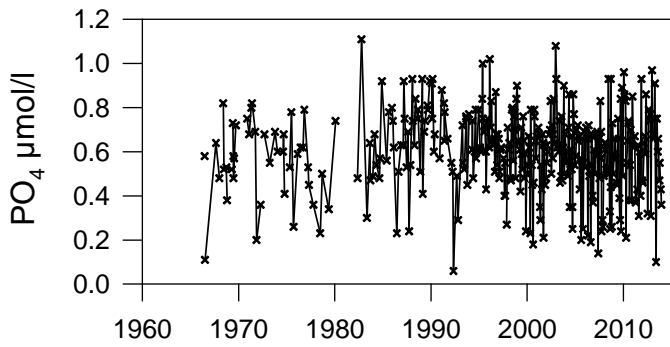
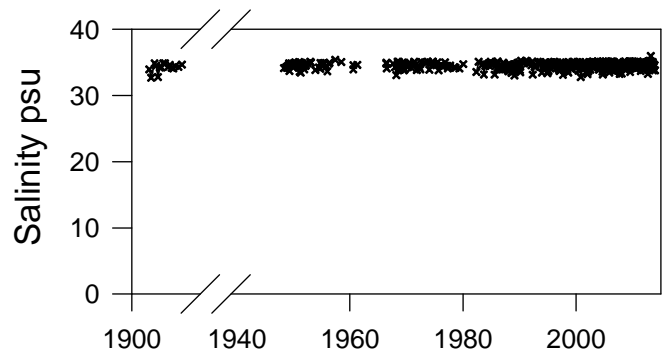
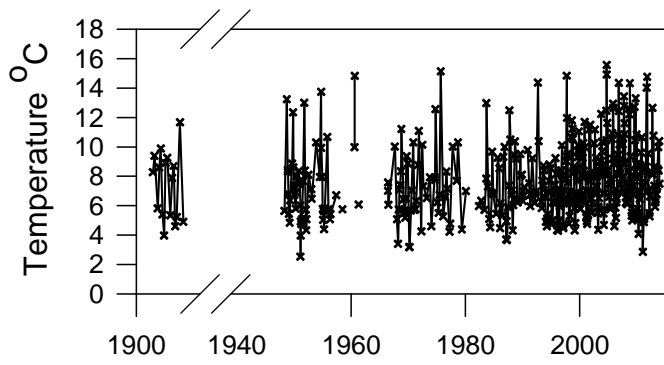


STATION P2 SURFACE WATER





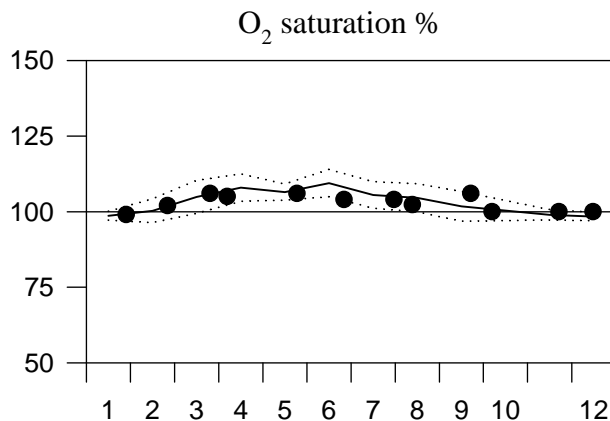
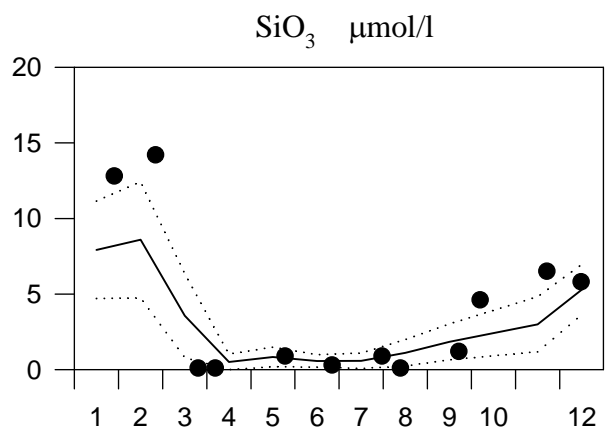
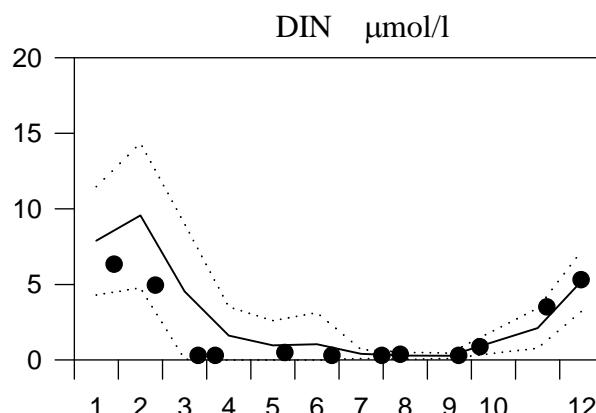
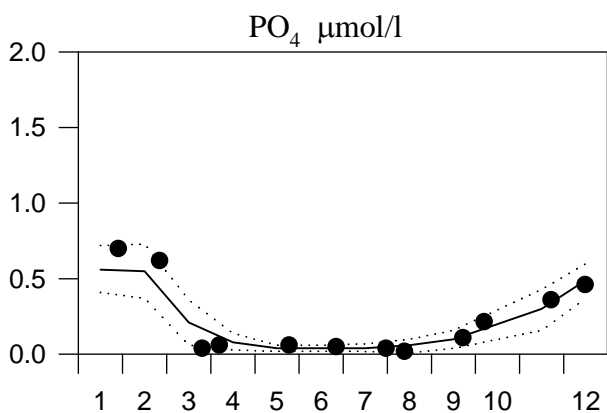
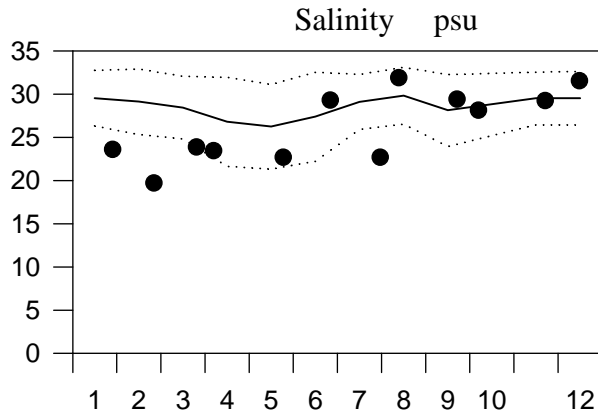
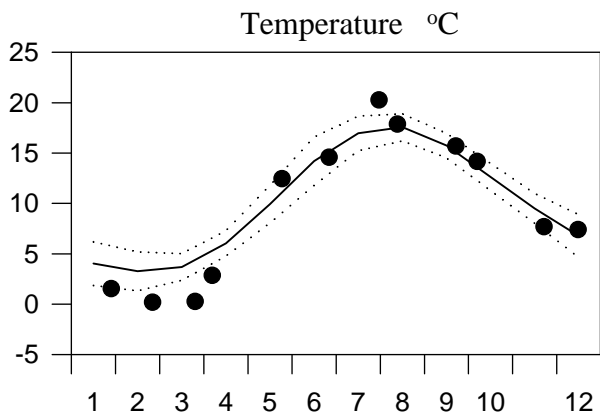
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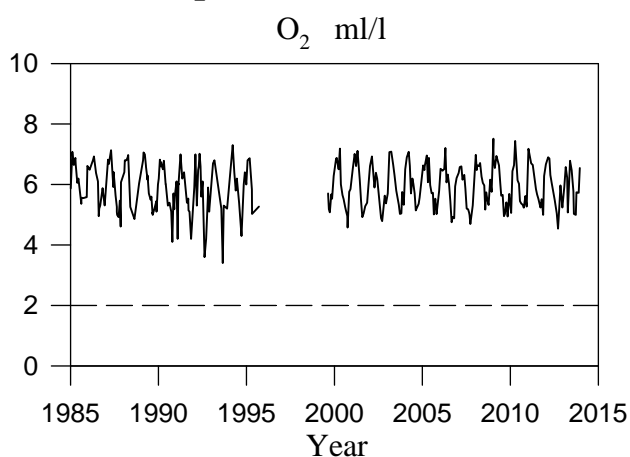
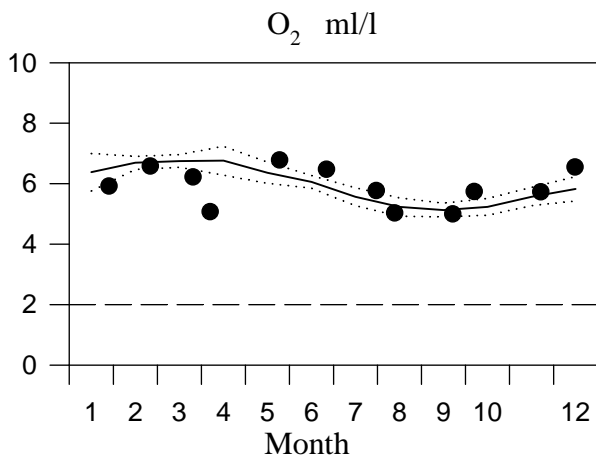
STATION Å13 SURFACE WATER

Annual Cycles

— Mean 1996-2010 ····· St.Dev. ● 2013

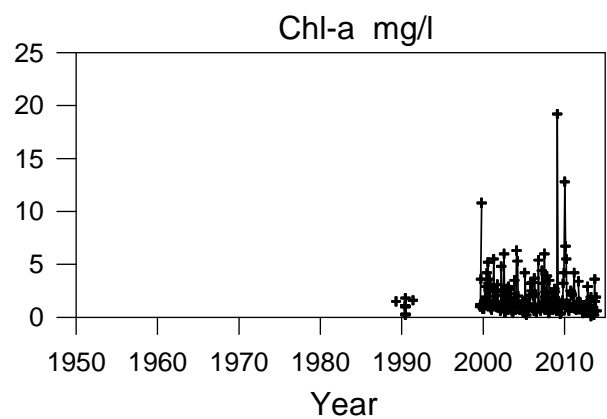
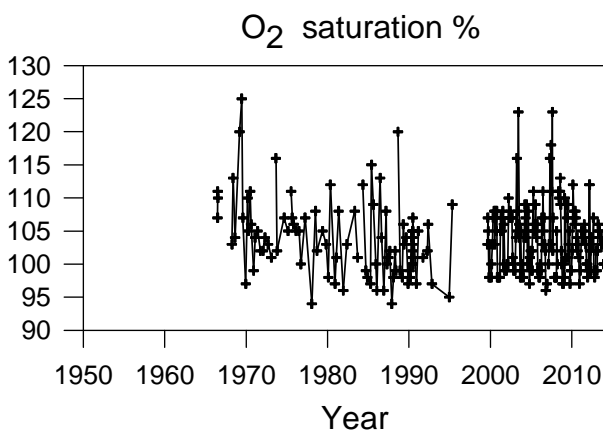
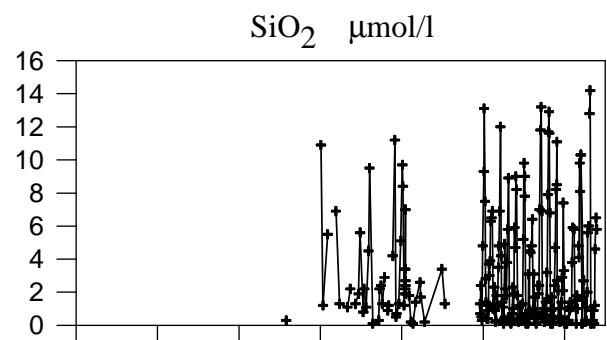
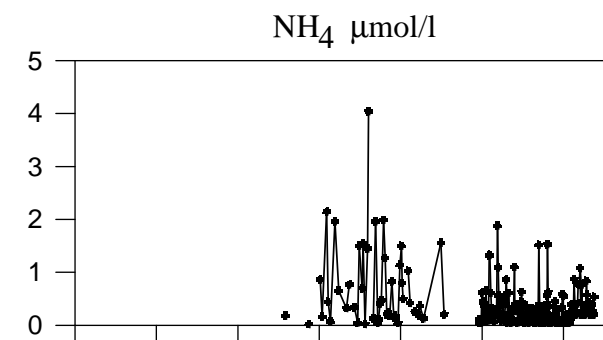
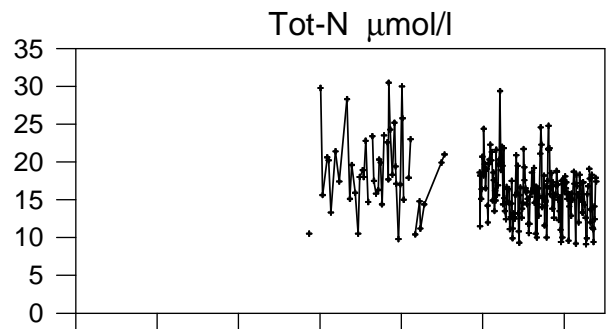
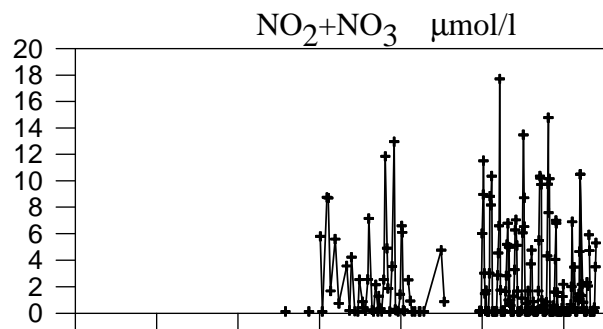
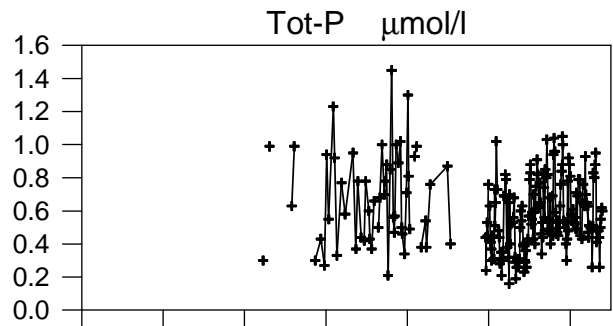
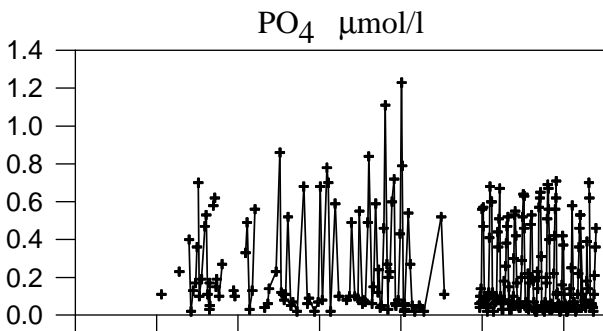
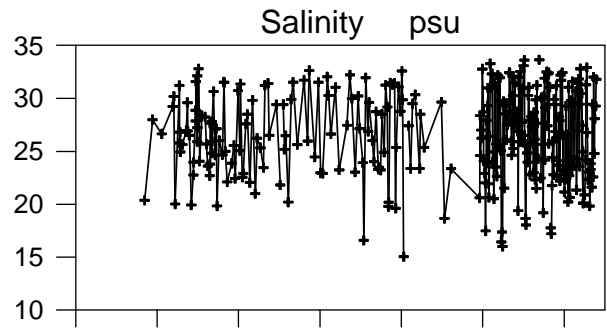
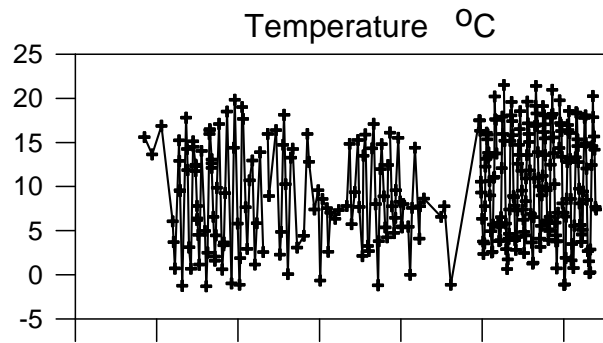


OXYGEN IN BOTTOM WATER (depth >=75m)



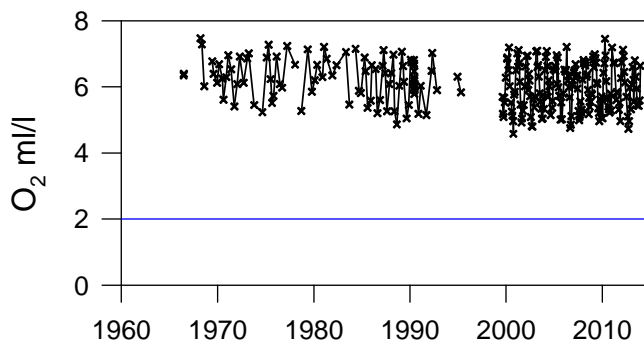
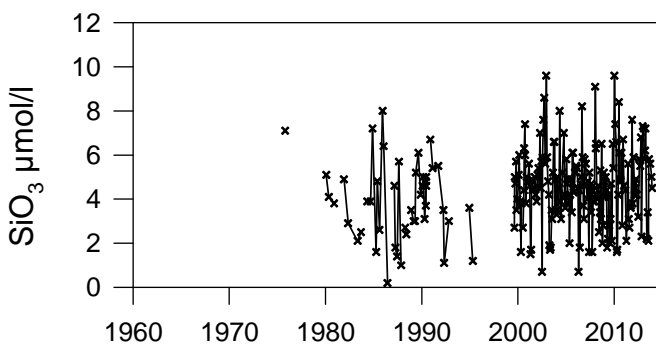
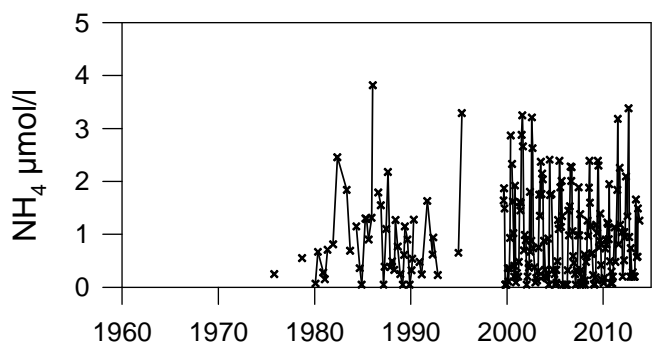
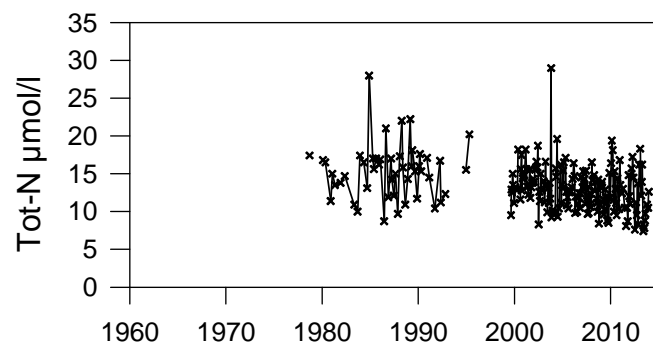
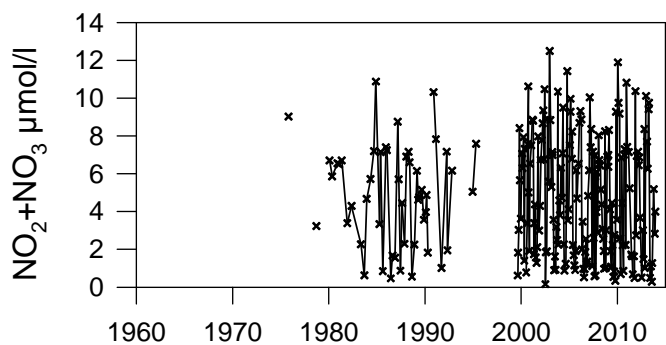
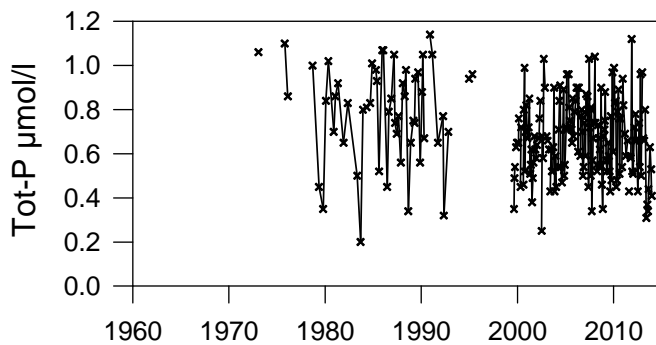
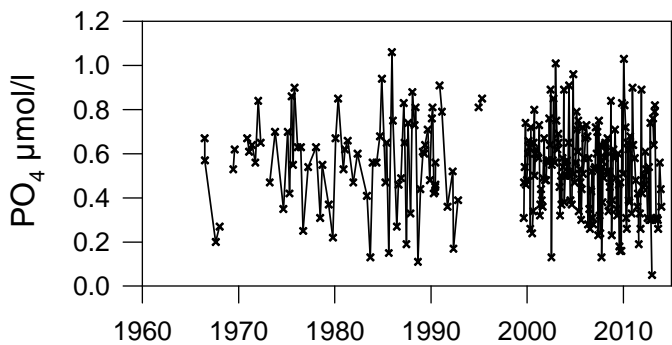
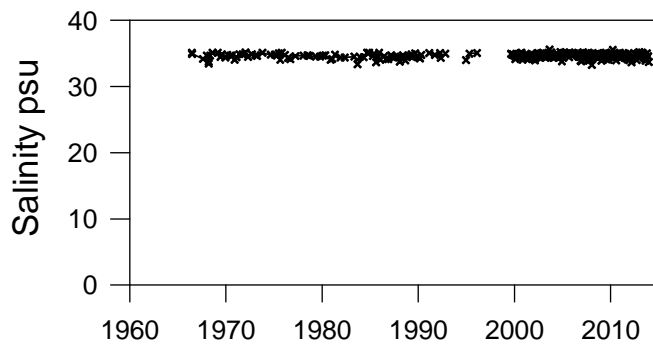
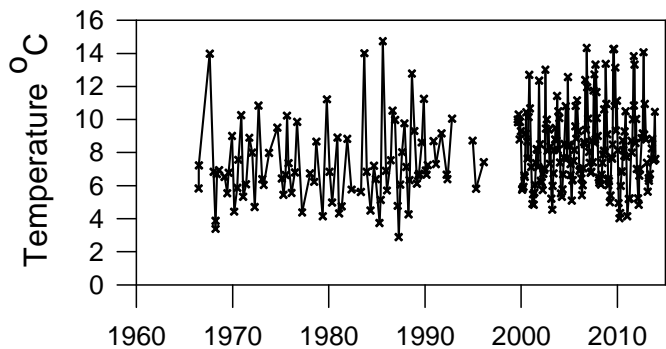


STATION Å13 SURFACE WATER





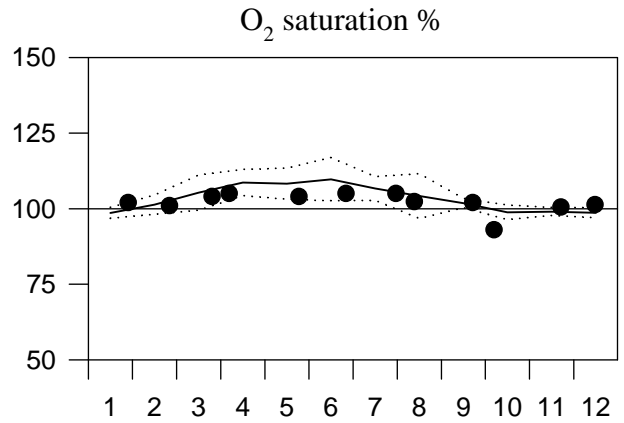
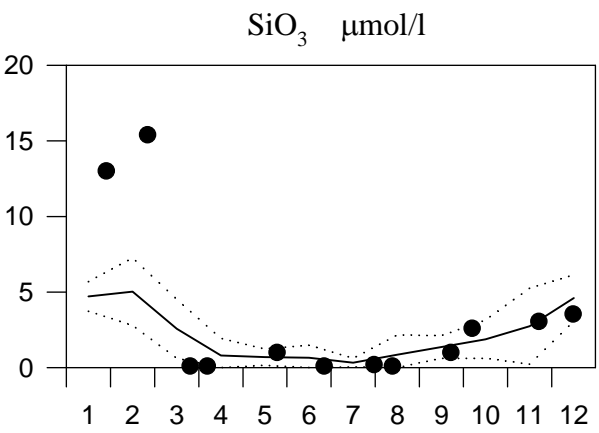
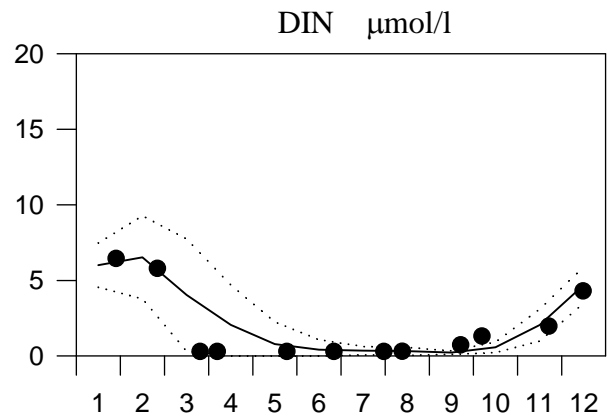
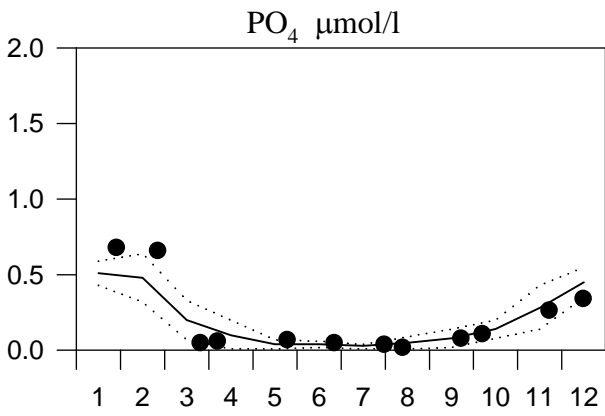
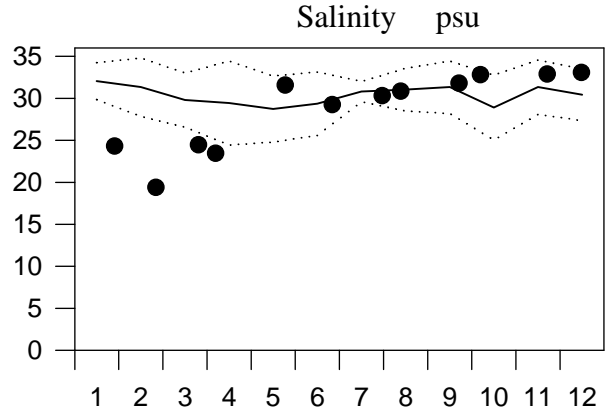
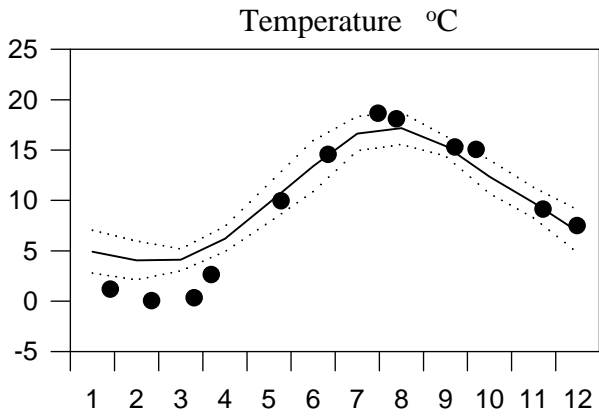
STATION Å13 DEEP WATER (75m)



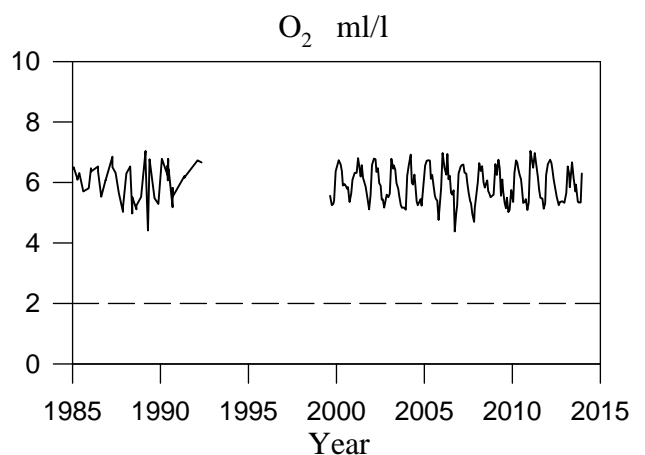
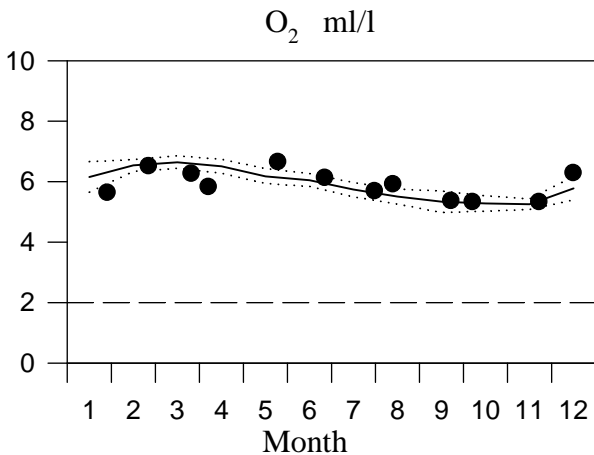
STATION Å15 SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2013

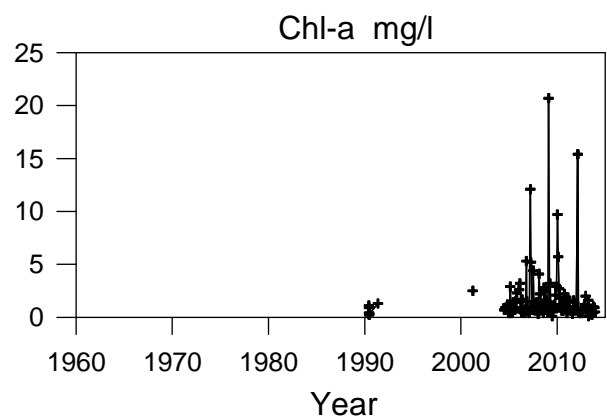
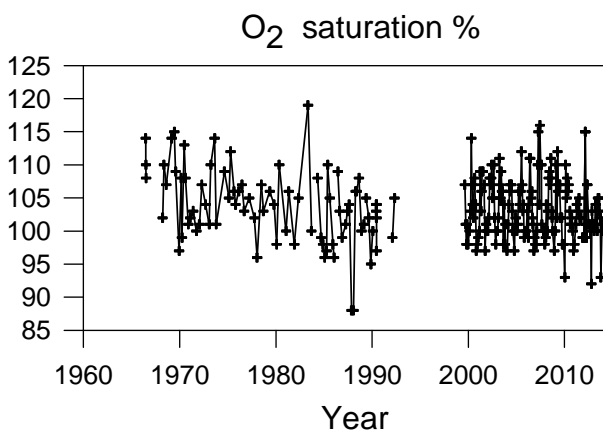
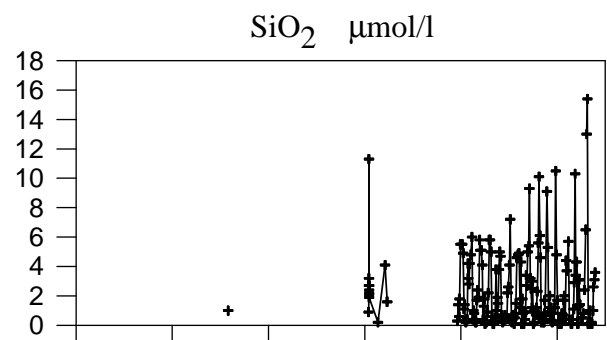
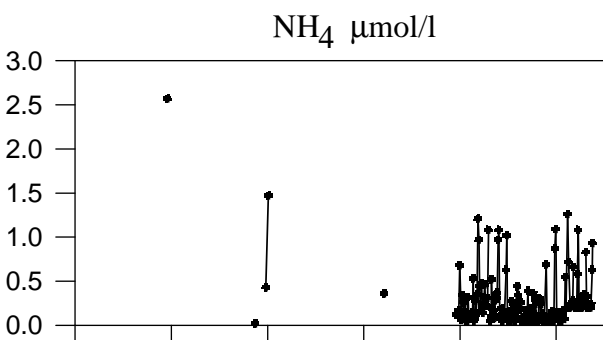
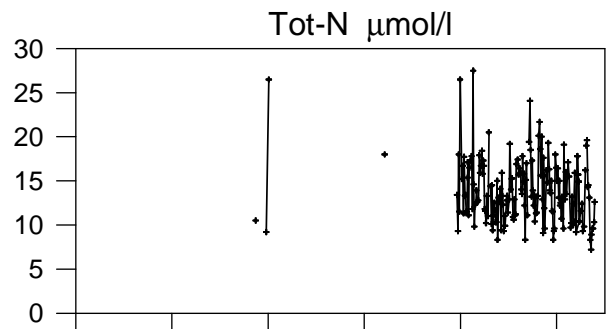
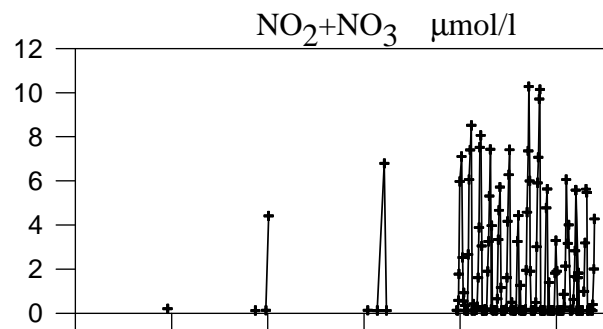
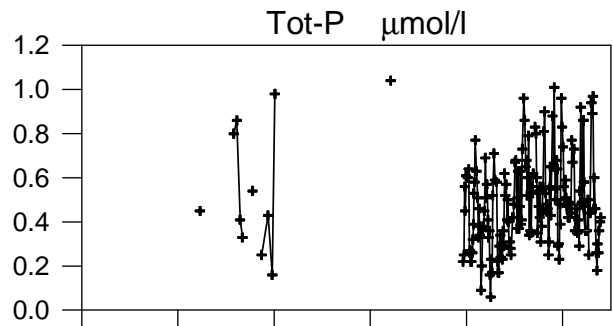
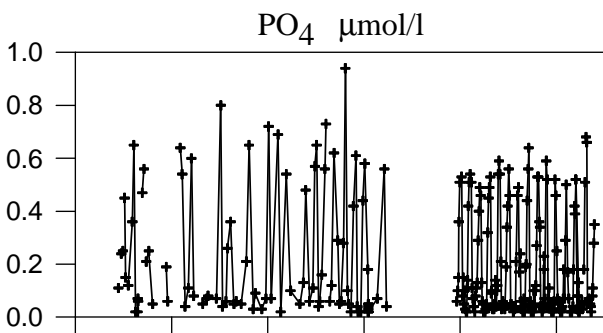
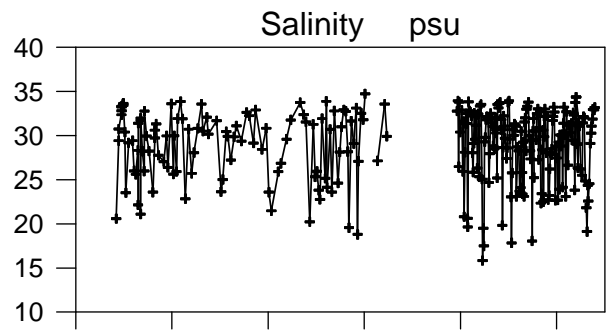
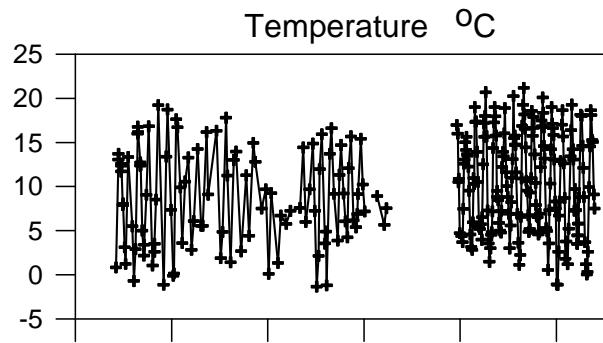


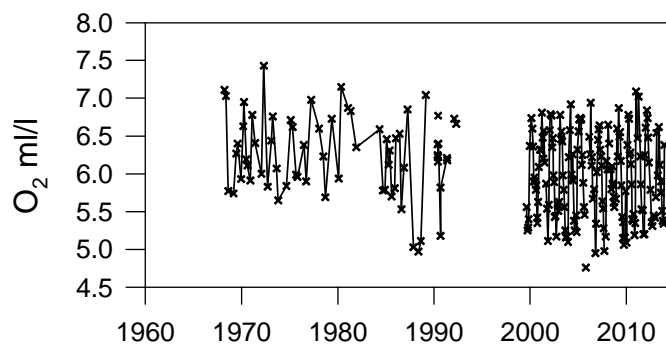
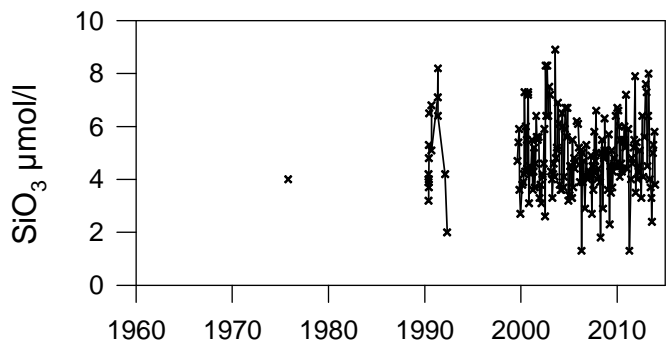
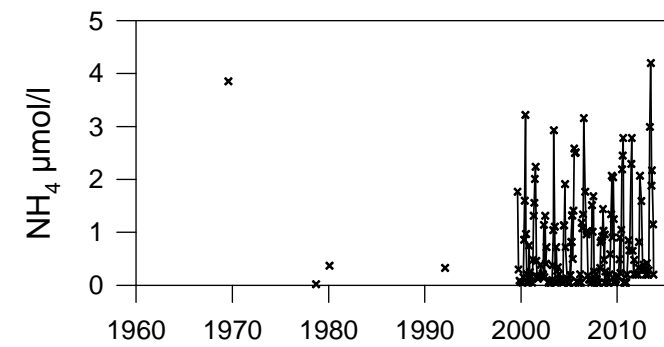
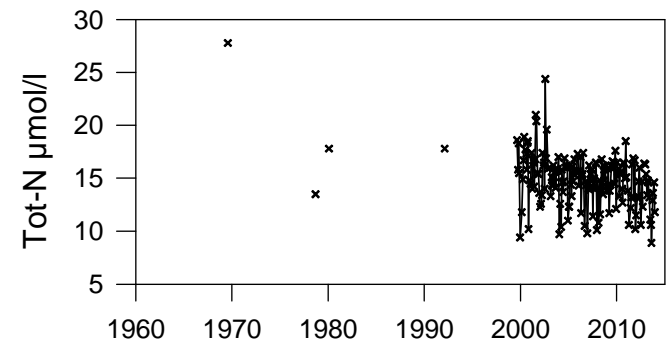
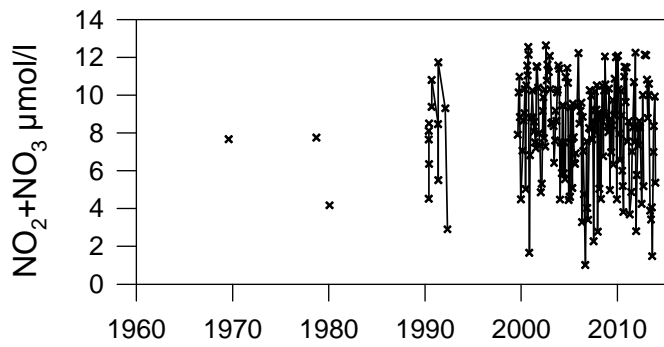
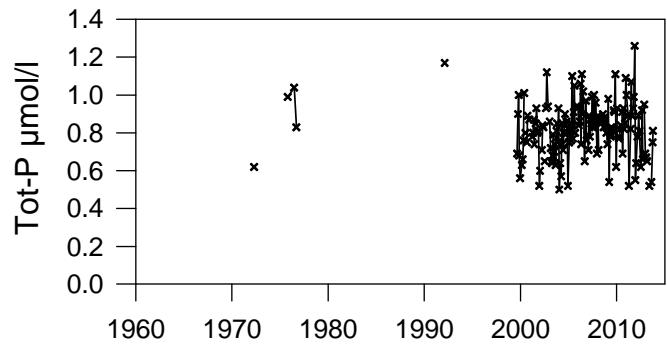
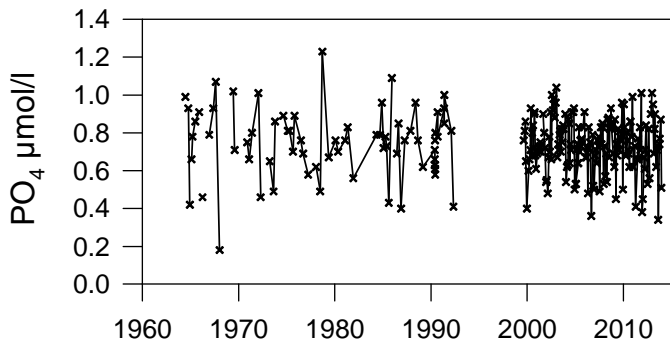
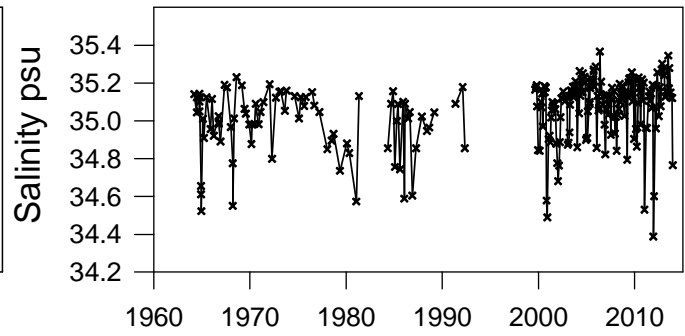
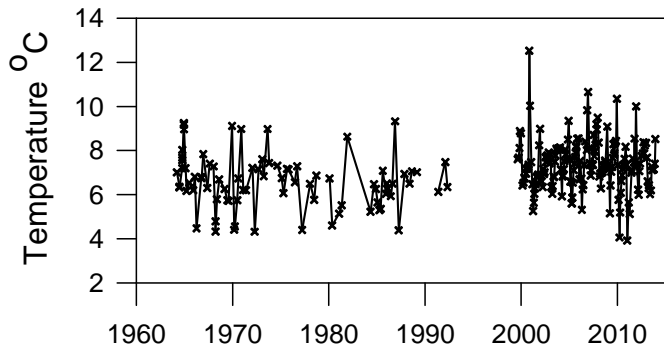
OXYGEN IN BOTTOM WATER (depth >=125m)





STATION Å15 SURFACE WATER

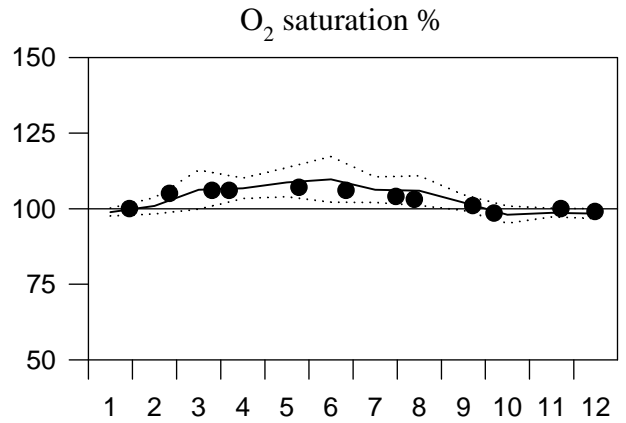
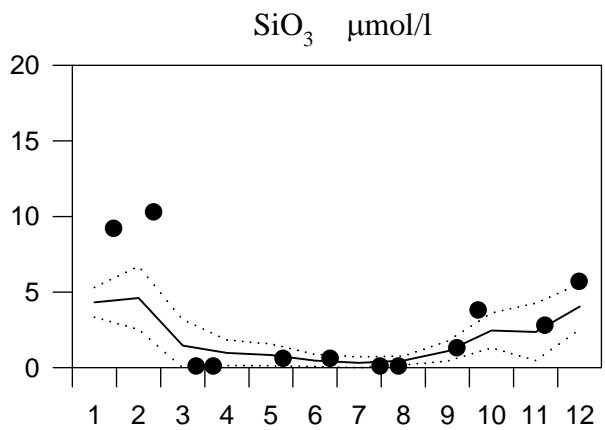
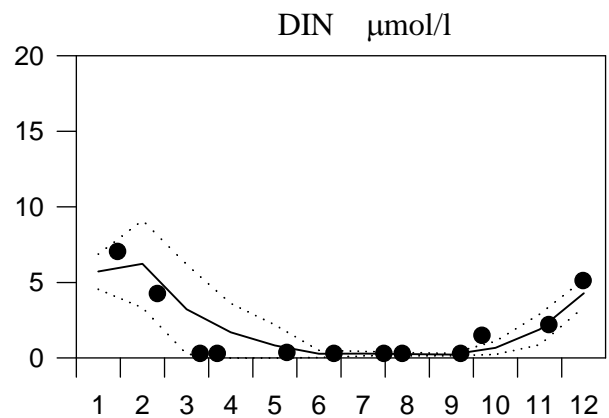
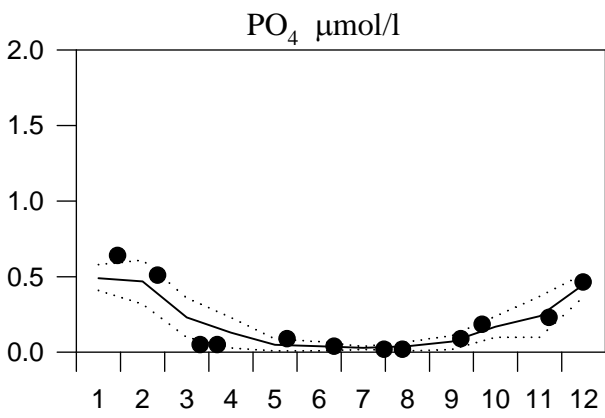
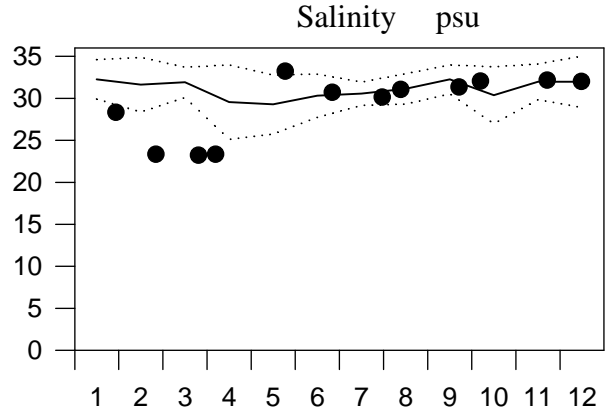
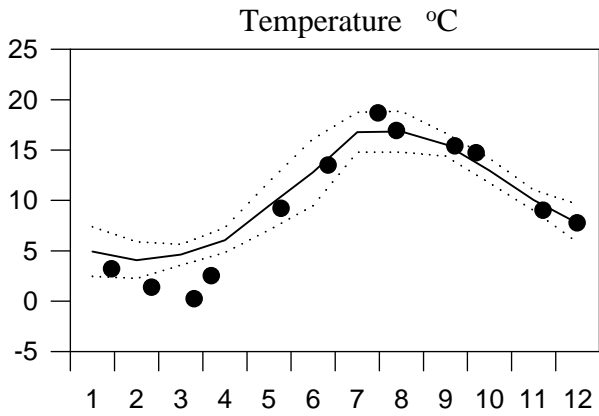




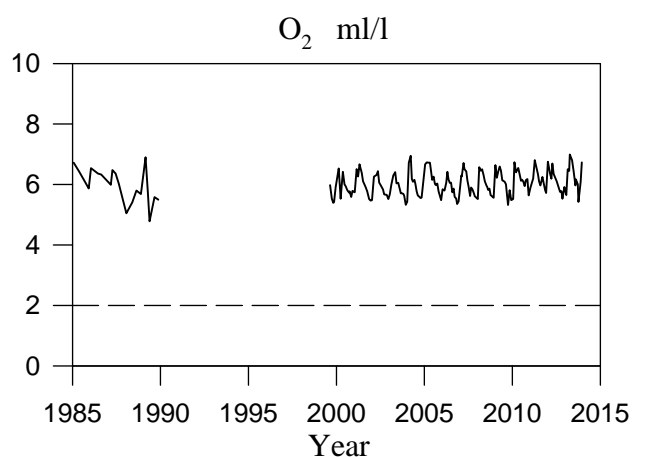
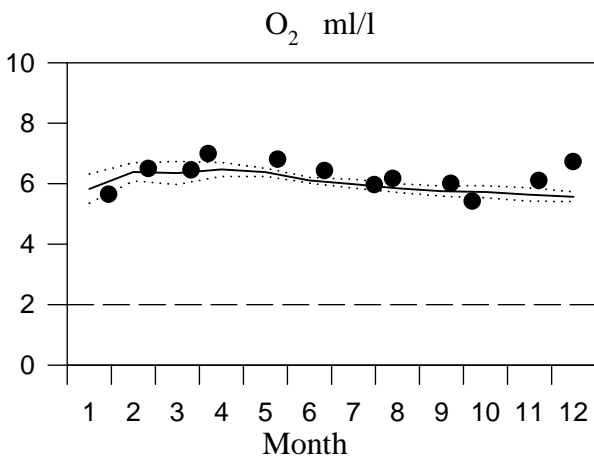
STATION Å17 SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2013

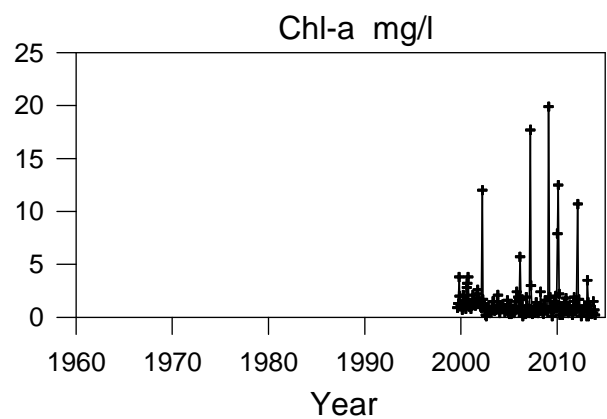
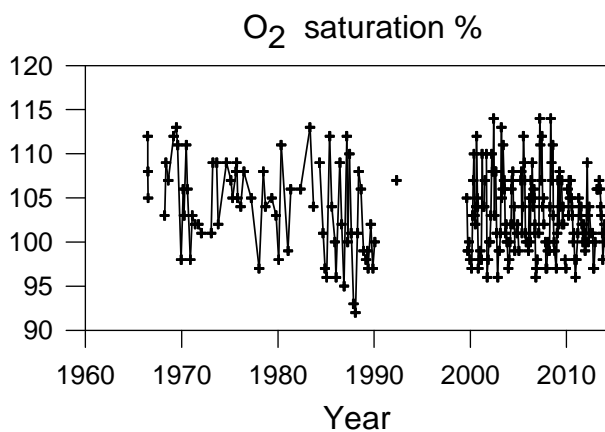
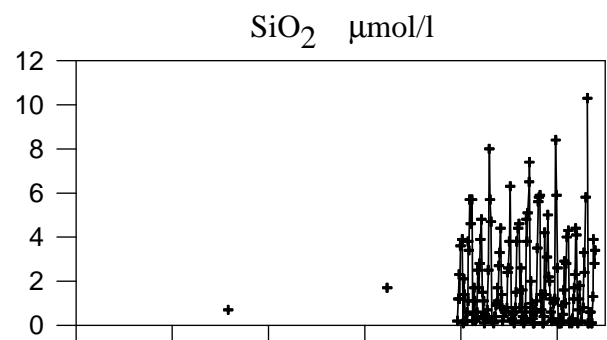
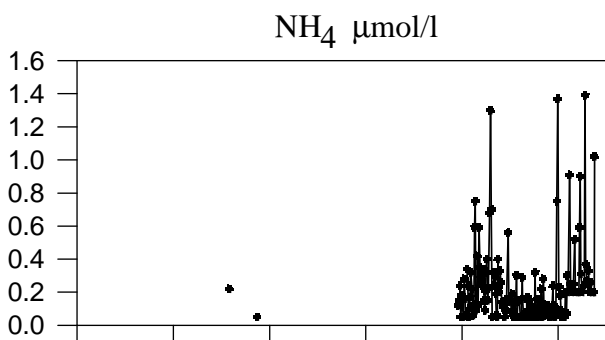
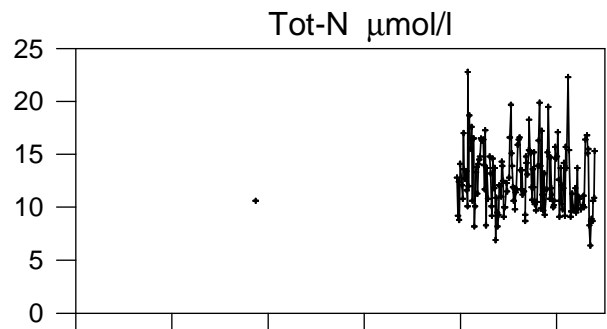
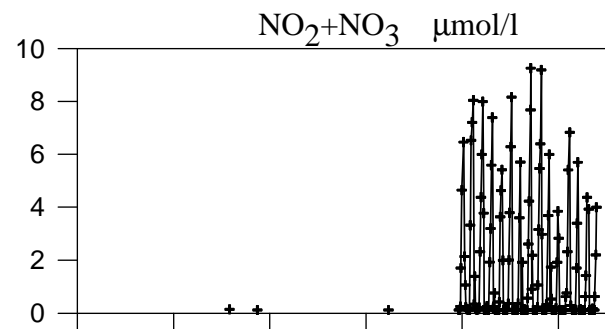
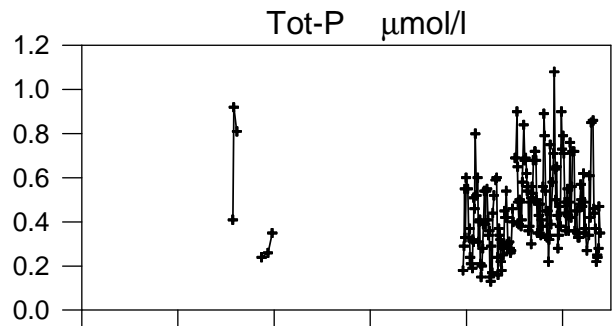
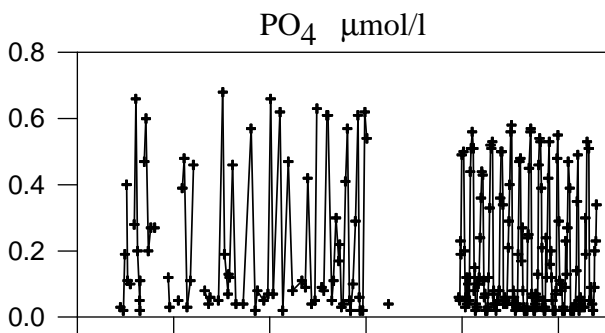
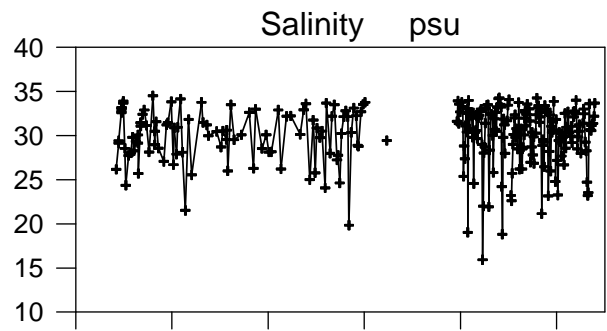
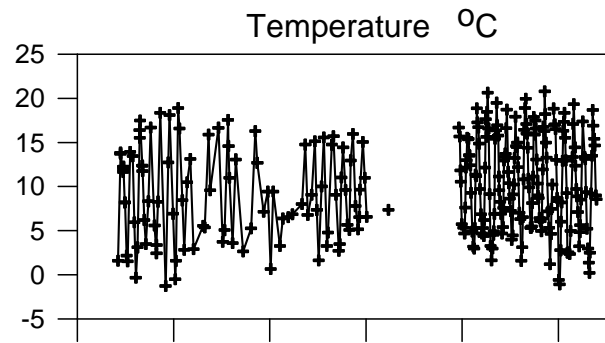


OXYGEN IN BOTTOM WATER (depth = 300m)



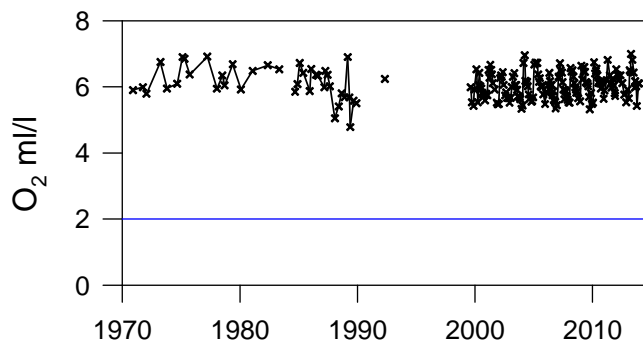
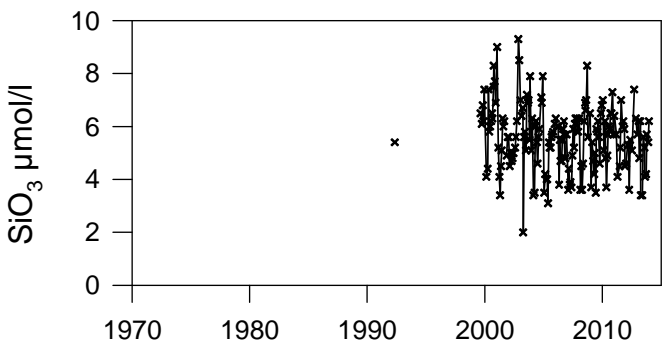
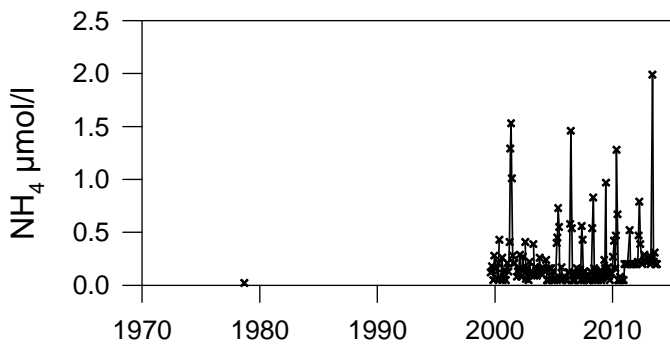
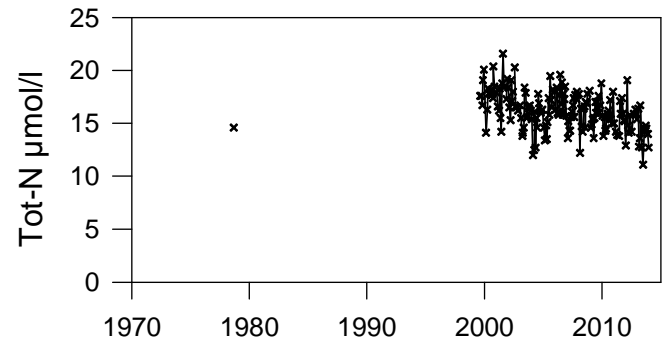
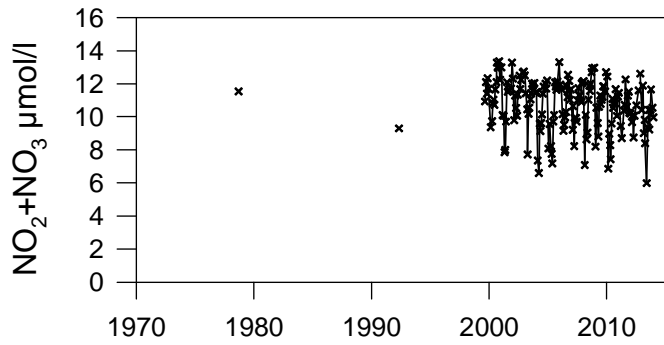
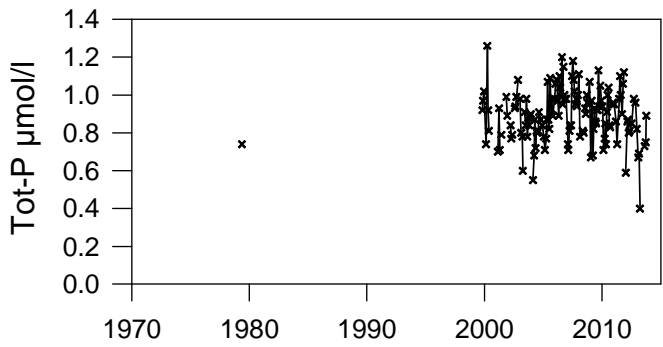
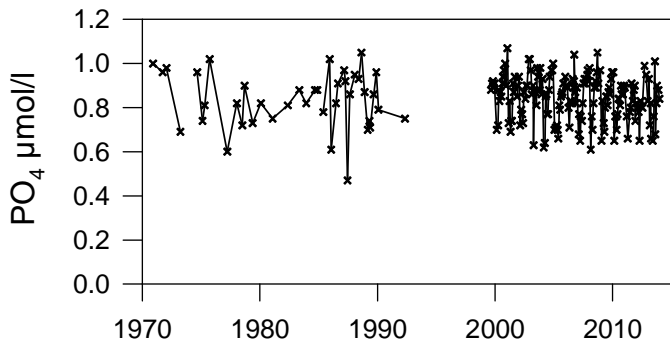
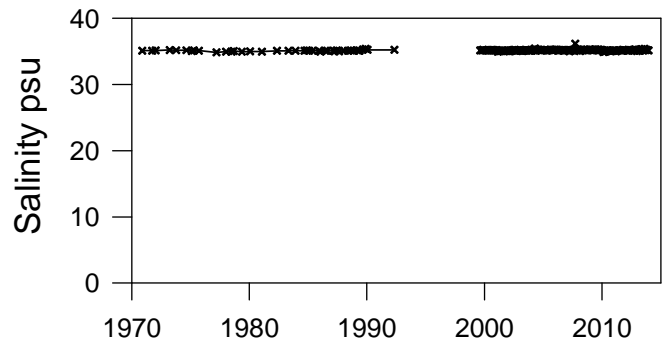
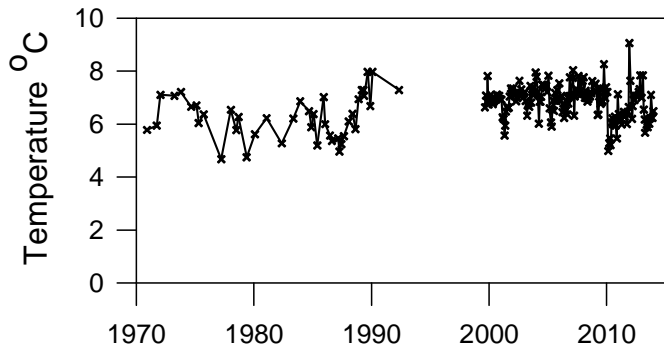


STATION Å17 SURFACE WATER





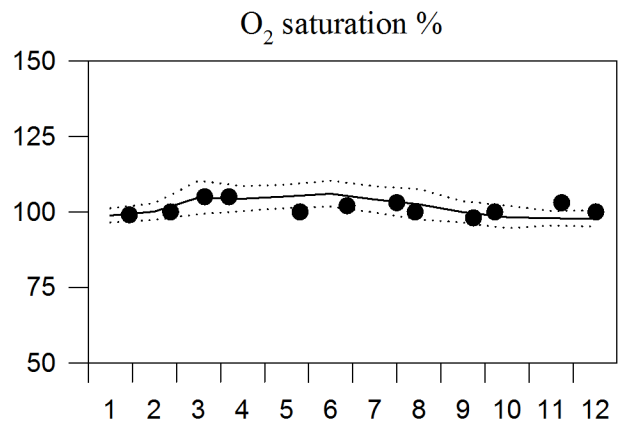
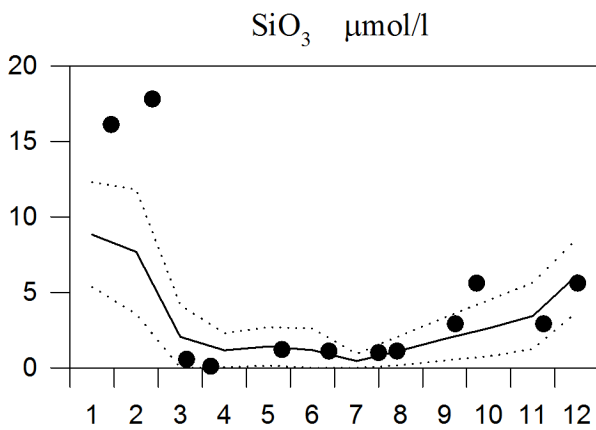
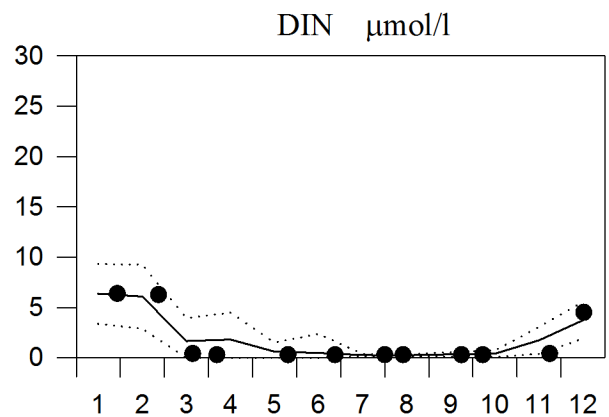
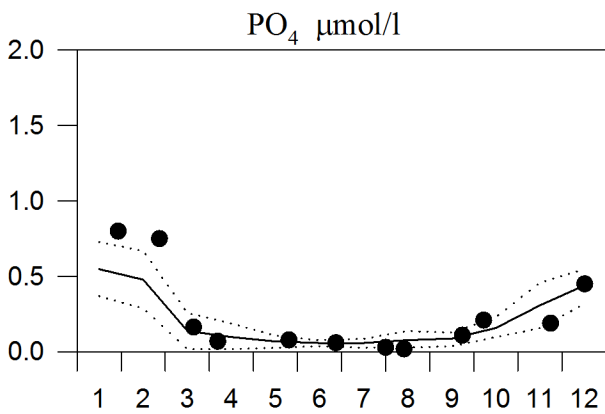
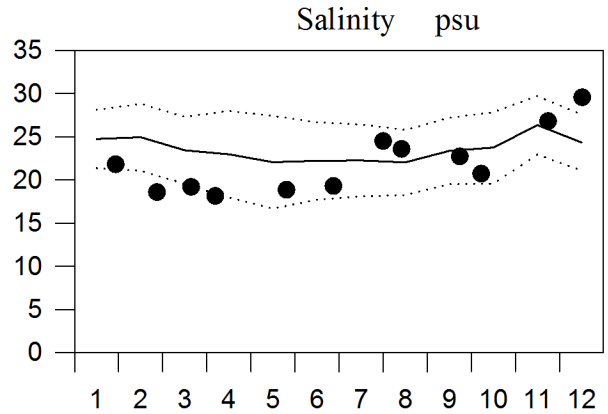
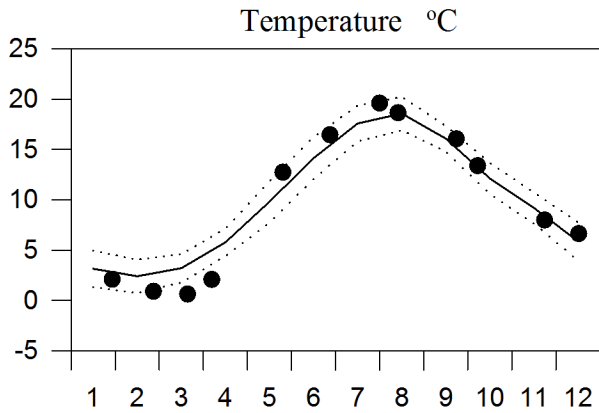
STATION Å17 DEEP WATER (300m)



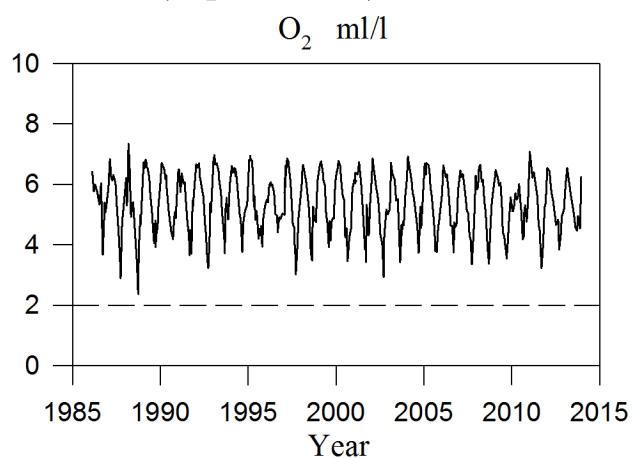
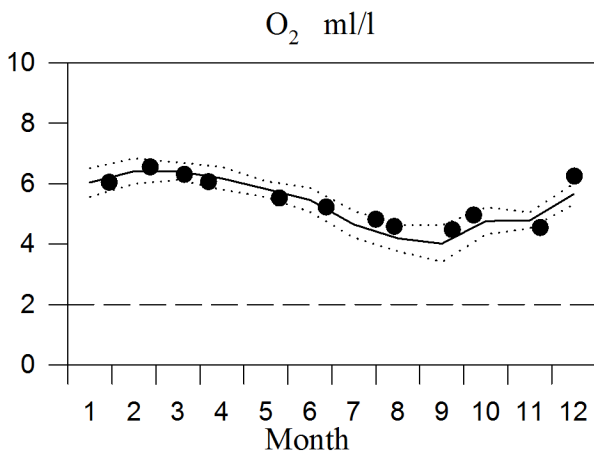
STATION FLADEN SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2013

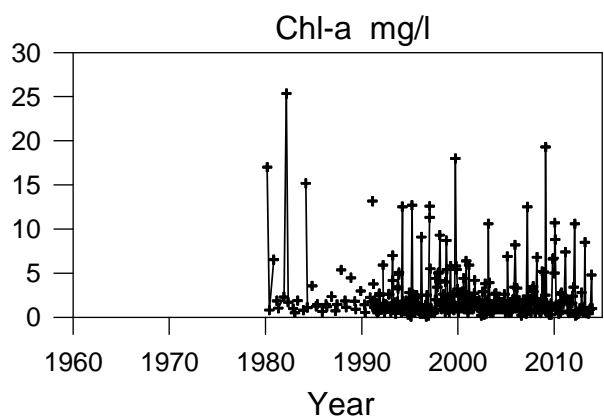
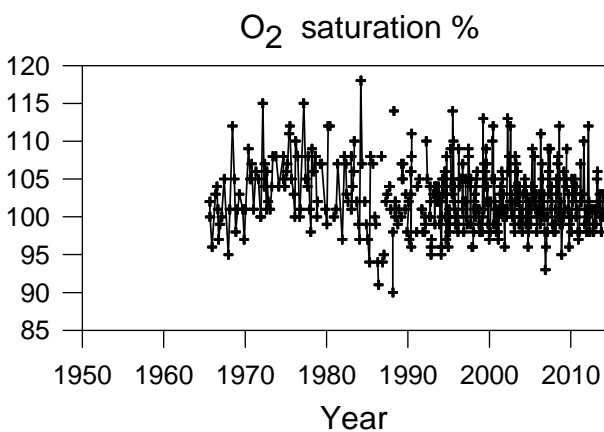
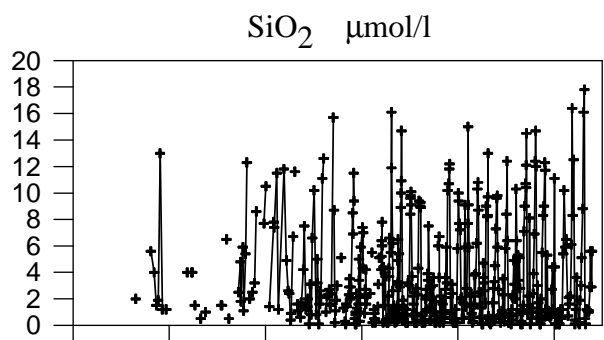
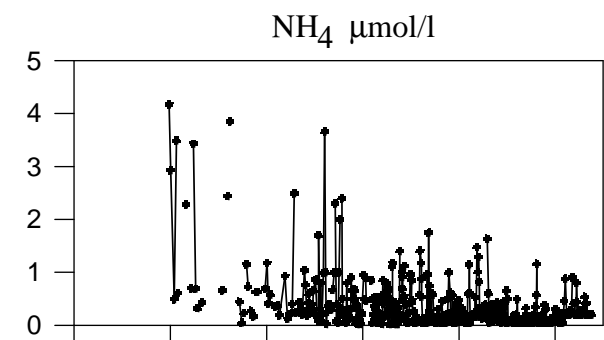
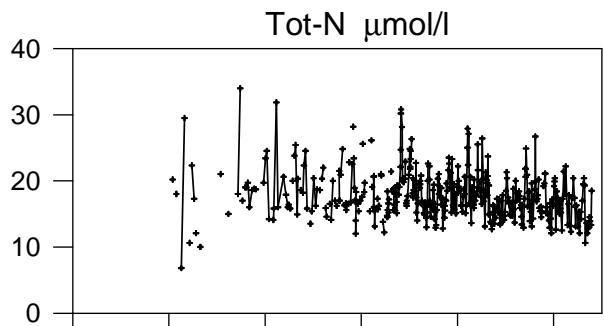
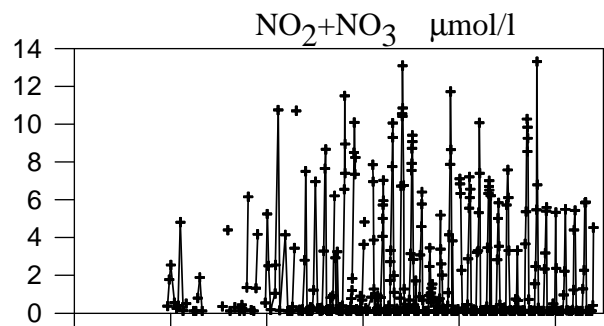
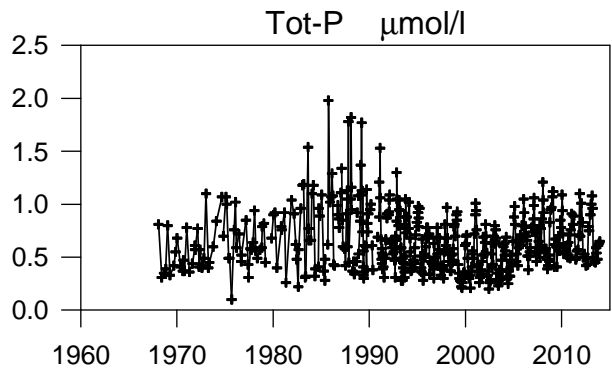
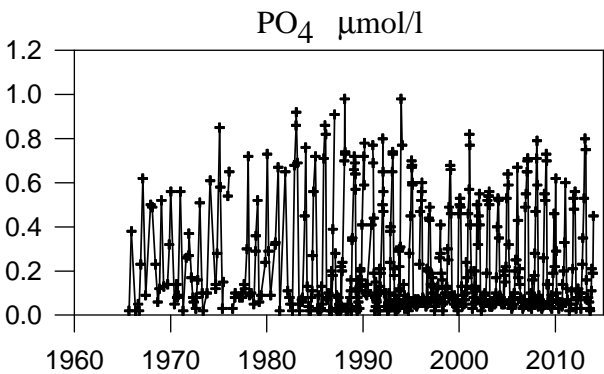
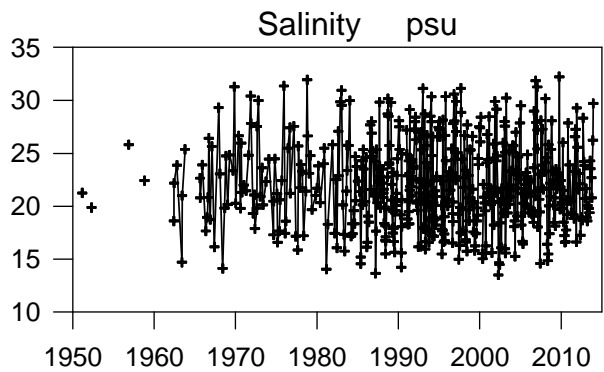
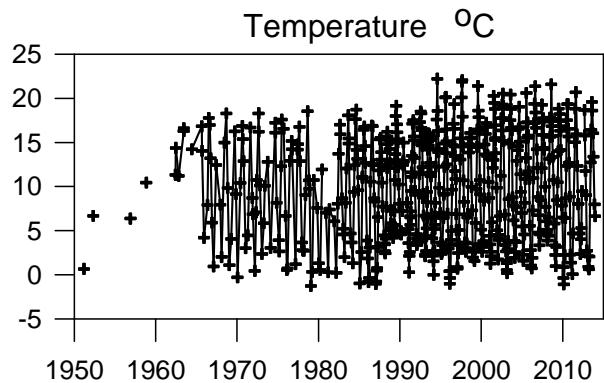


OXYGEN IN BOTTOM WATER (depth > 70m)



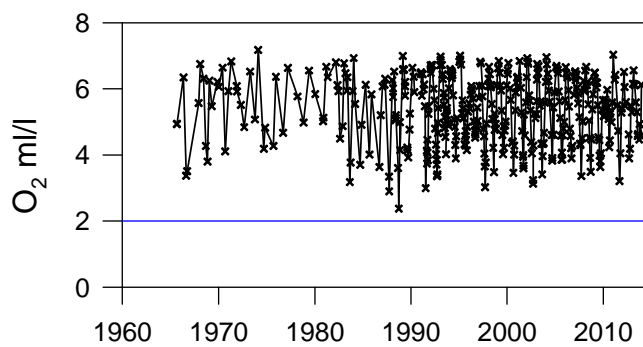
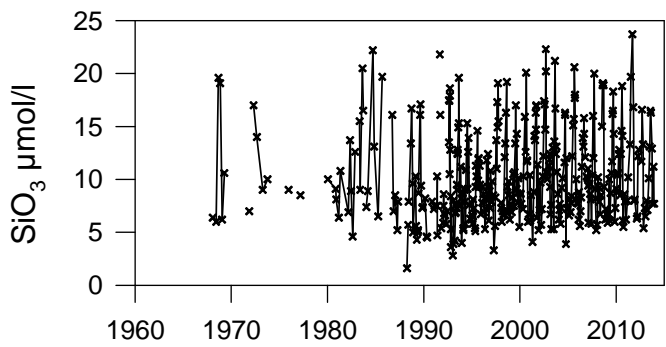
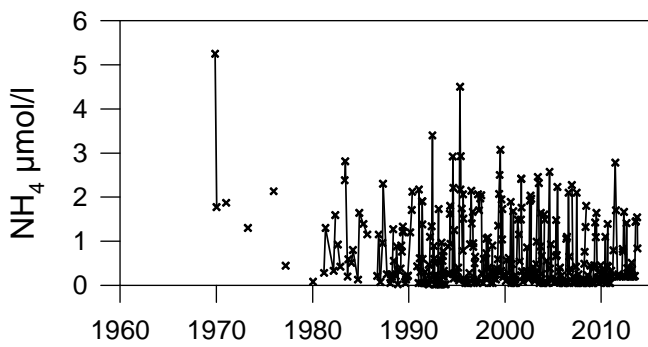
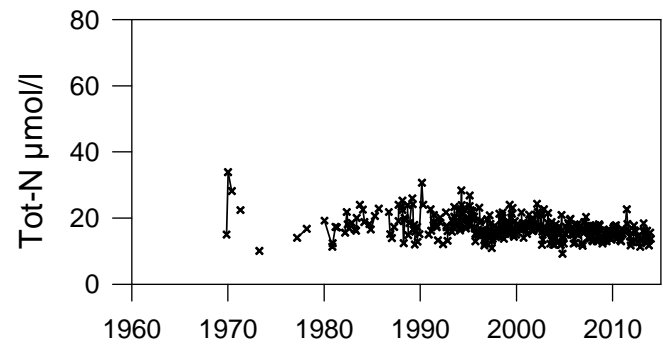
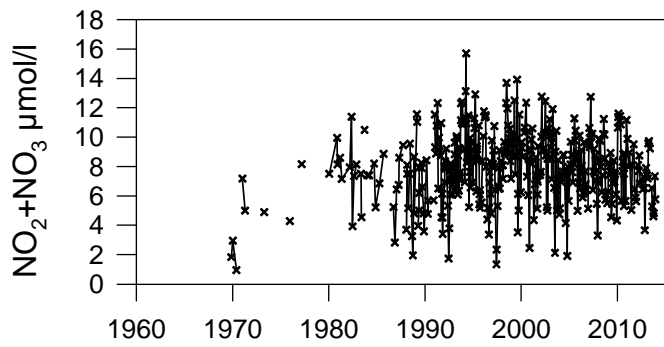
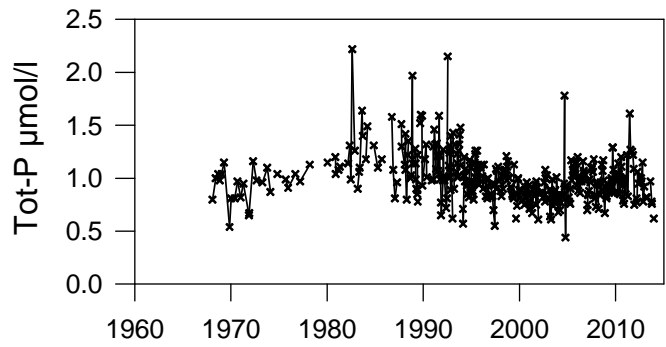
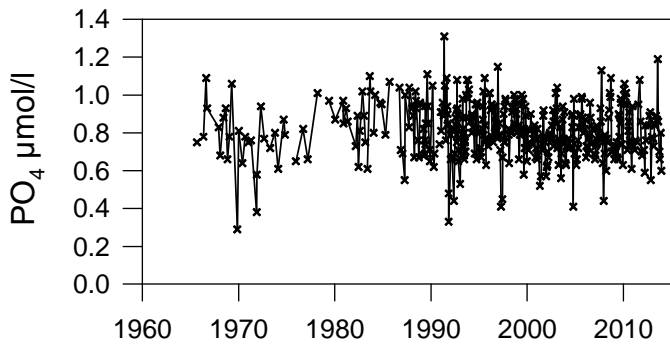
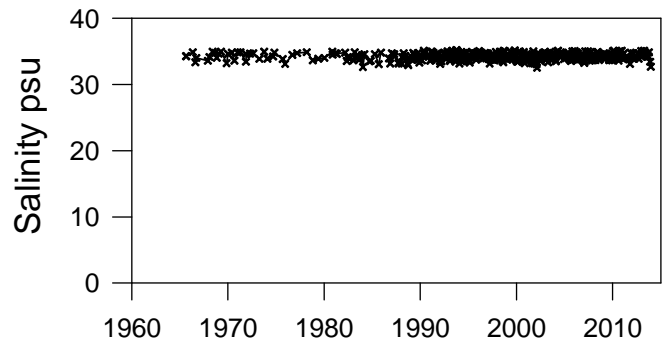
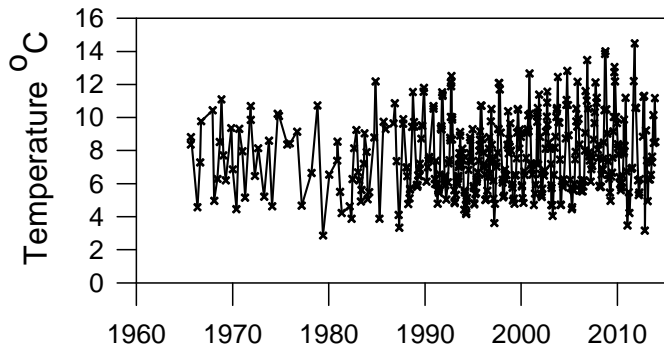


STATION FLADEN SURFACE WATER





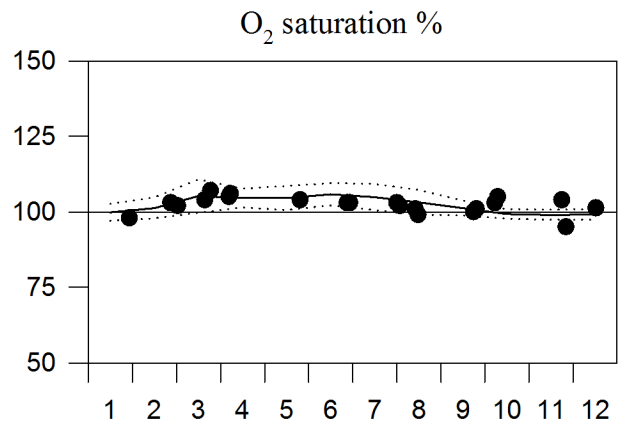
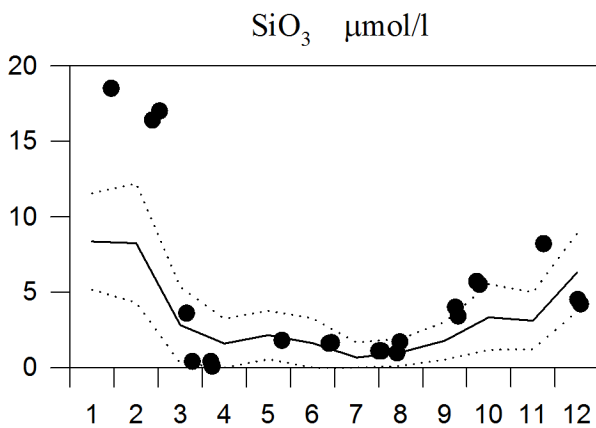
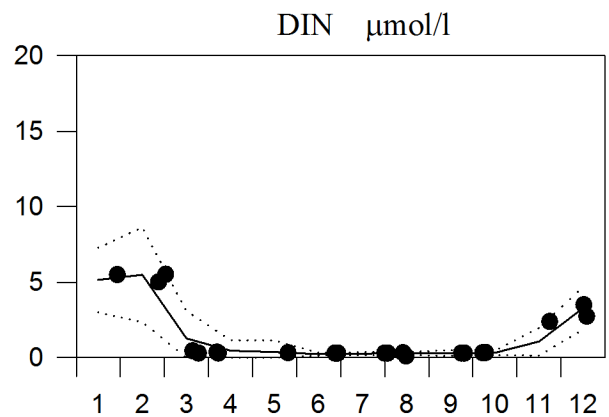
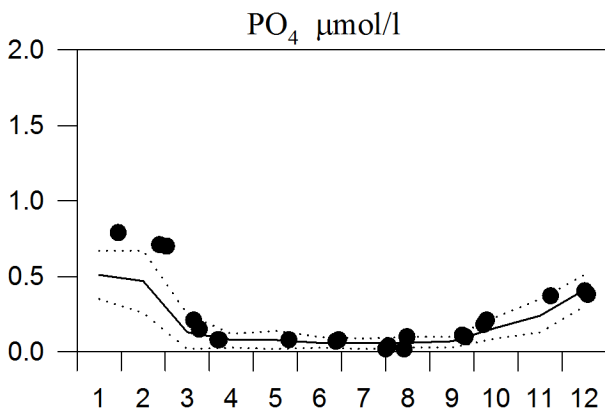
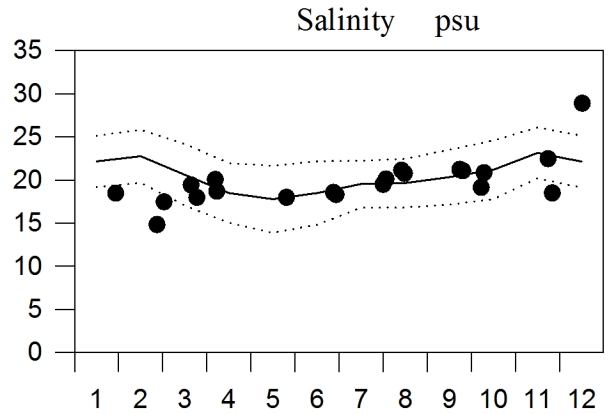
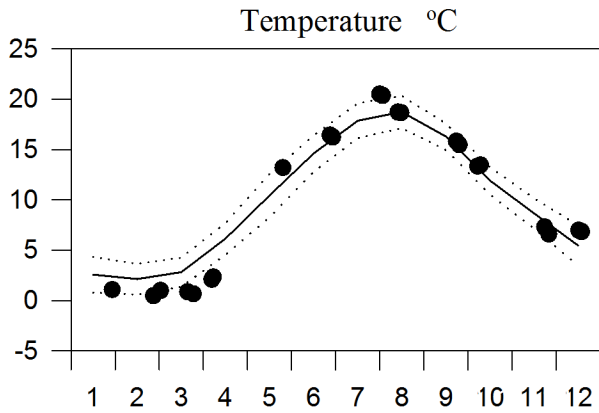
STATION FLADEN DEEP WATER (70m)



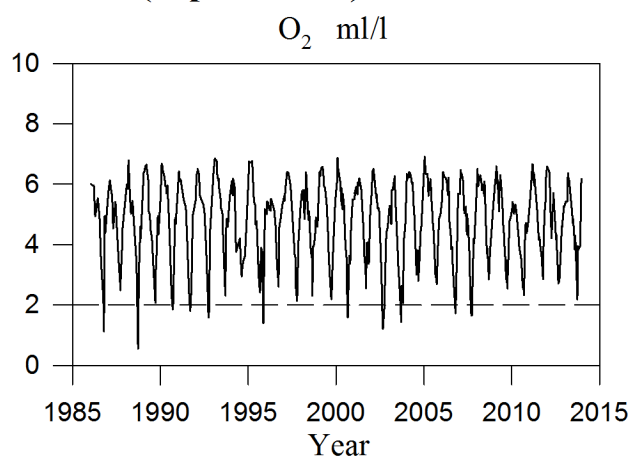
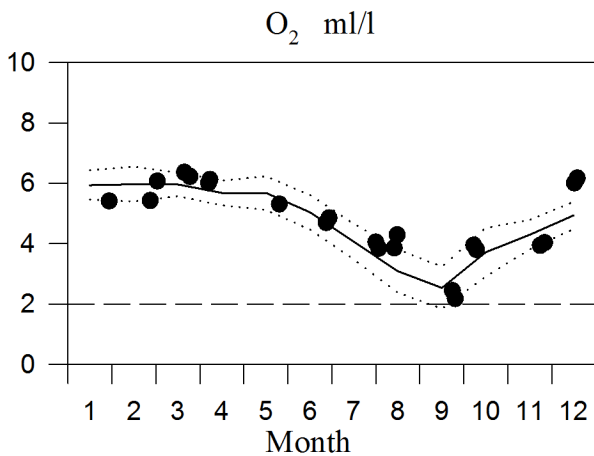
STATION ANHOLT E SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2013

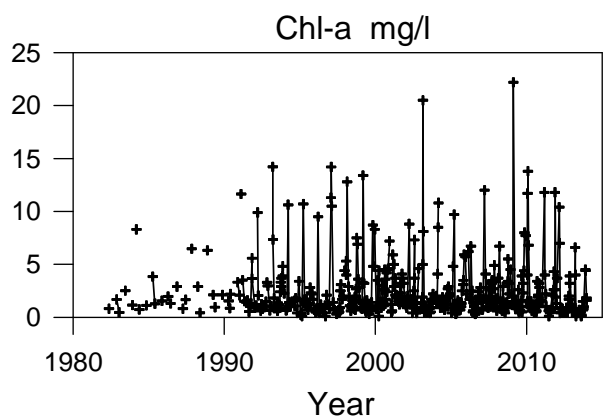
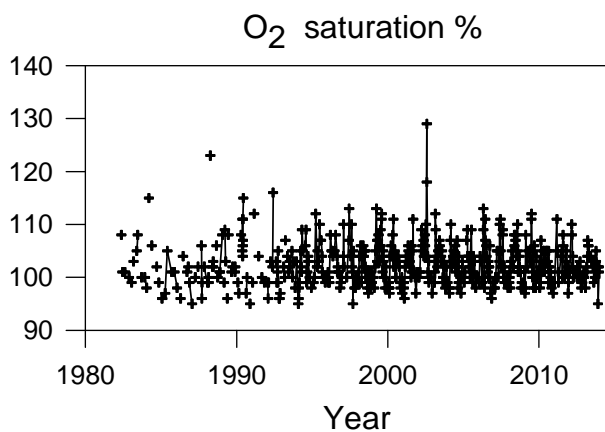
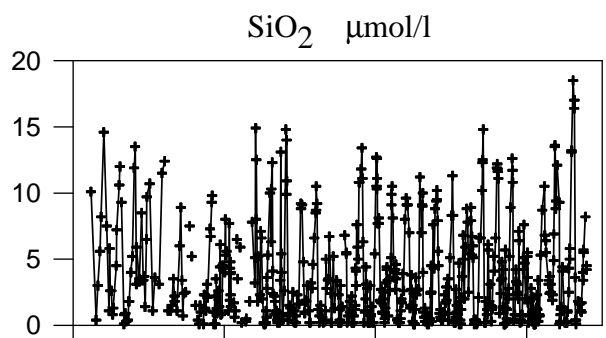
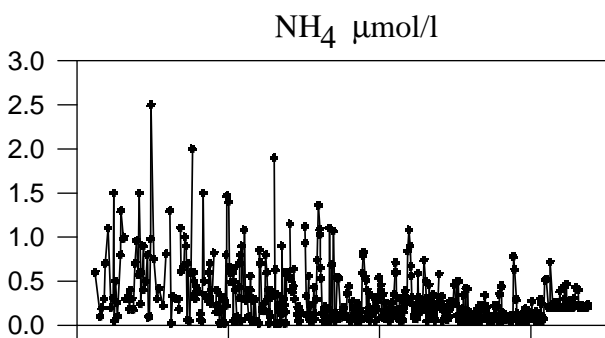
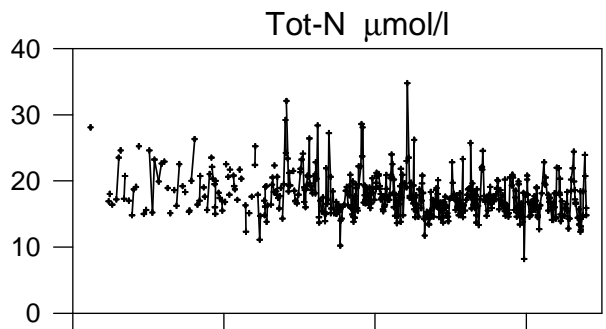
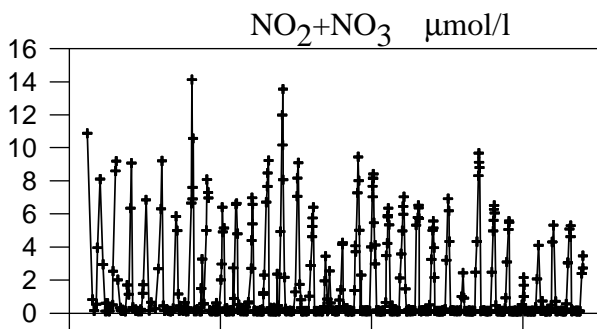
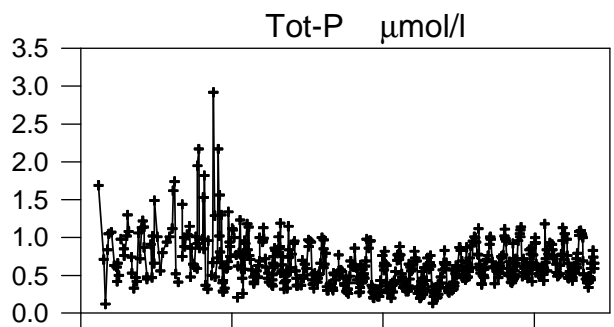
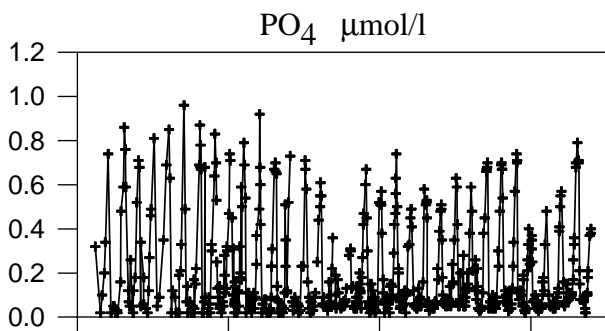
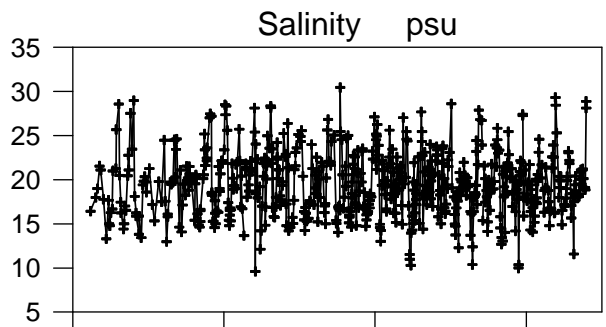
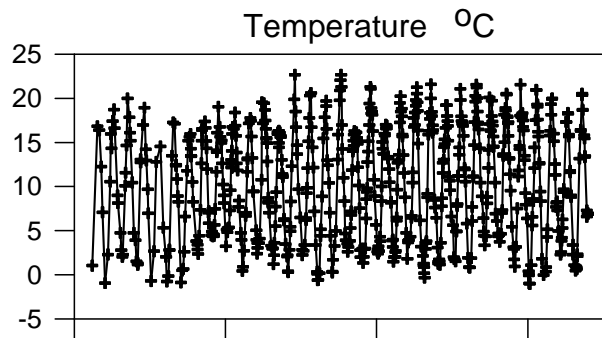


OXYGEN IN BOTTOM WATER (depth > 50m)



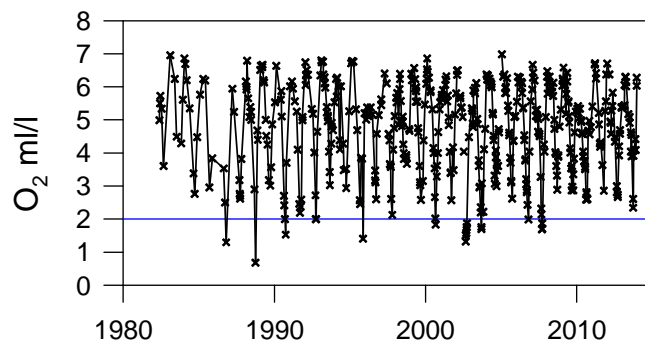
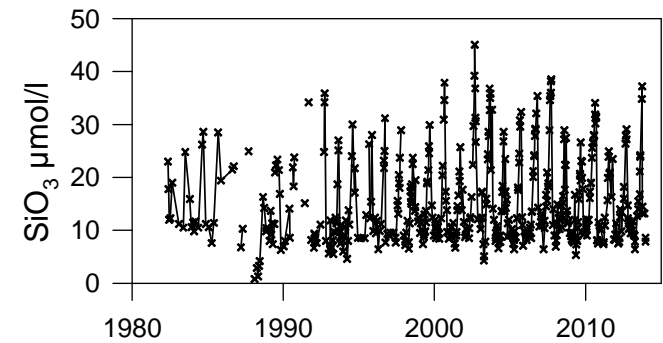
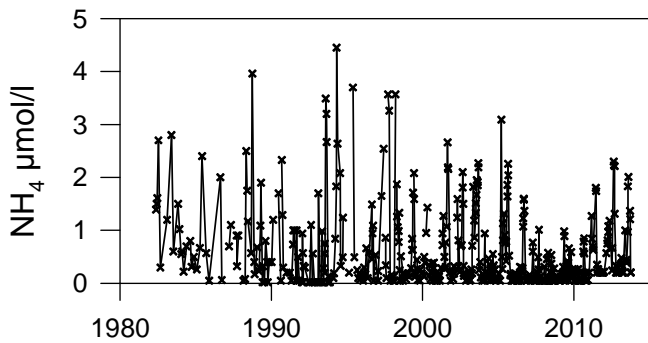
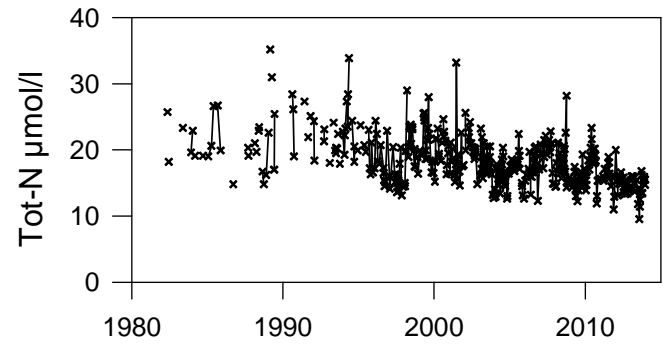
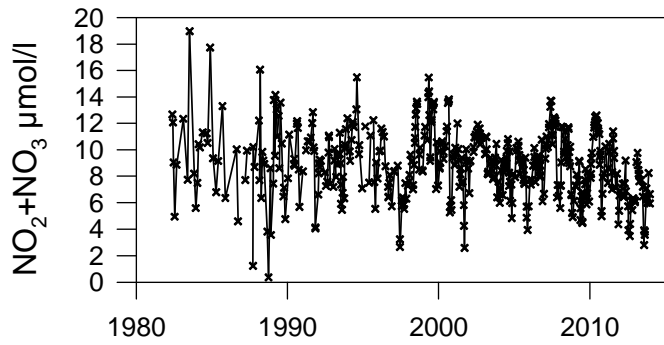
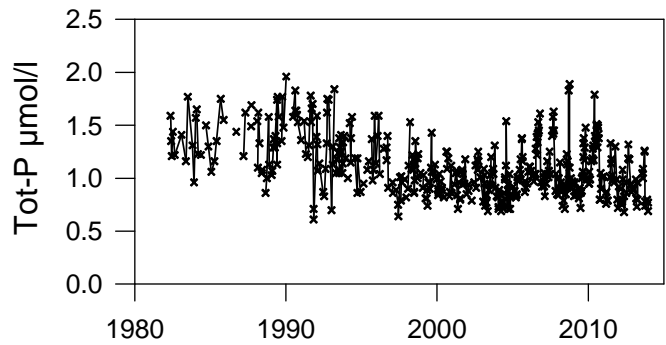
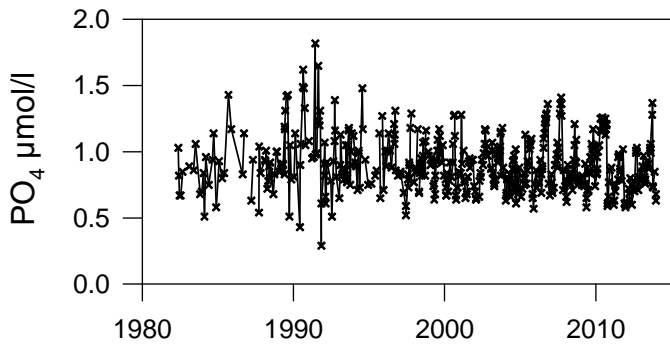
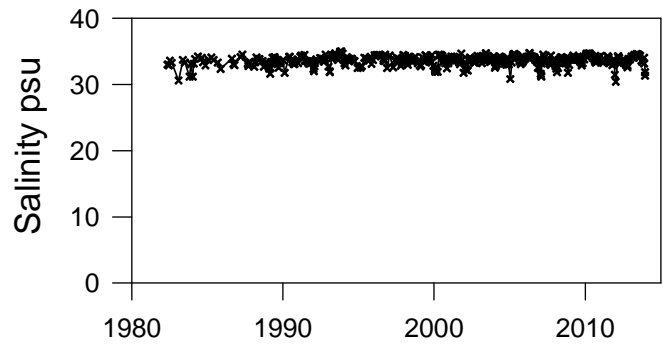
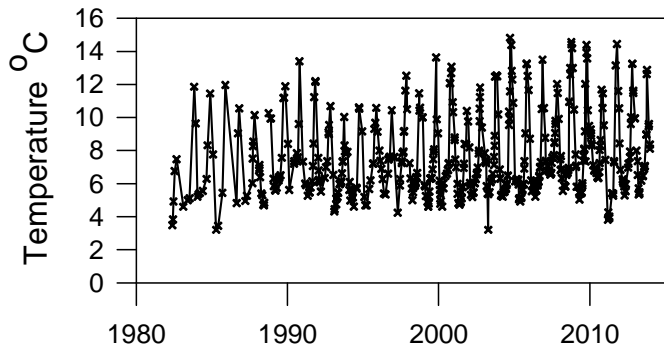


STATION ANHOLT E SURFACE WATER





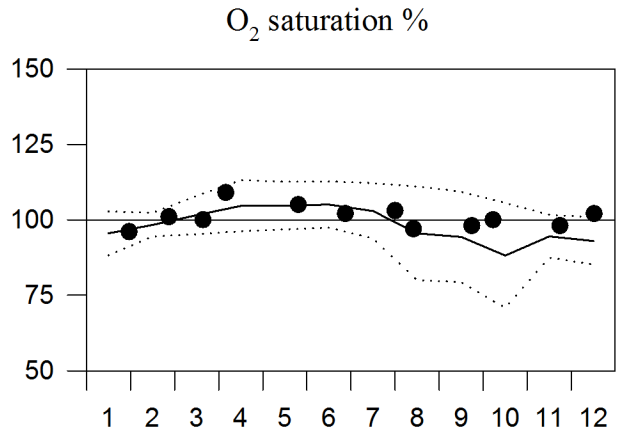
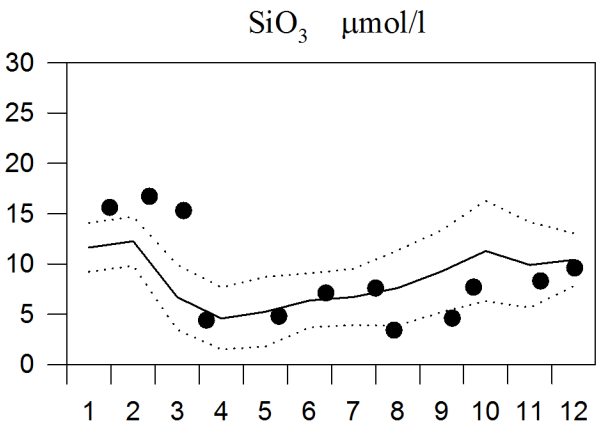
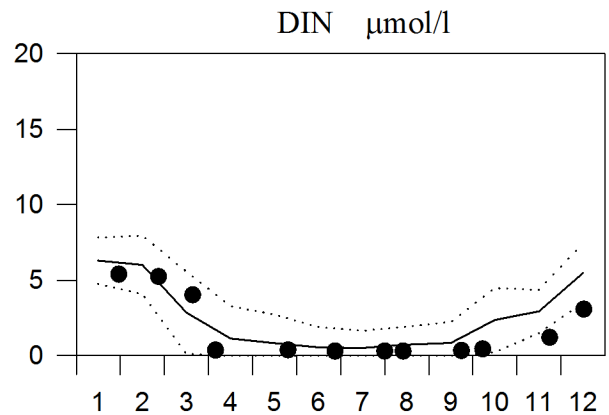
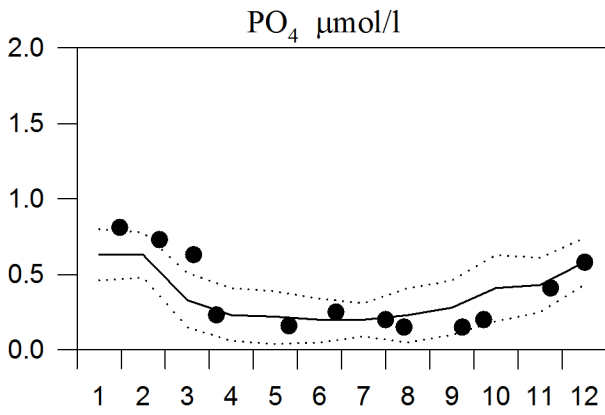
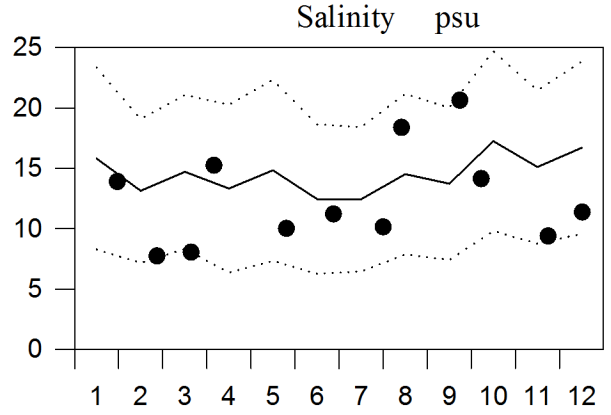
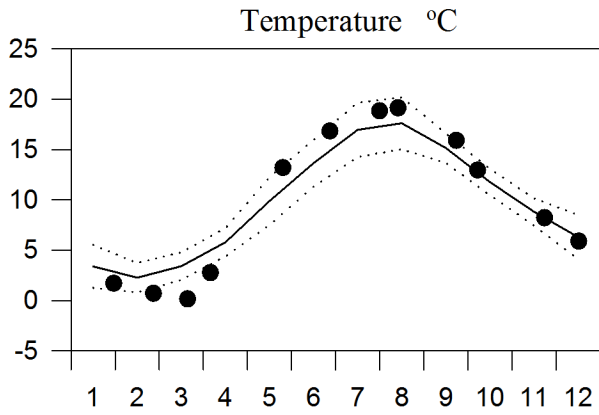
STATION ANHOLT-E DEEP WATER (50m)



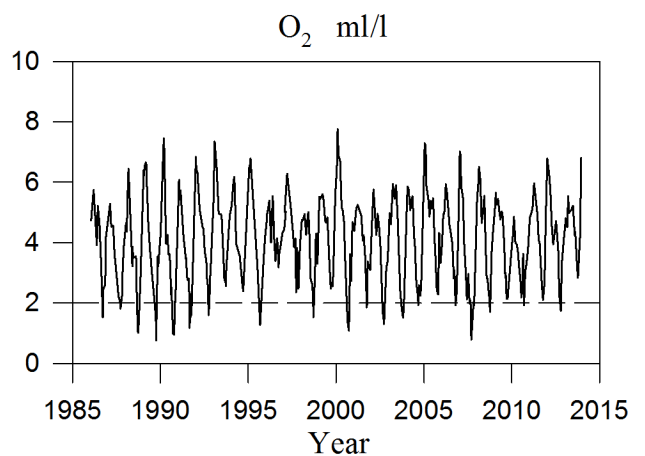
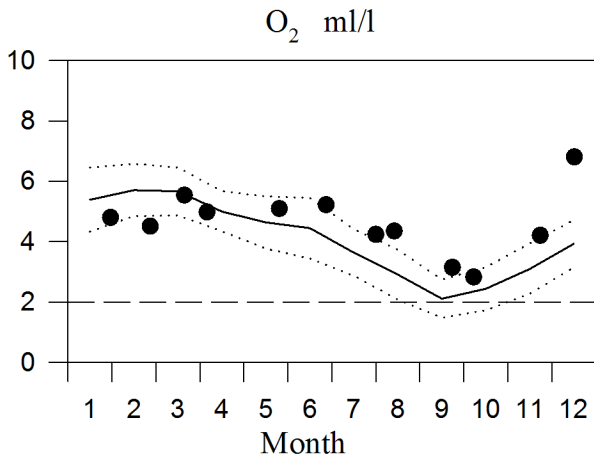
STATION W LANDSKRONA SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2013

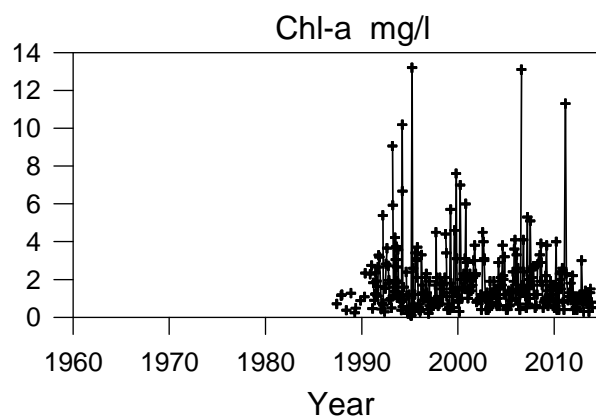
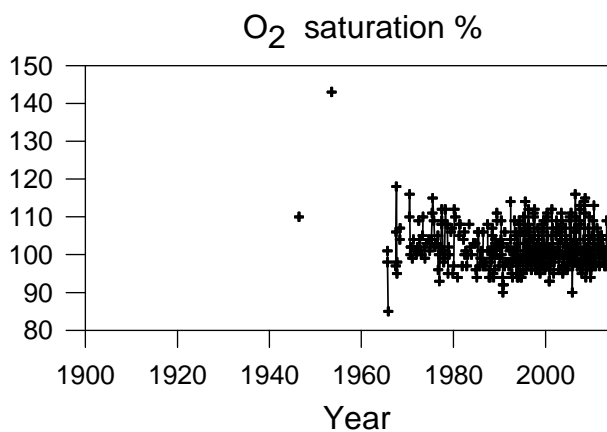
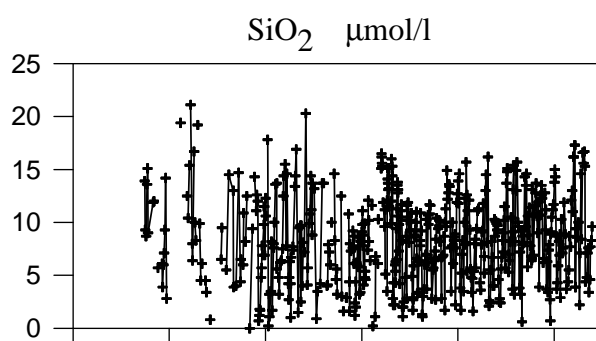
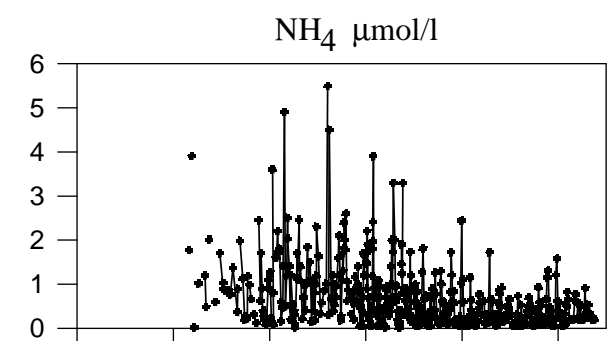
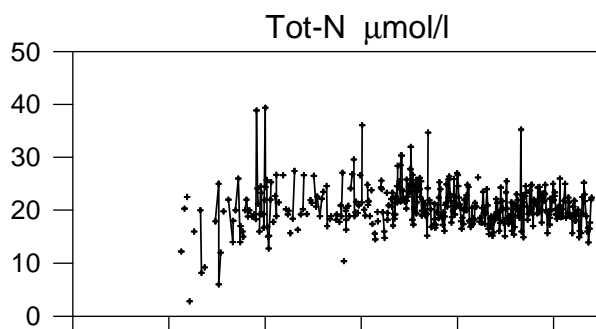
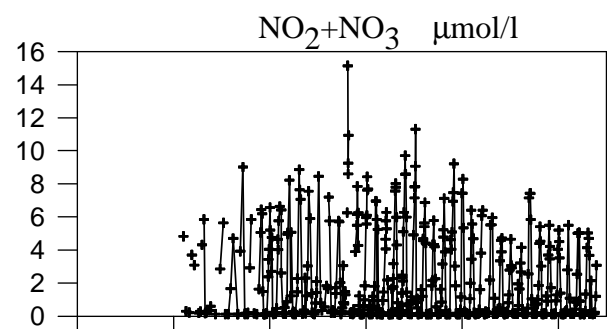
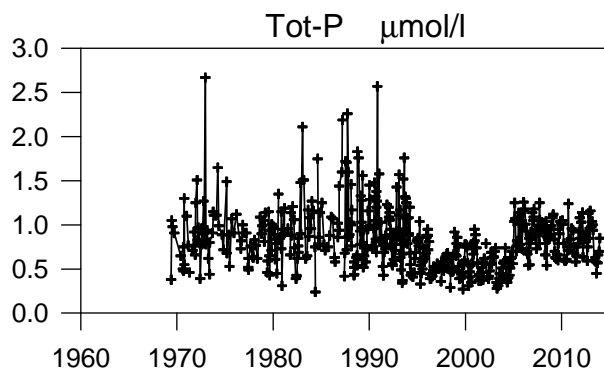
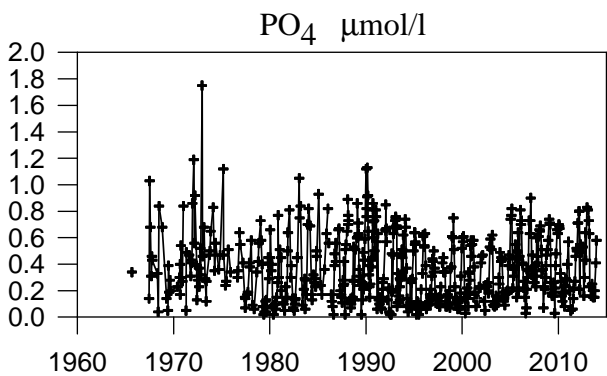
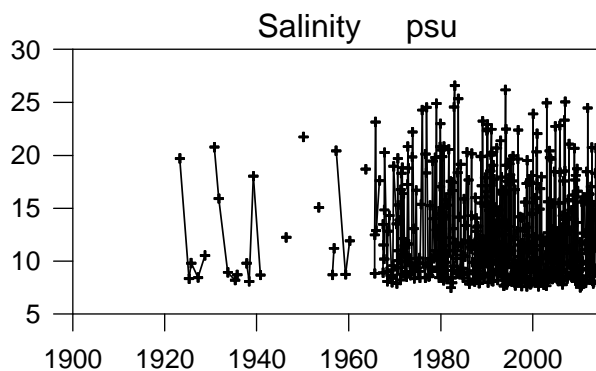
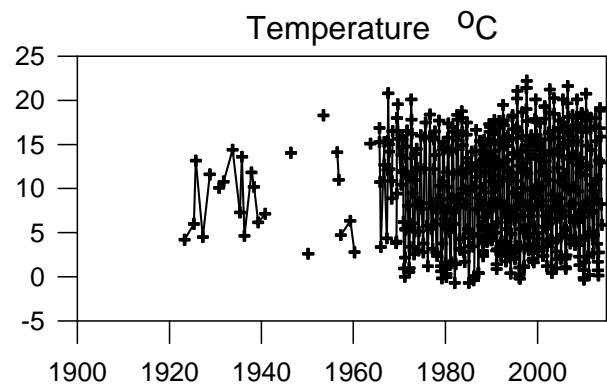


OXYGEN IN BOTTOM WATER (depth >40m)



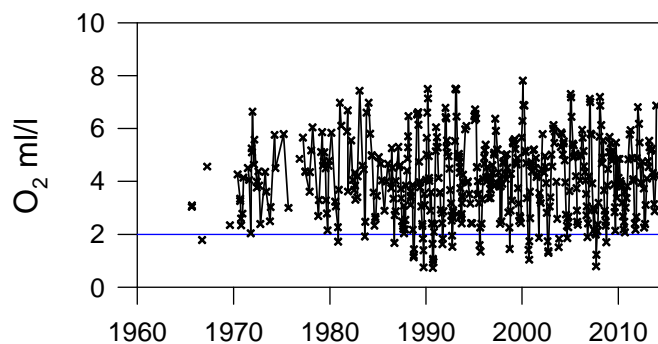
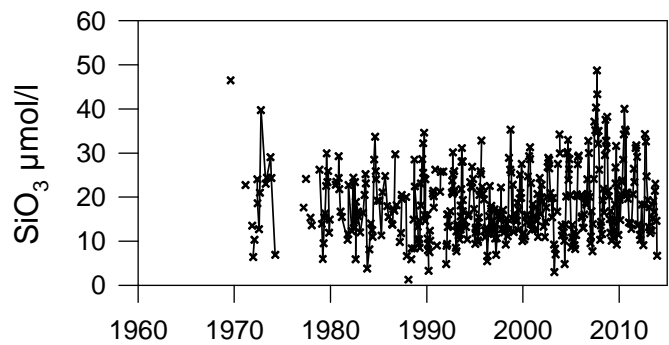
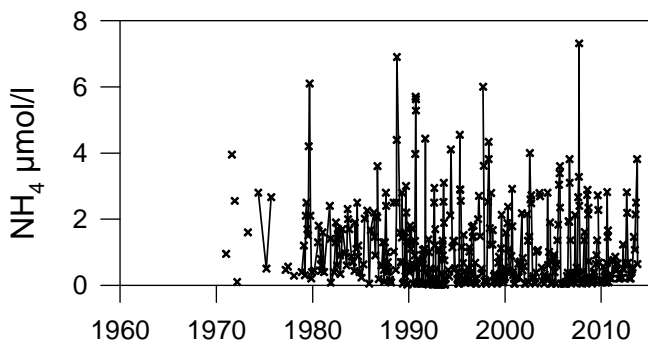
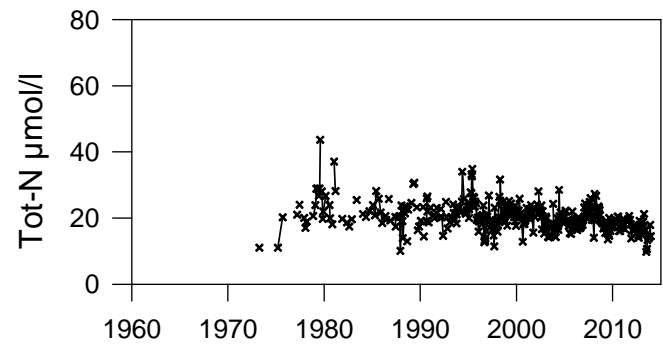
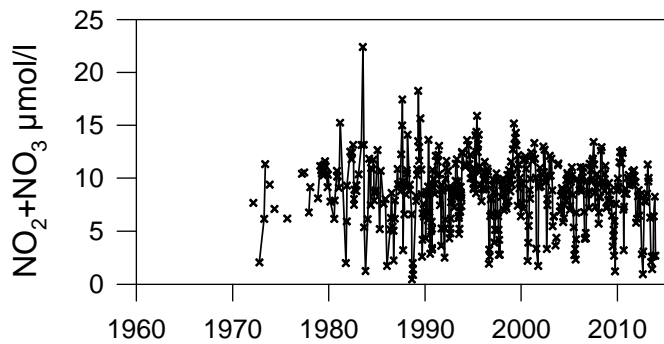
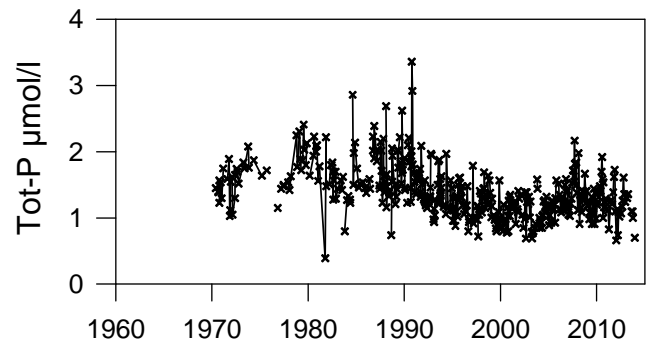
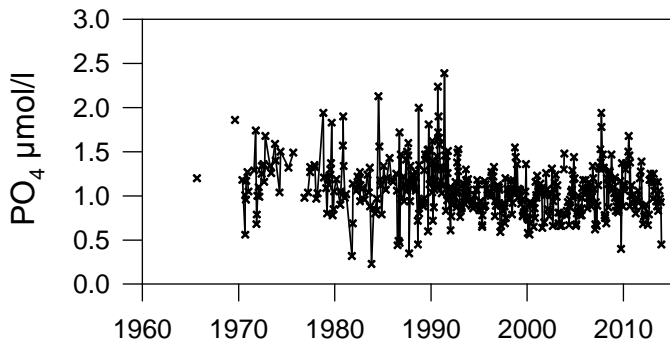
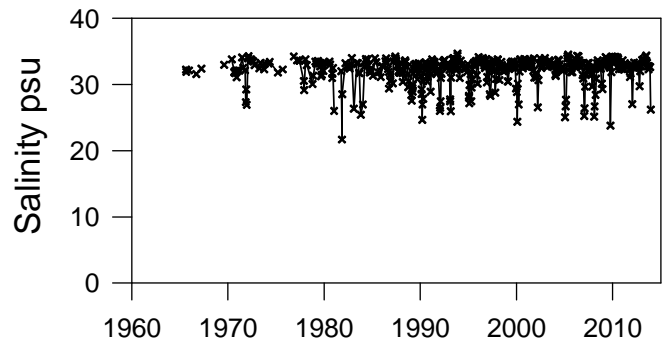
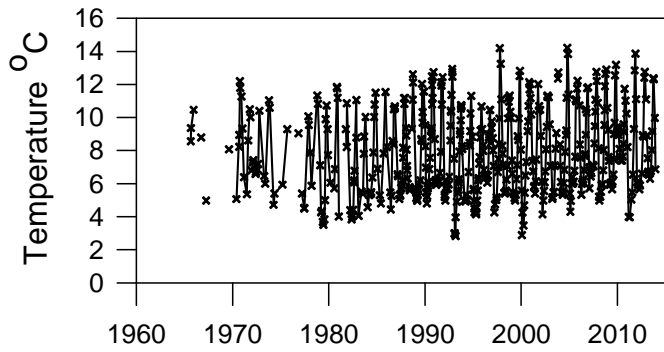


STATION W LANDSKRONA SURFACE WATER





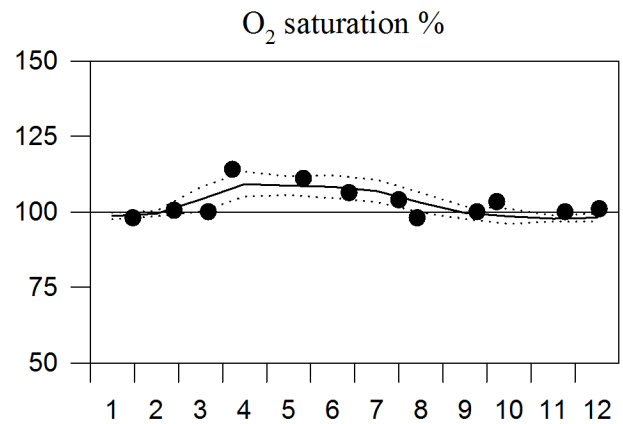
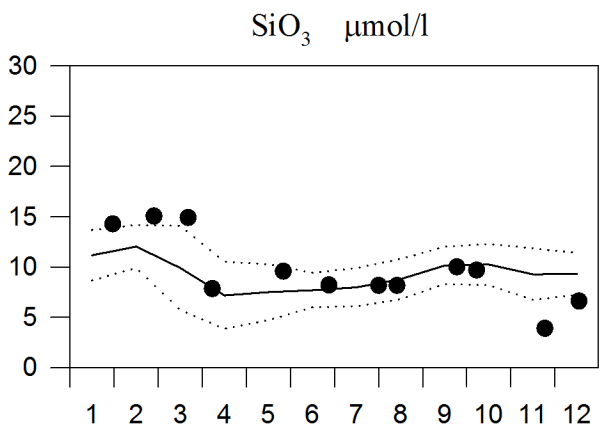
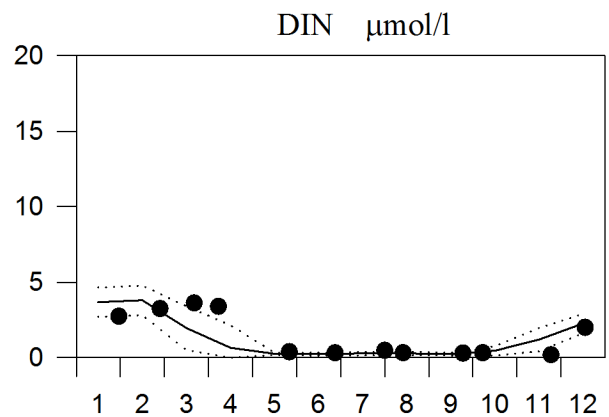
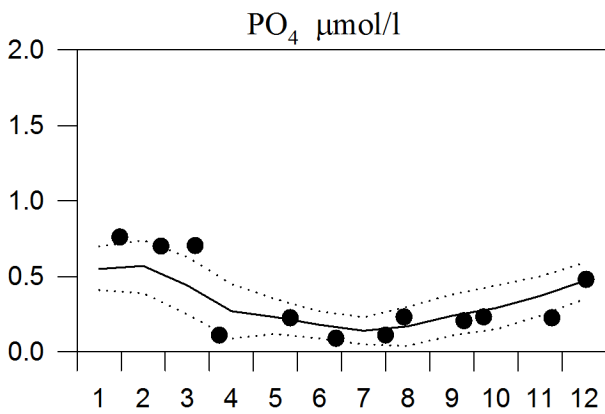
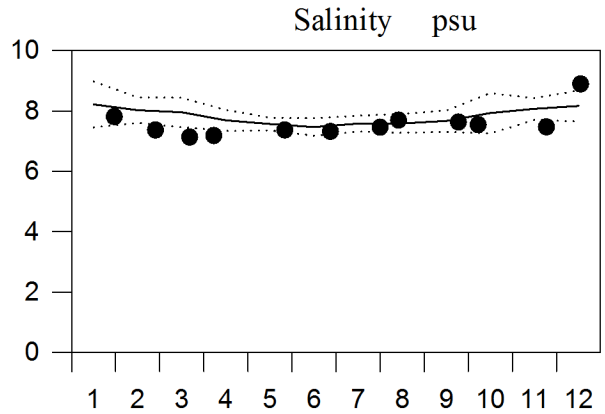
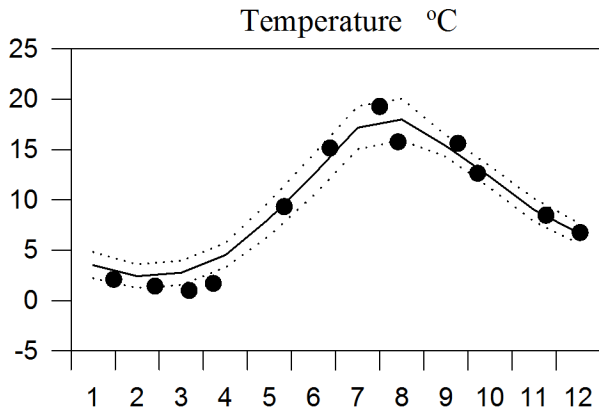
STATION W LANDSKRONA DEEP WATER (40m)



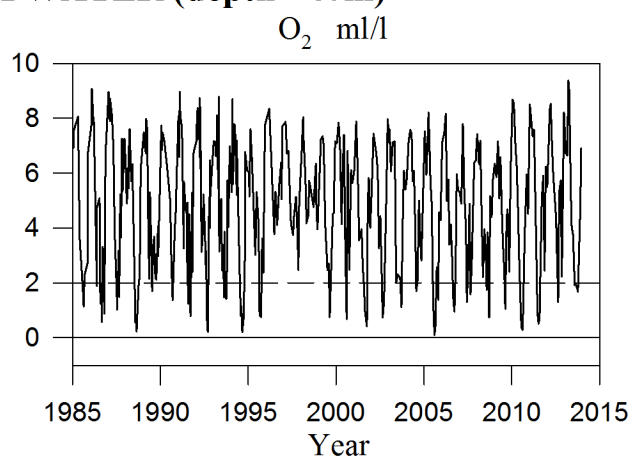
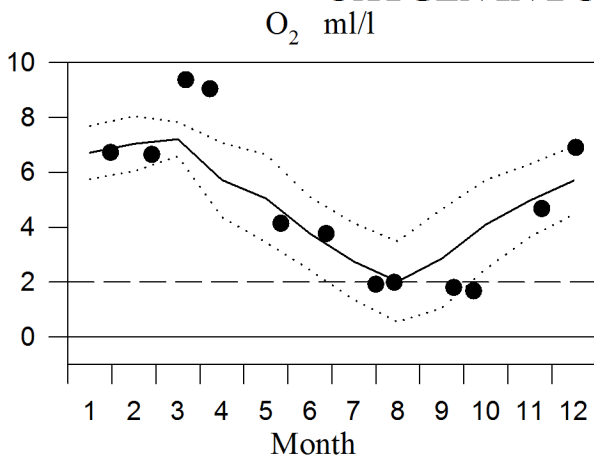
STATION BY1 SURFACE WATER

Annual Cycles

— Mean 1996-2010 ····· St.Dev. ● 2013

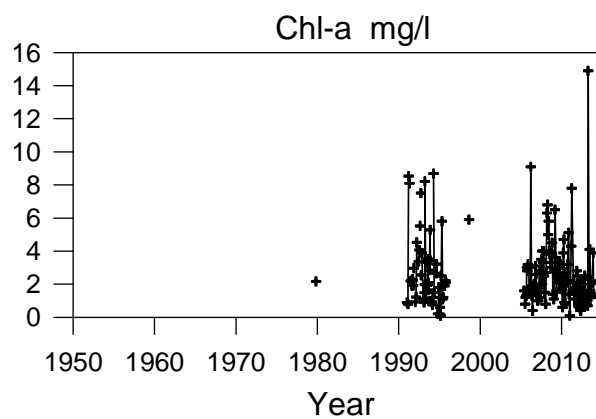
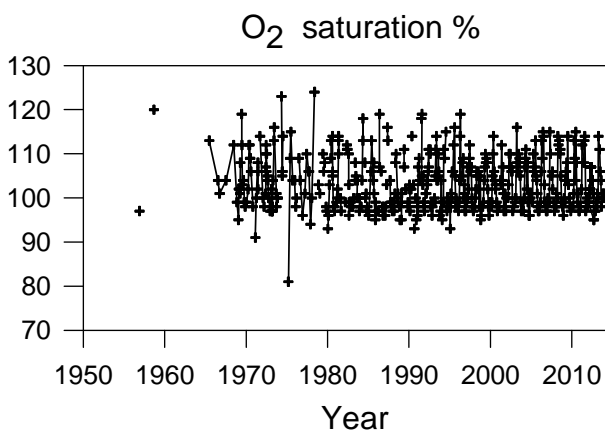
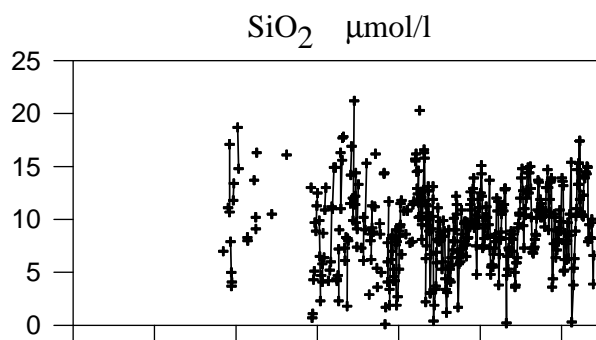
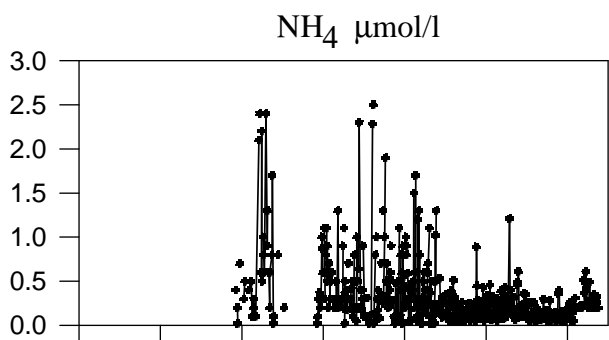
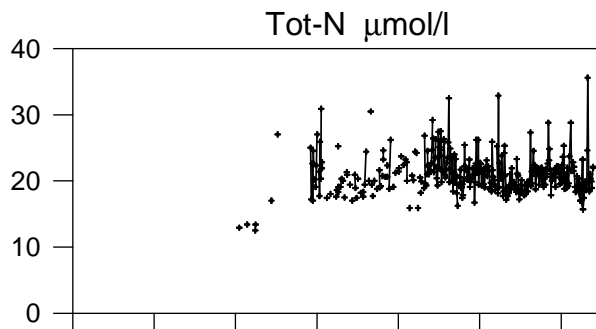
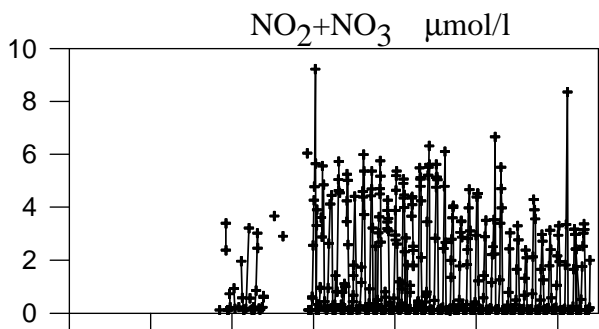
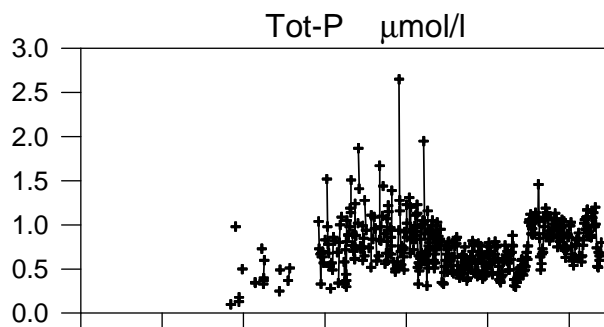
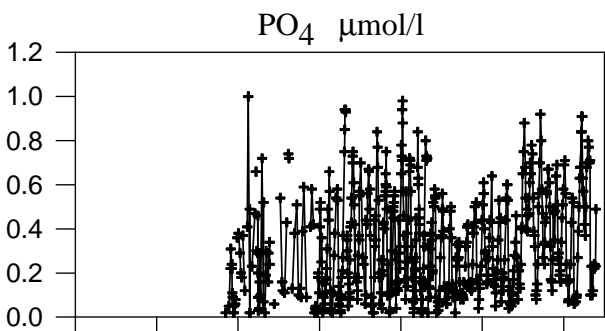
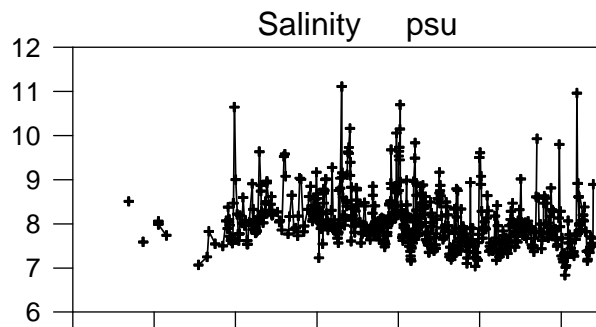
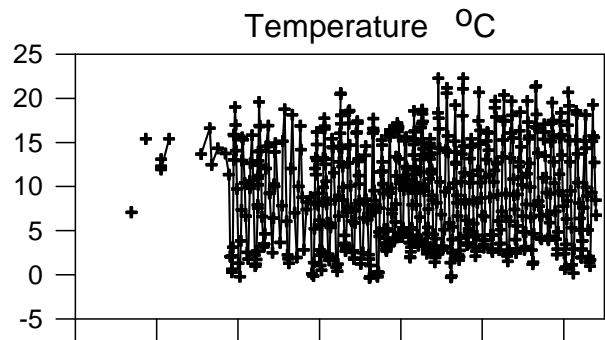


OXYGEN IN BOTTOM WATER (depth >40m)



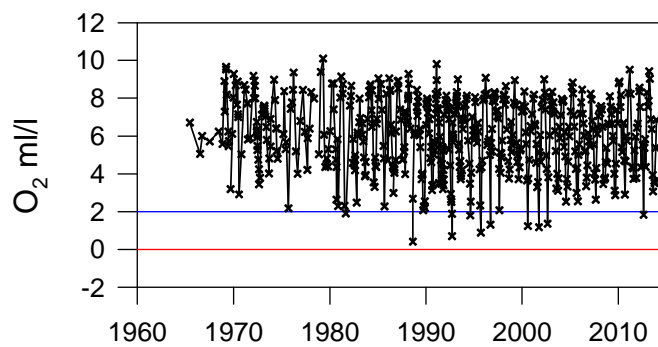
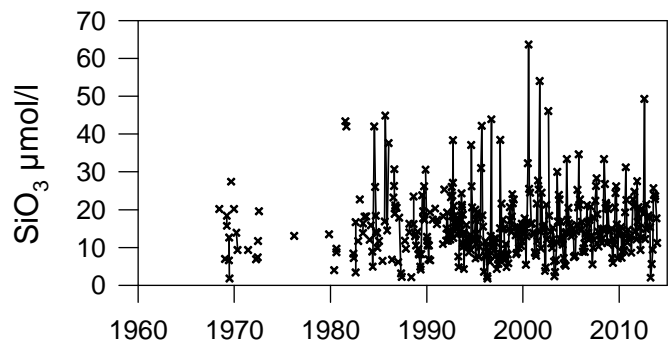
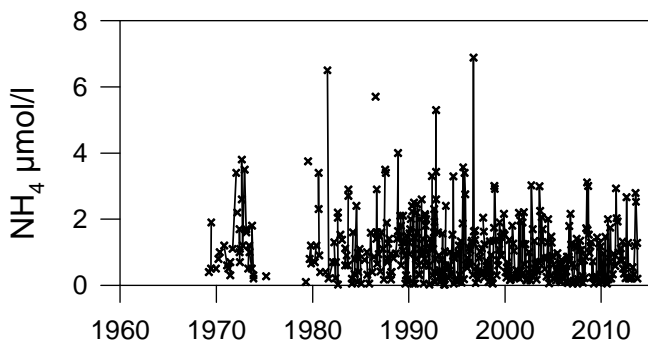
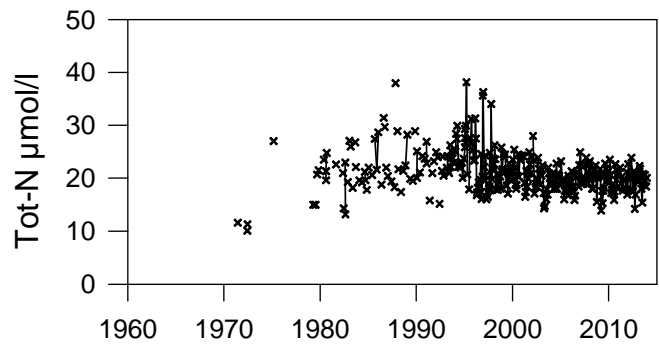
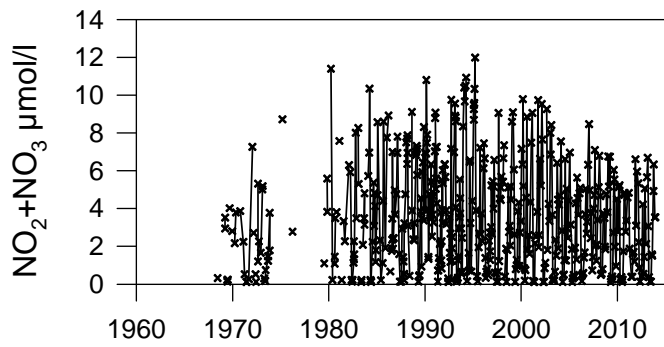
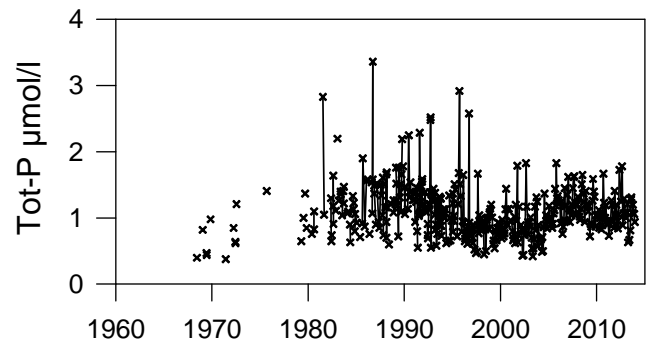
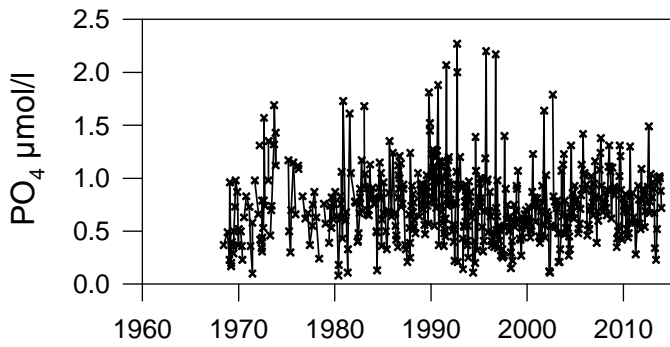
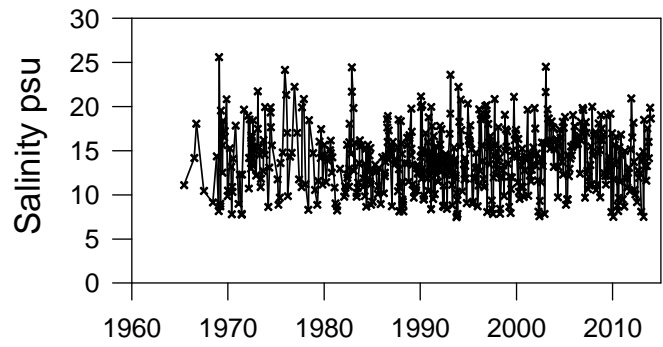
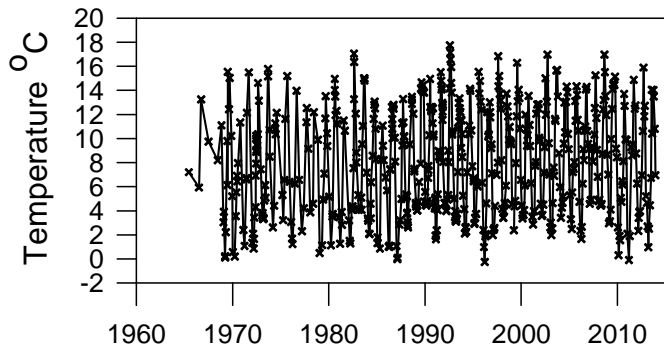


STATION BY1 SURFACE WATER





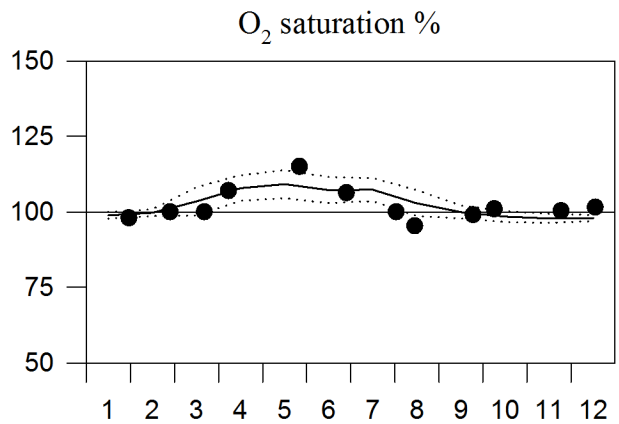
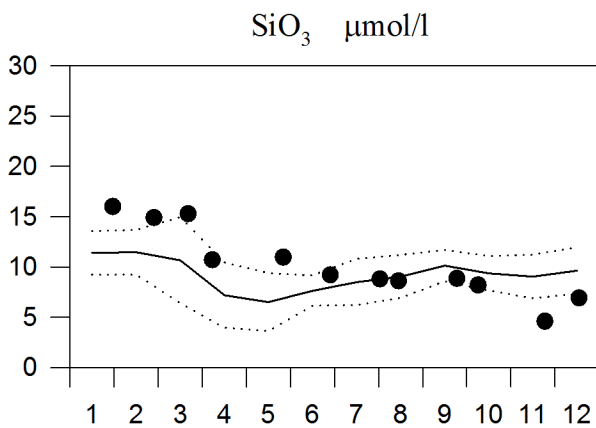
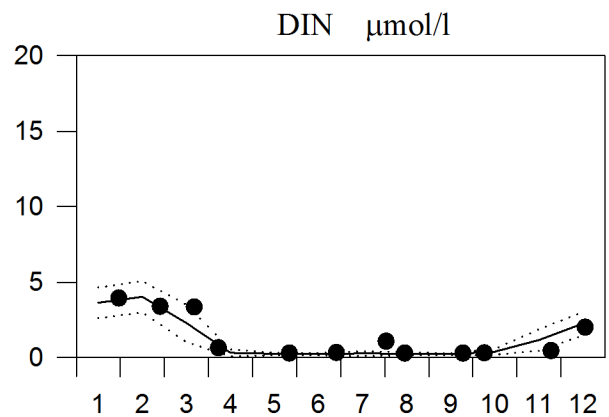
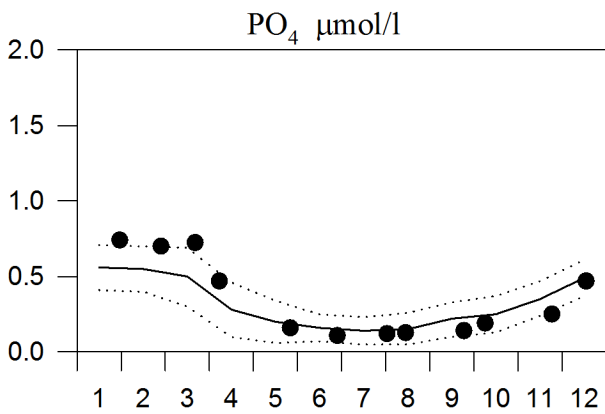
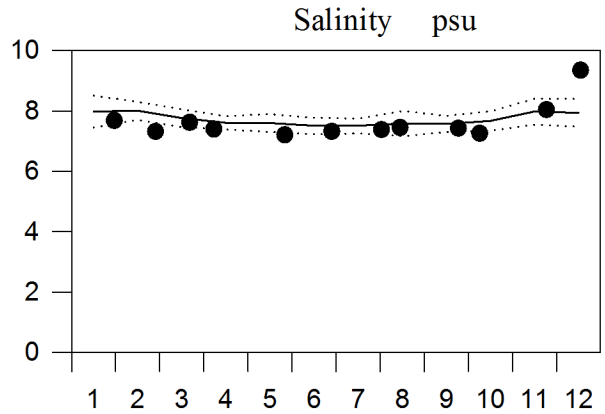
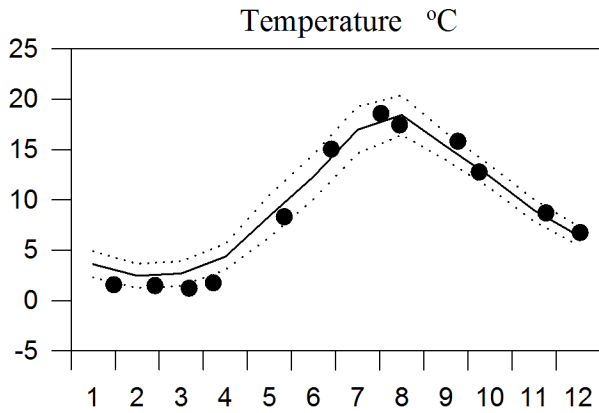
STATION BY1 DEEP WATER (40m)



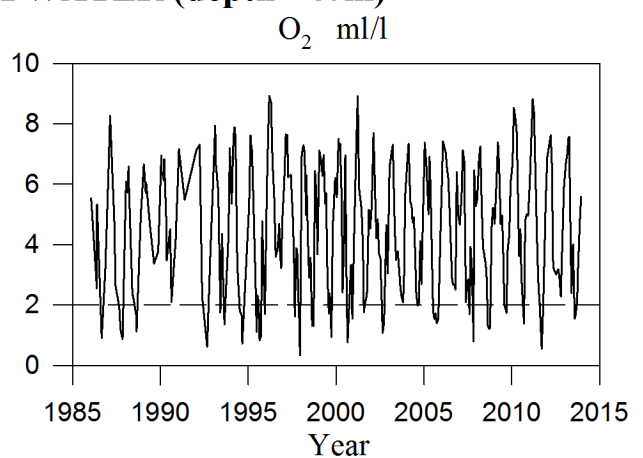
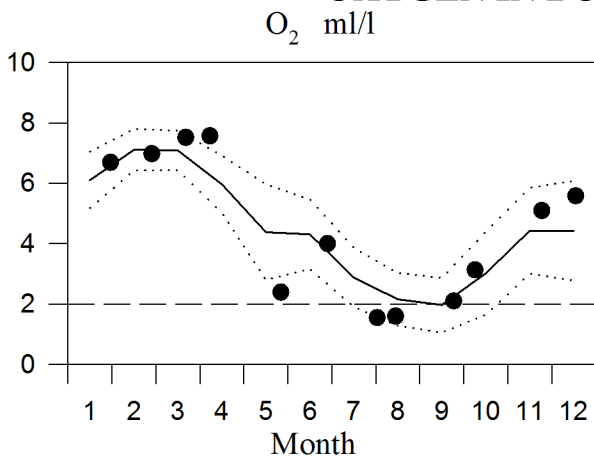
STATION BY2 SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2013

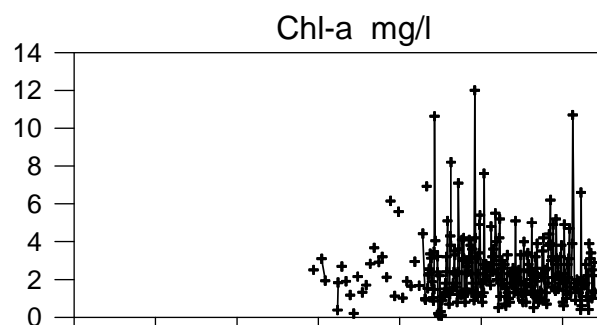
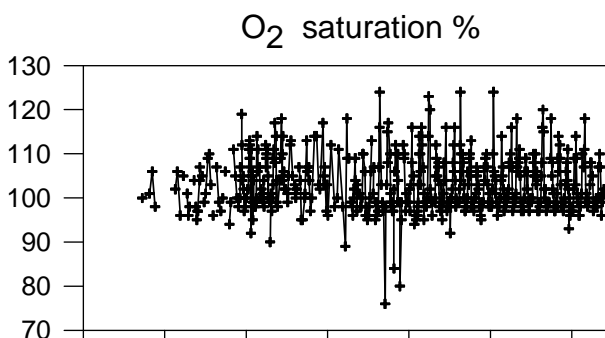
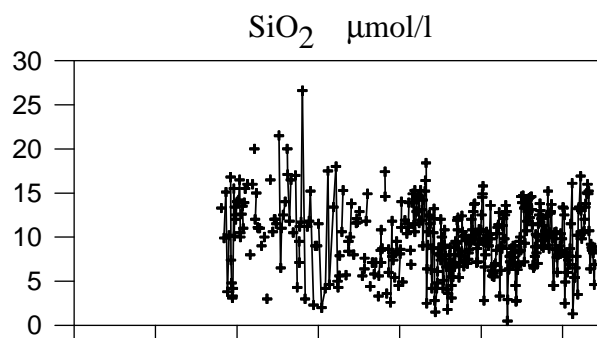
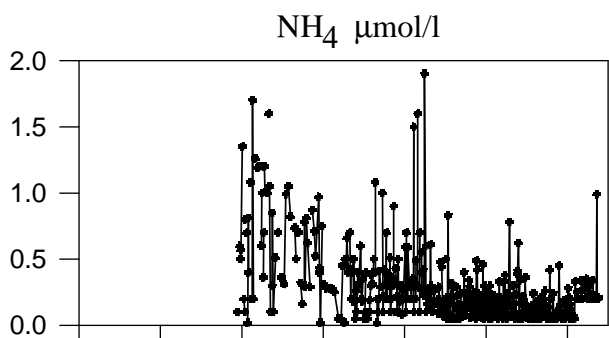
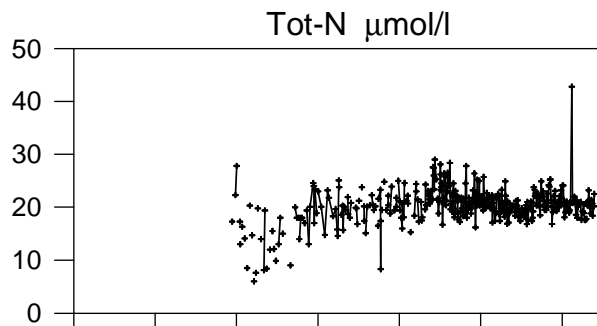
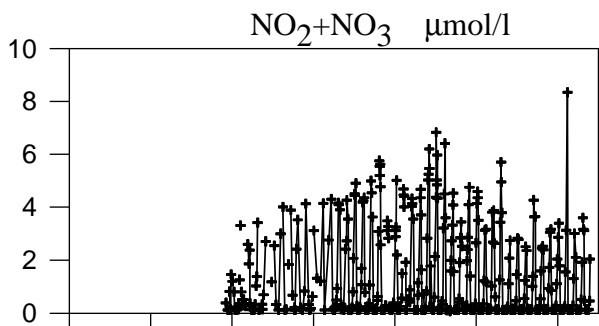
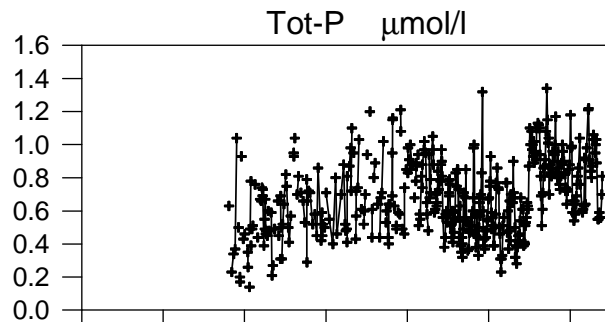
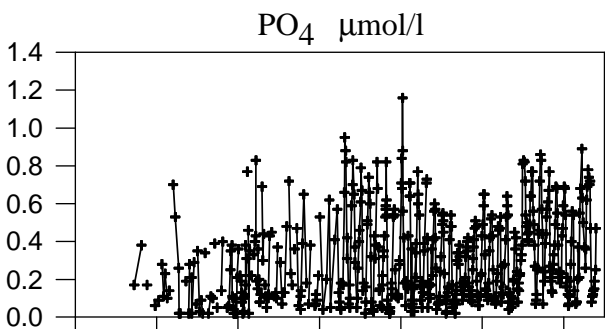
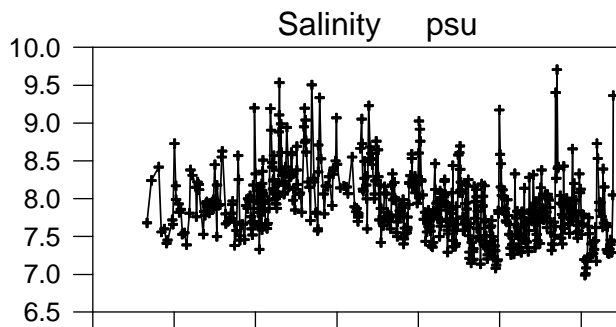
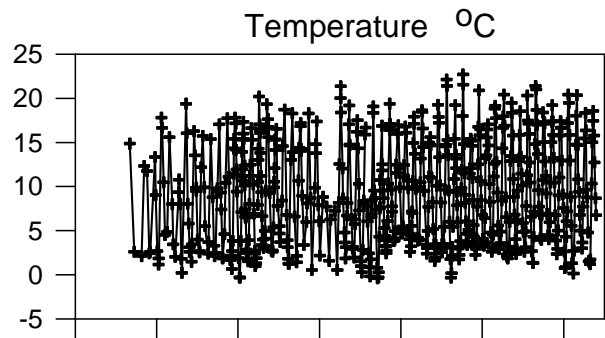


OXYGEN IN BOTTOM WATER (depth >40m)





STATION BY2 SURFACE WATER

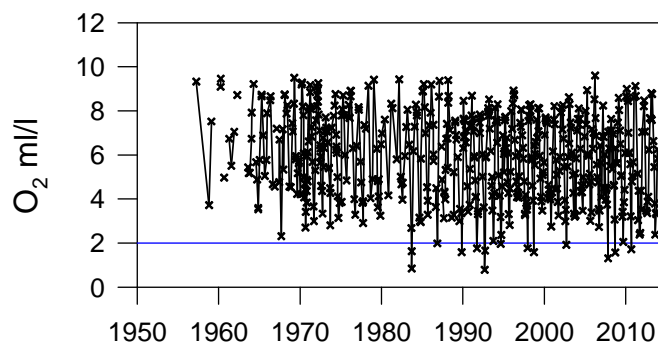
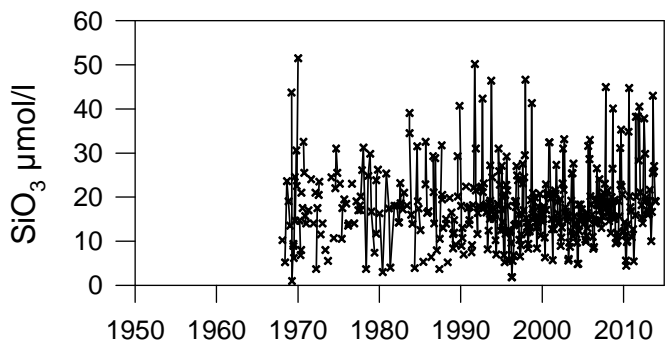
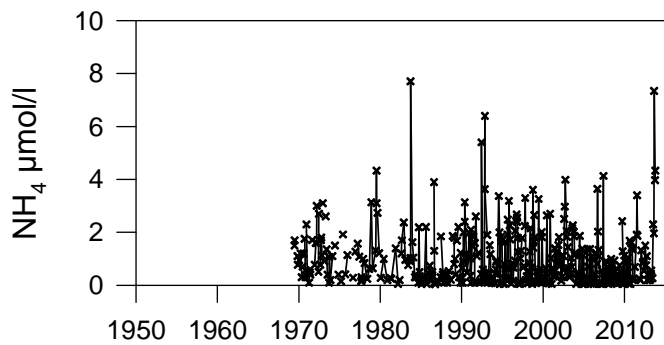
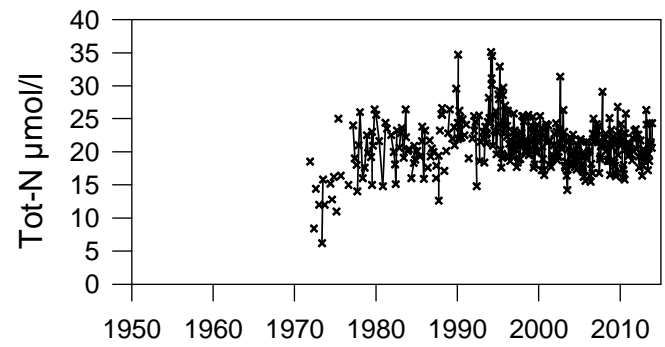
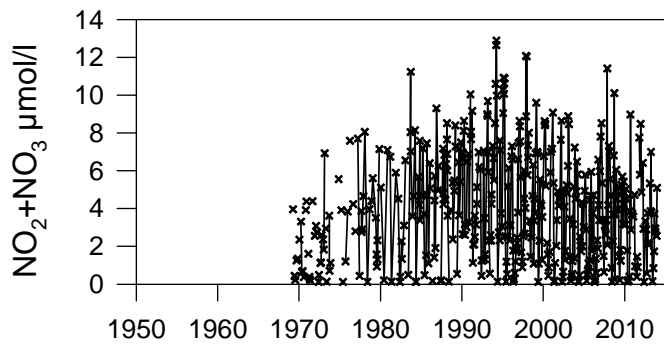
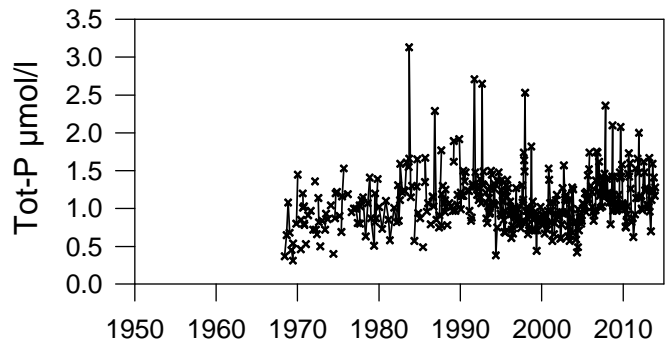
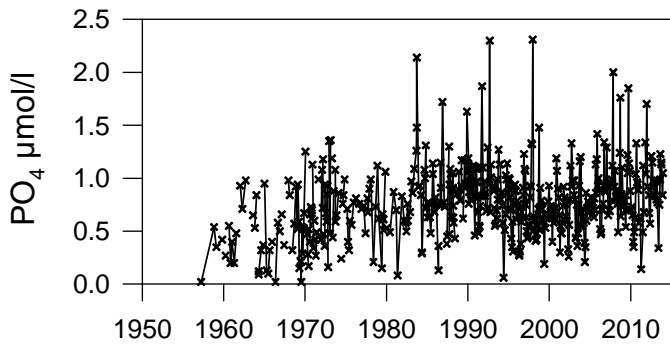
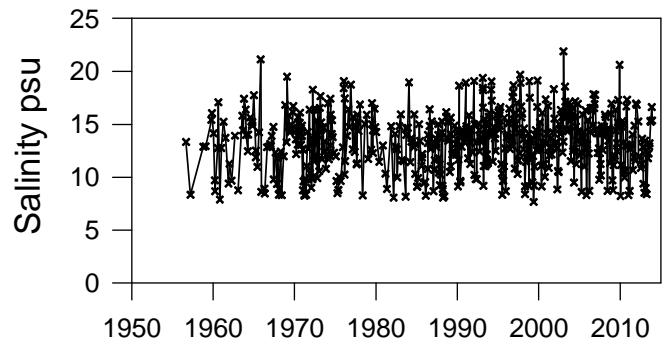
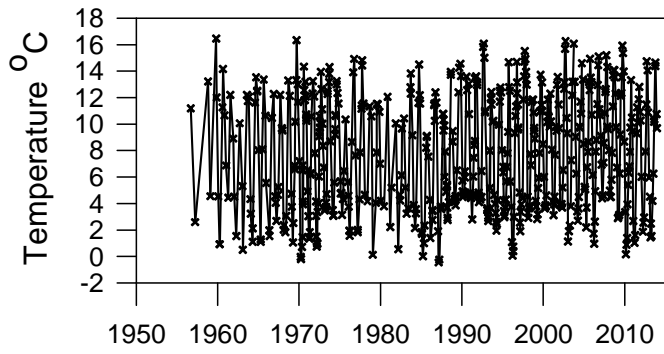


Year

Year



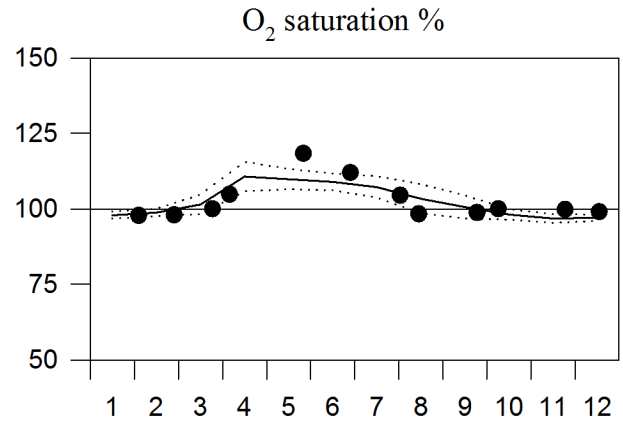
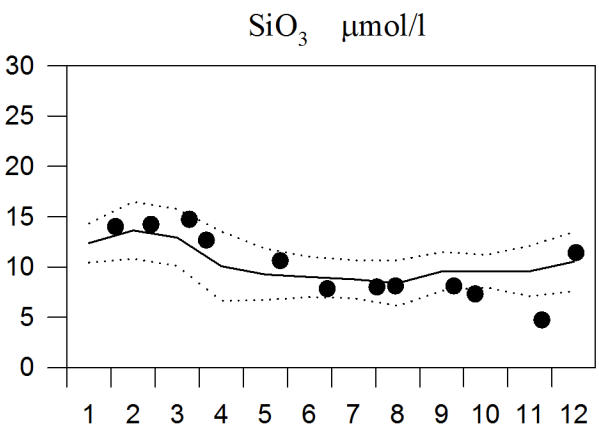
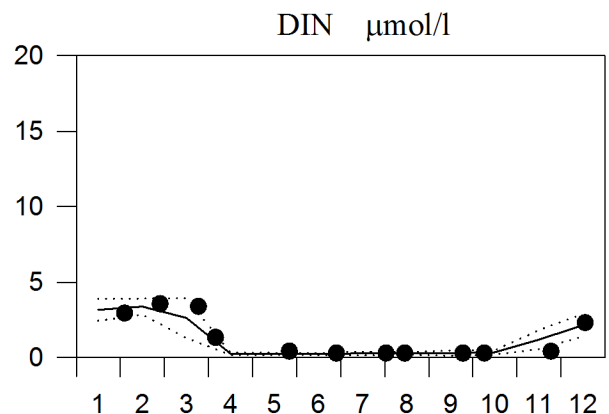
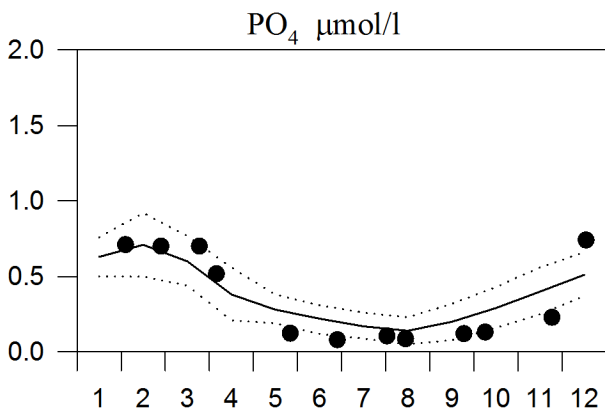
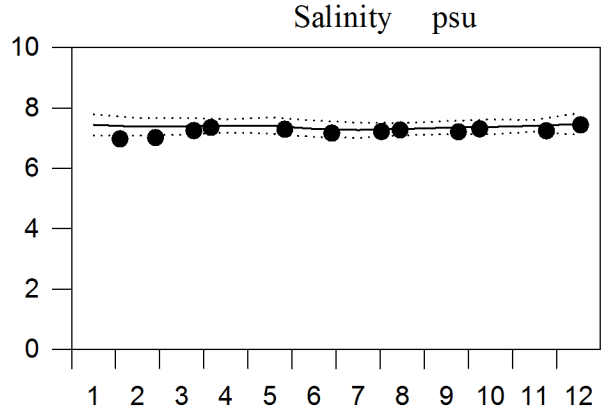
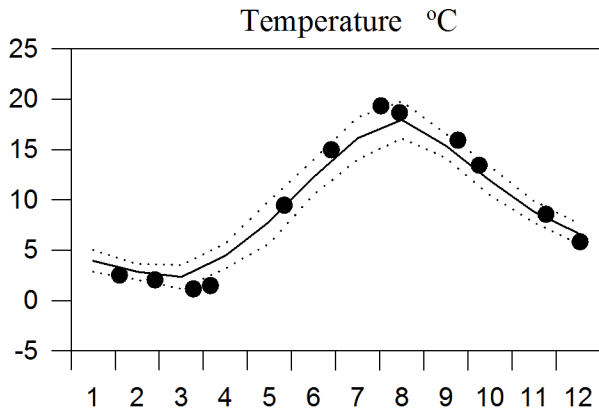
STATION BY2 DEEP WATER (40m)



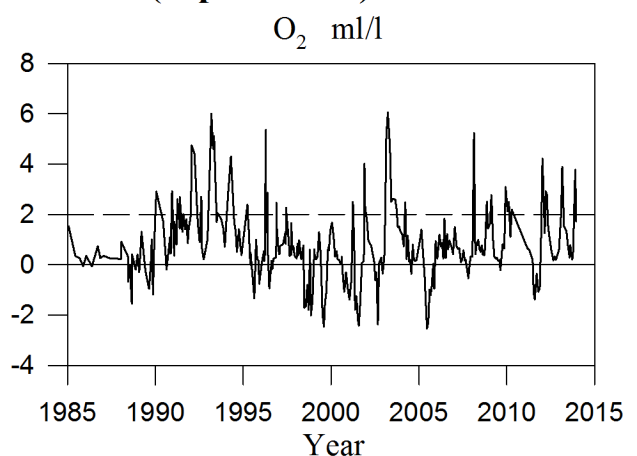
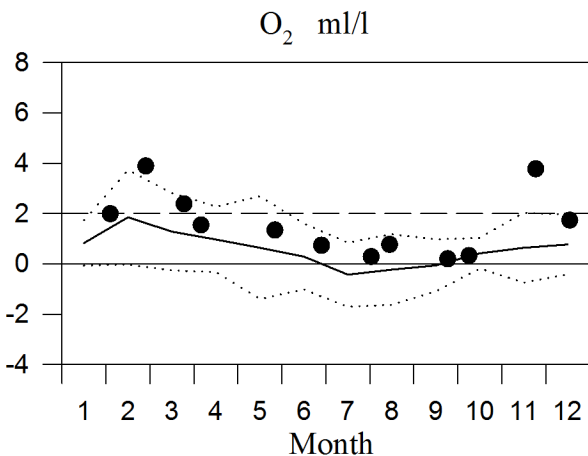
STATION HANÖBUKTEN SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2013

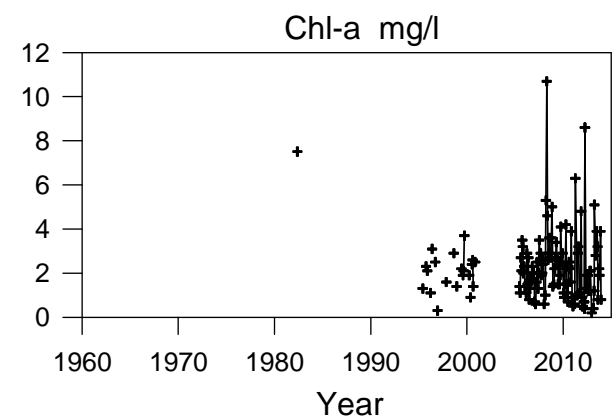
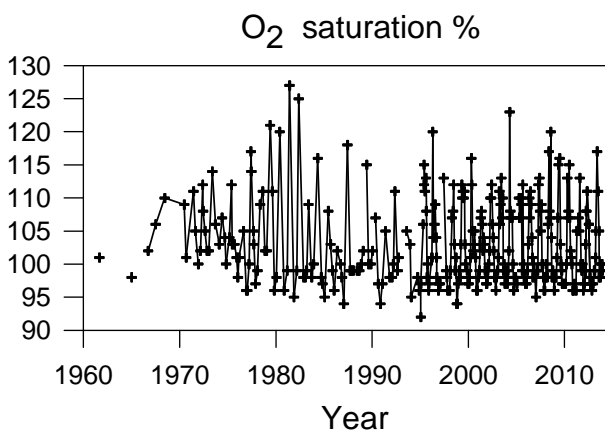
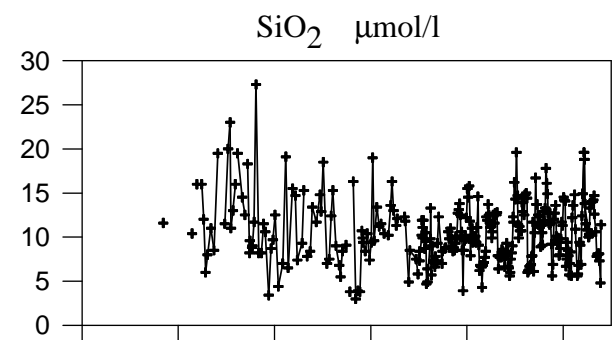
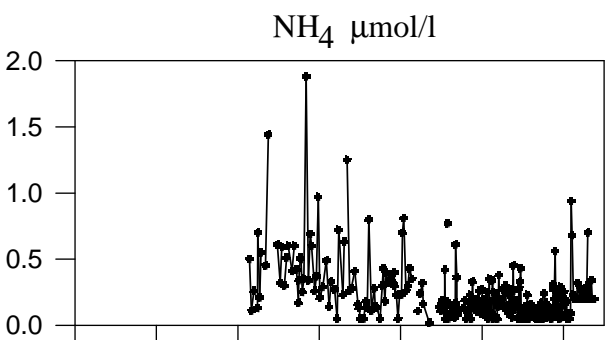
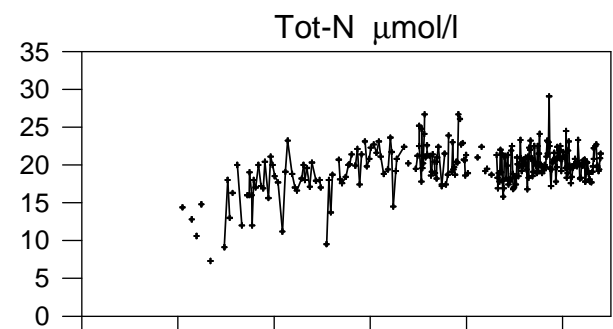
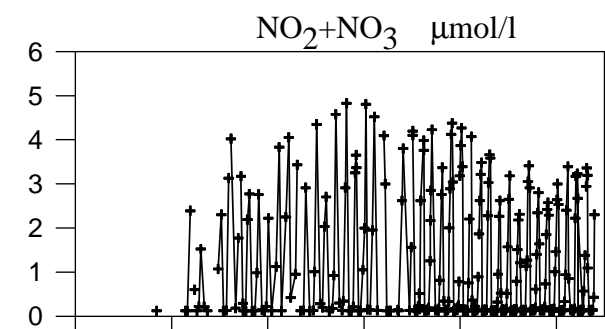
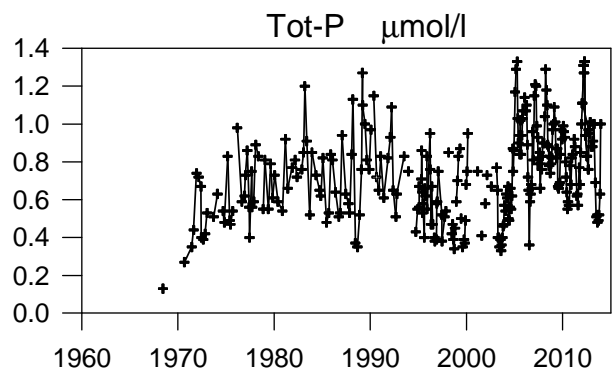
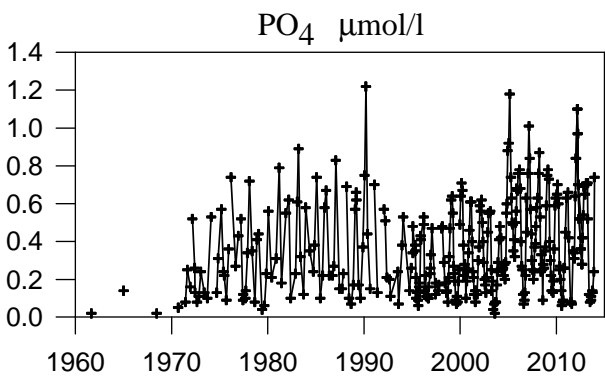
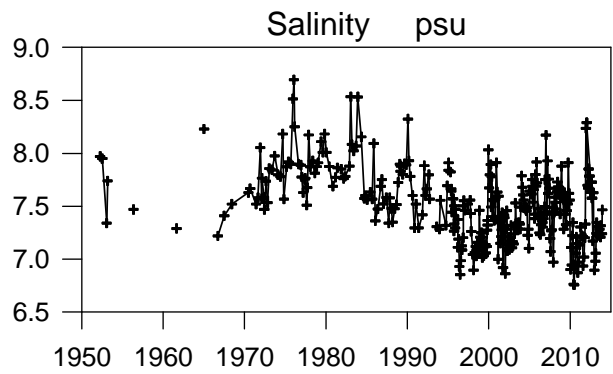
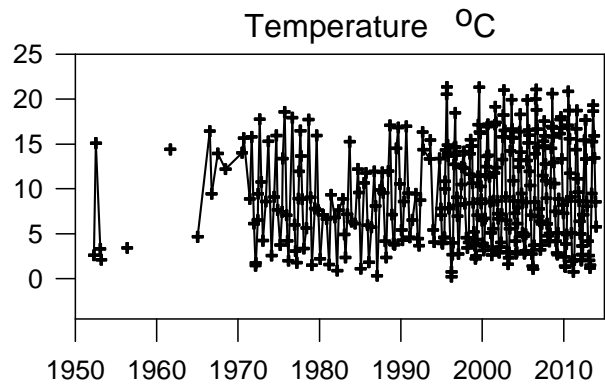


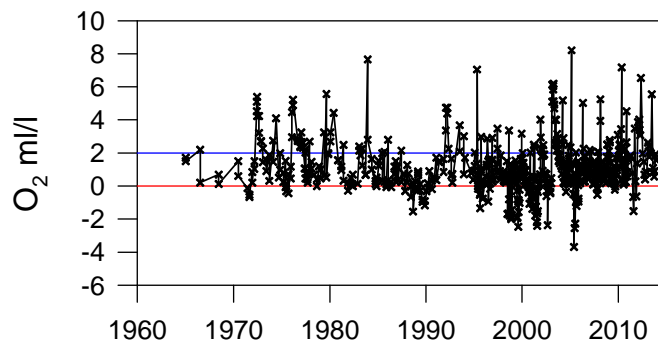
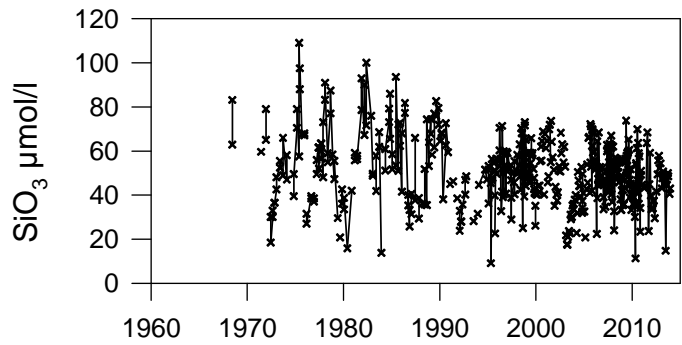
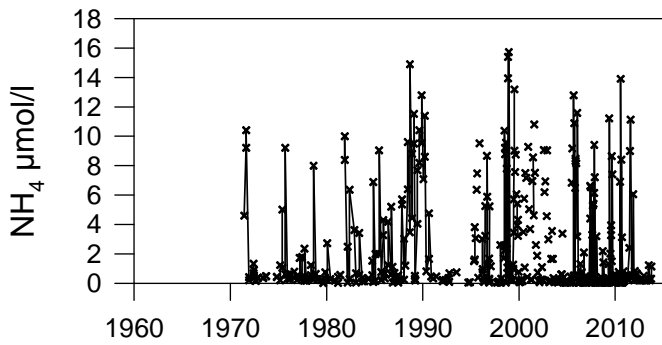
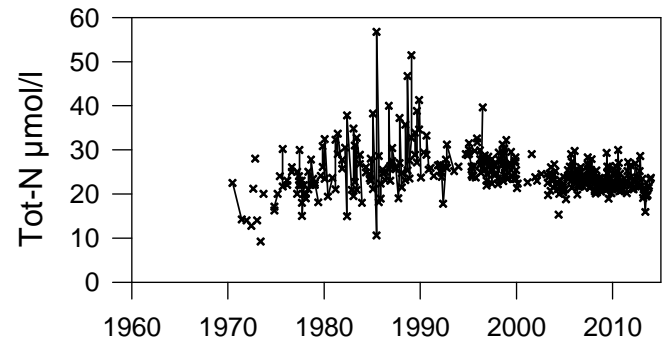
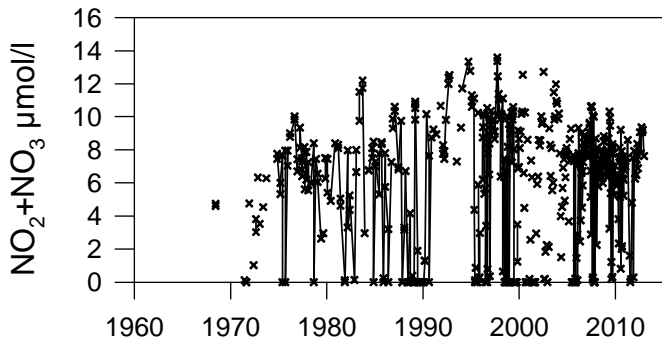
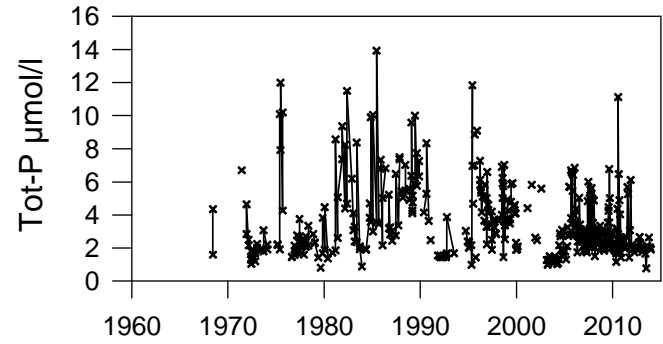
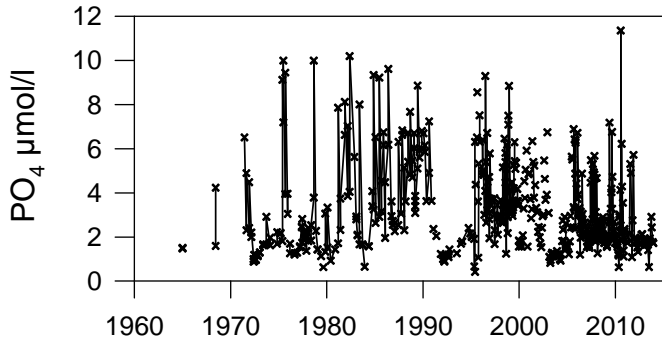
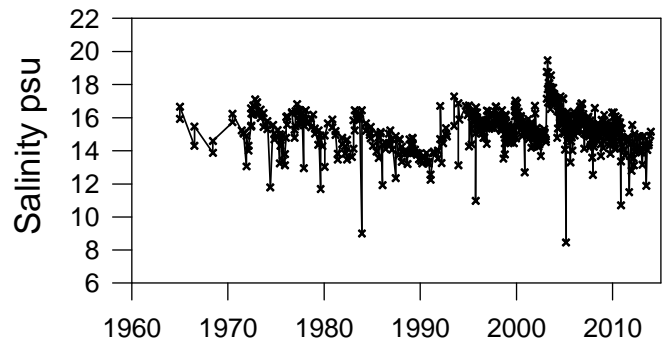
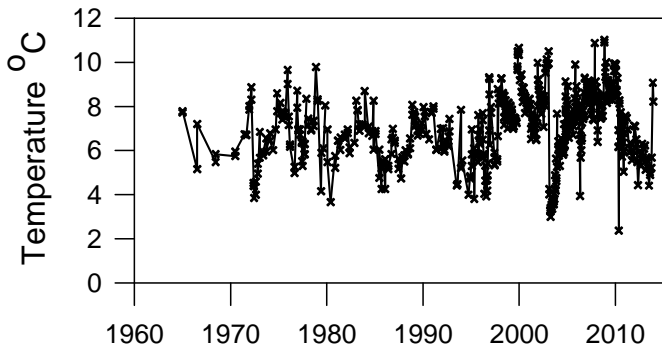
OXYGEN IN BOTTOM WATER (depth > 70m)





STATION HANÖBUKTEN SURFACE WATER

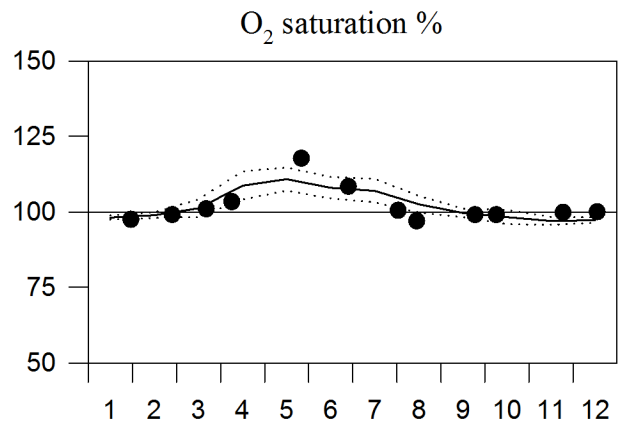
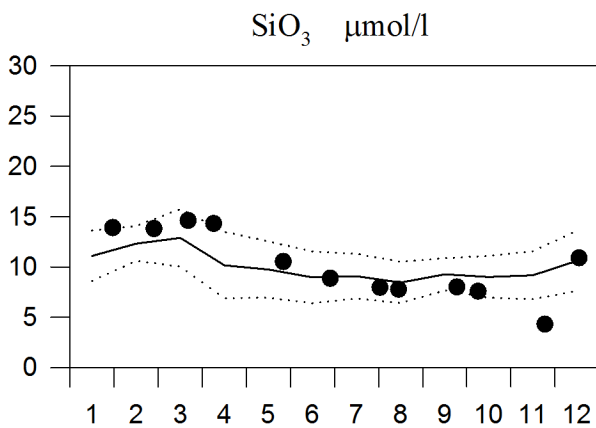
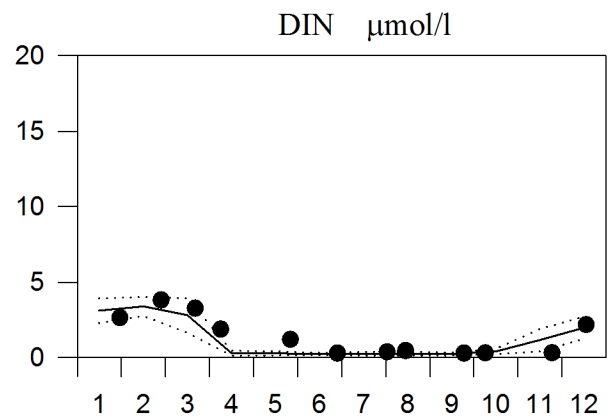
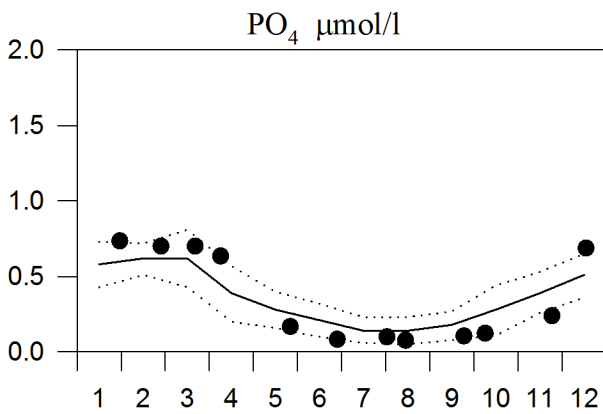
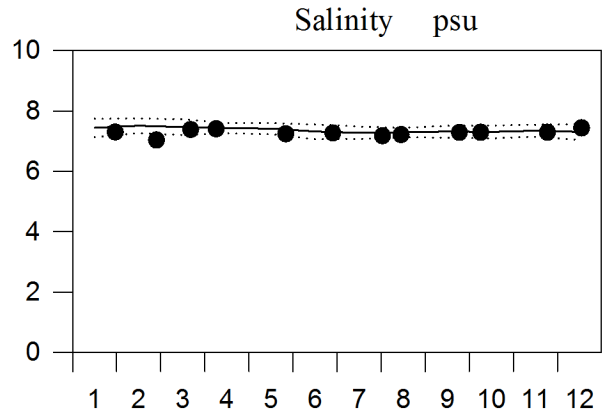
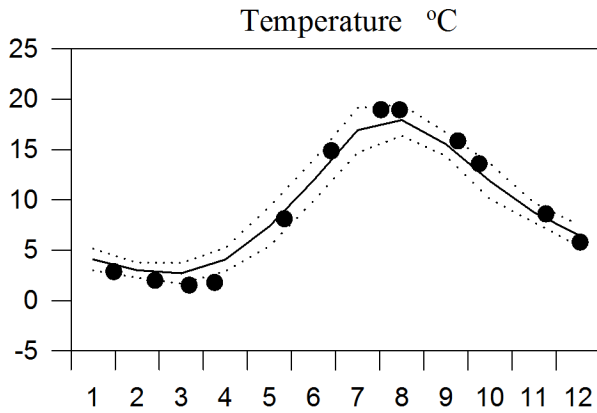




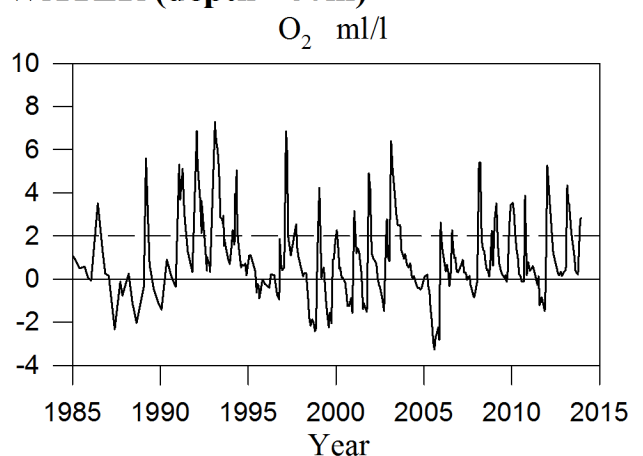
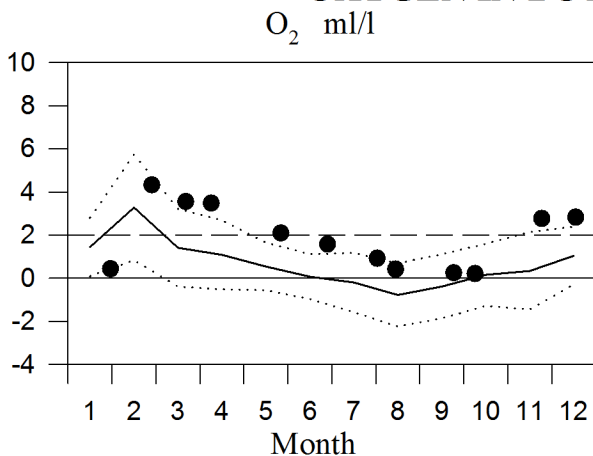
STATION BY4 SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2013

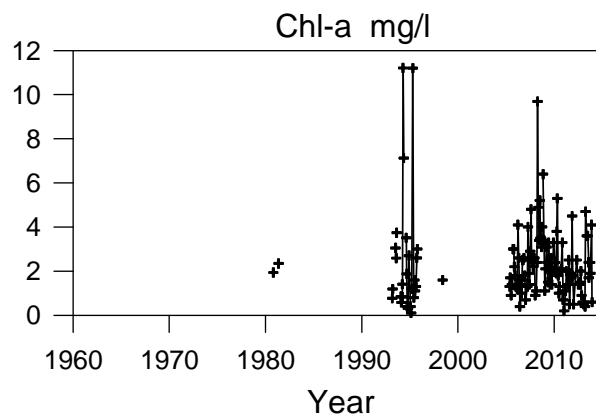
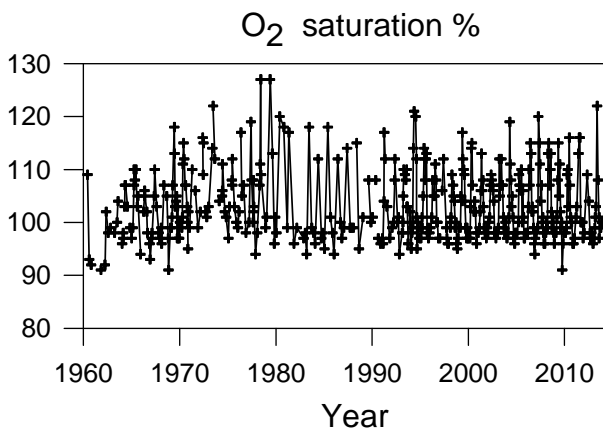
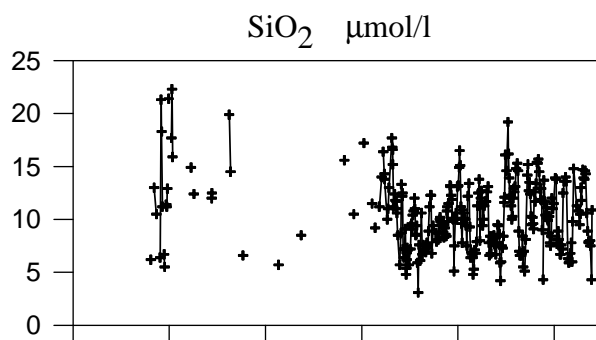
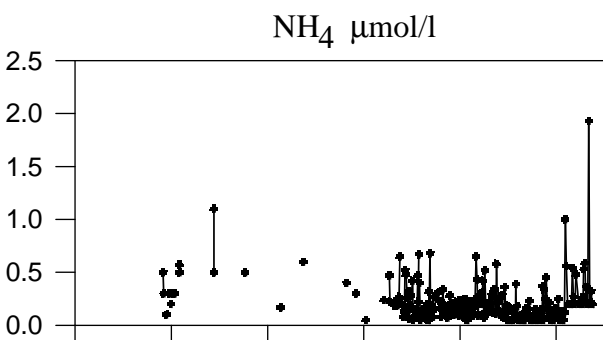
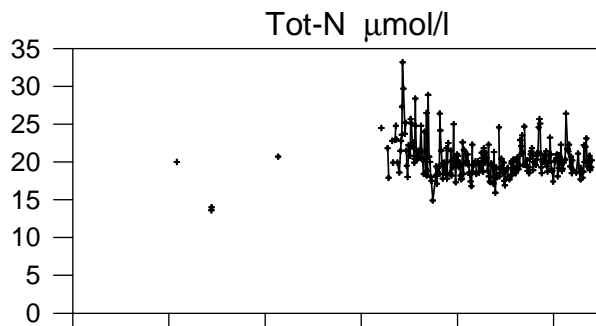
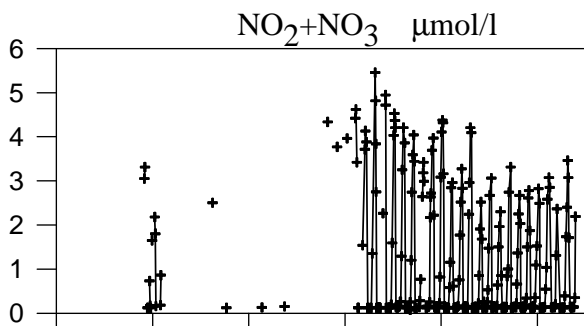
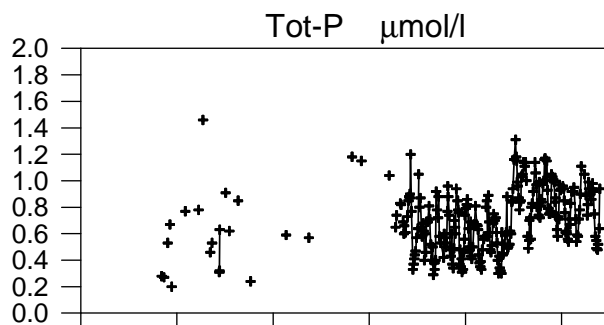
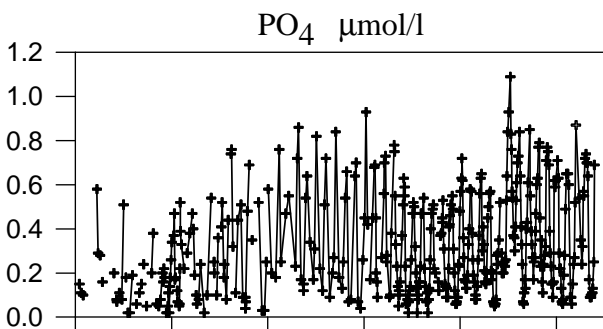
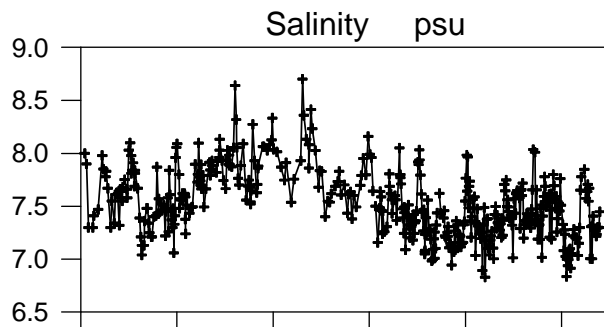
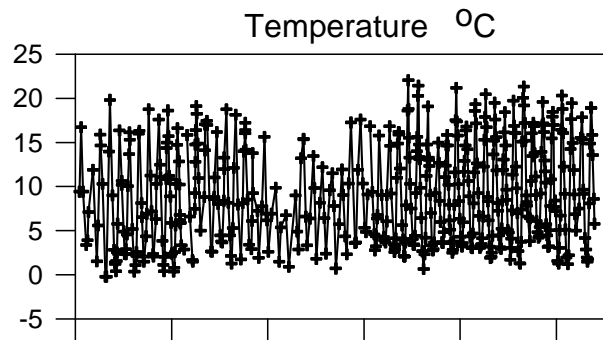


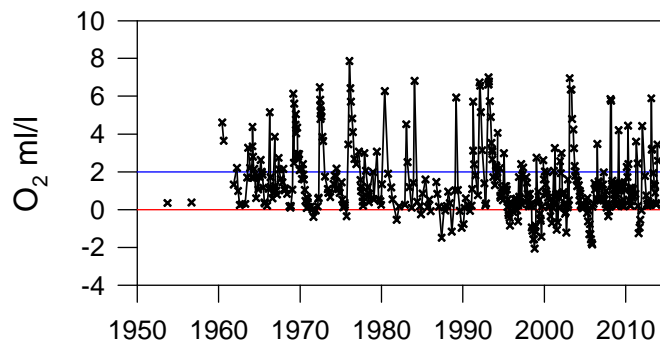
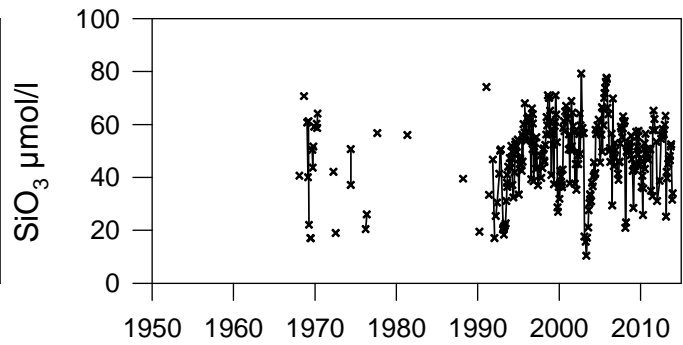
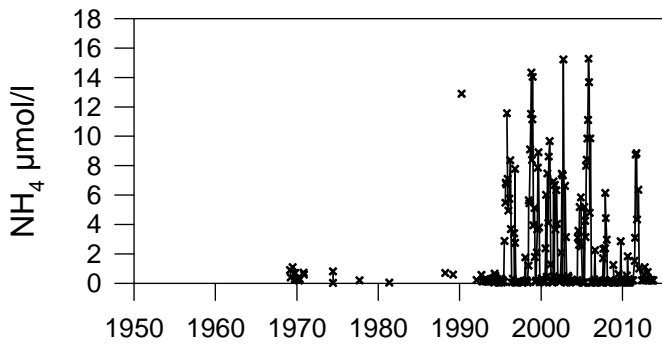
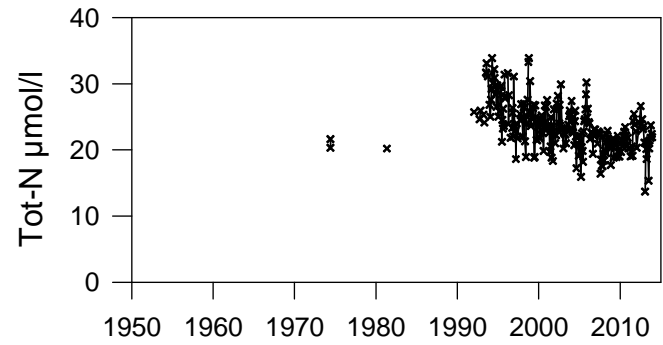
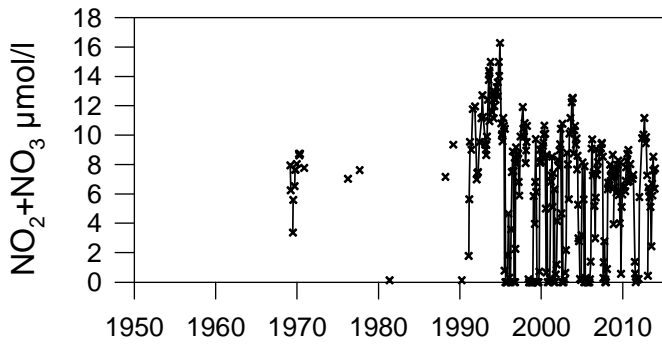
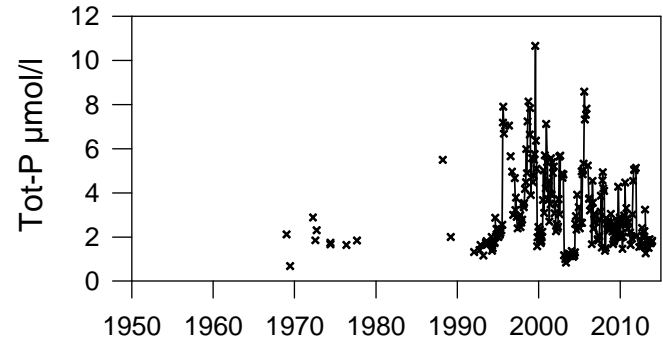
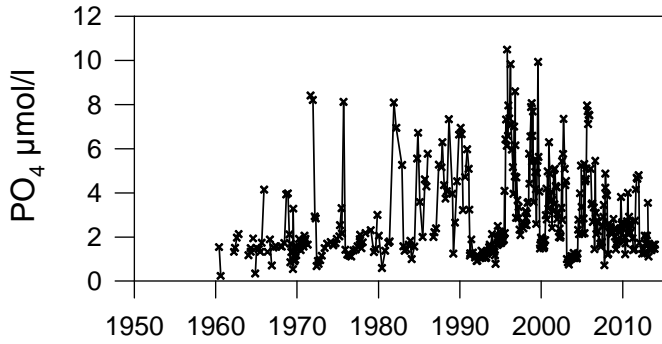
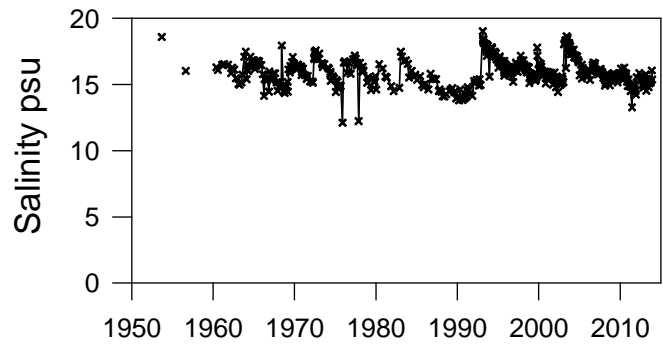
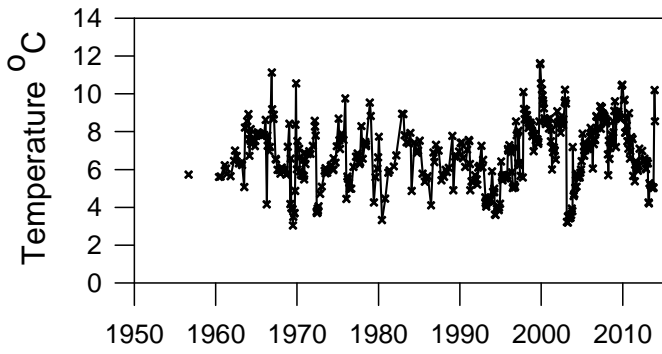
OXYGEN IN BOTTOM WATER (depth >80m)





STATION BY4 SURFACE WATER

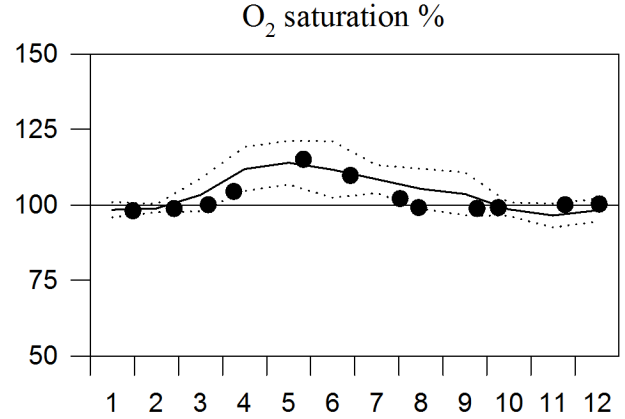
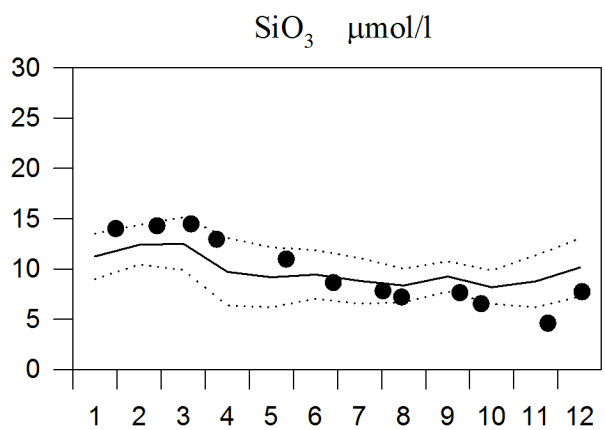
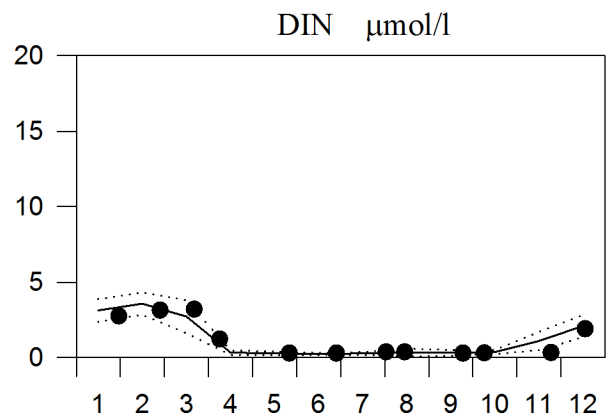
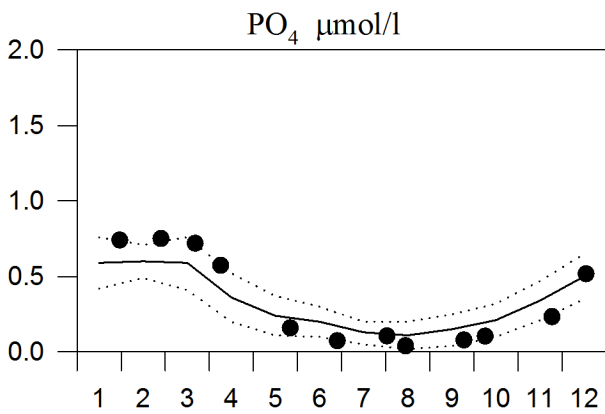
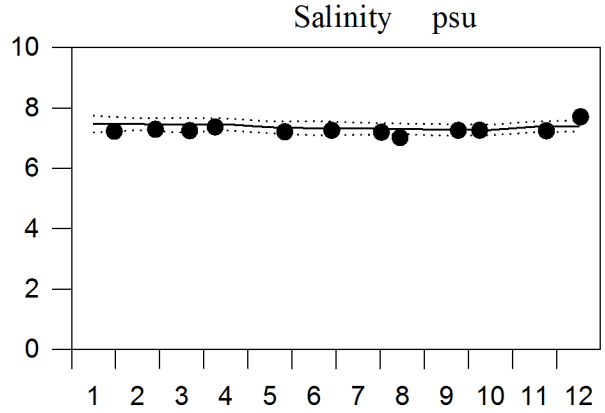
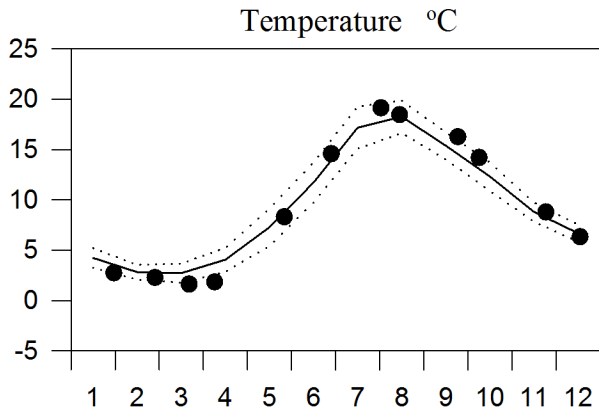




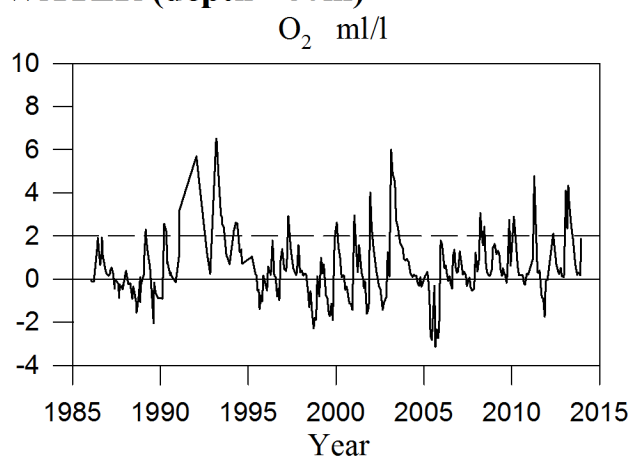
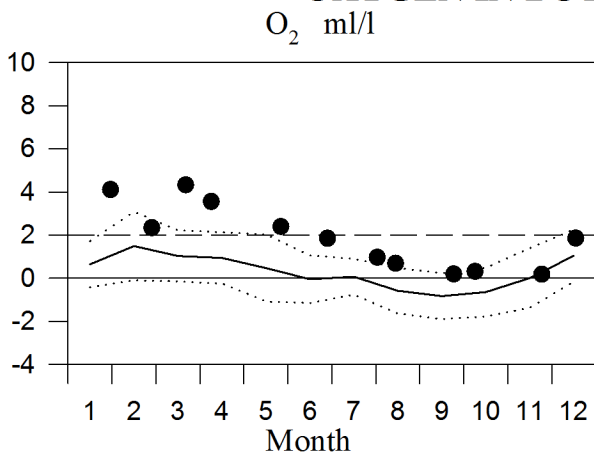
STATION BY5 SURFACE WATER

Annual Cycles

— Mean 1996-2010 ····· St.Dev. ● 2013

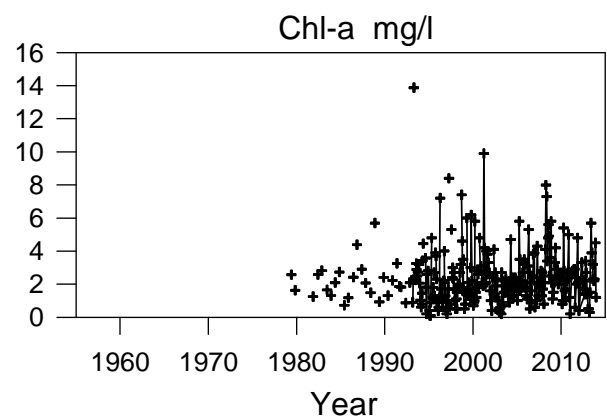
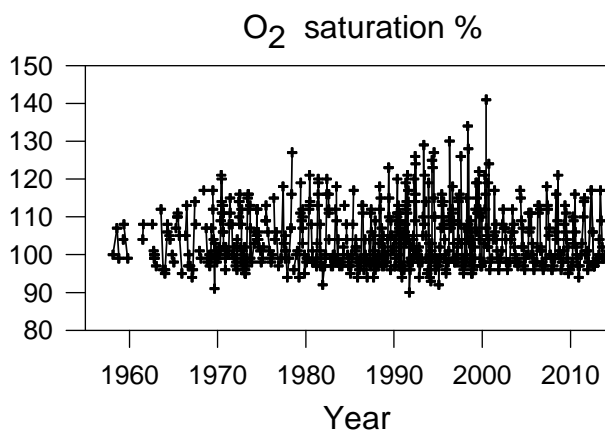
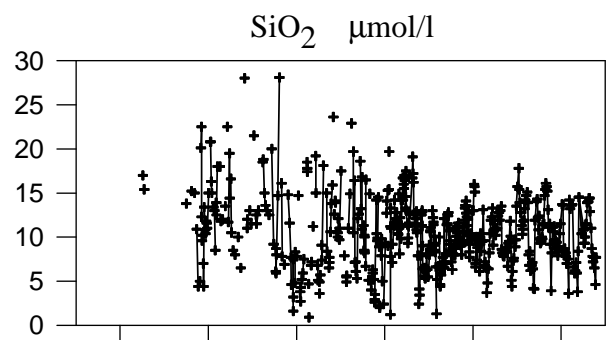
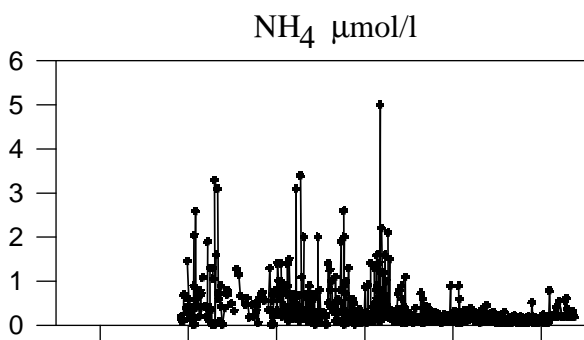
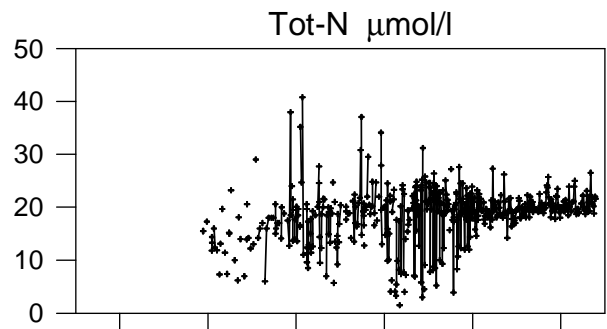
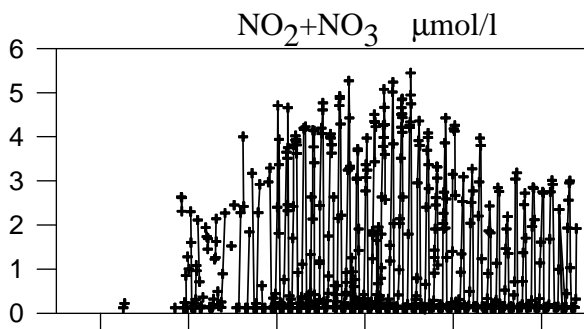
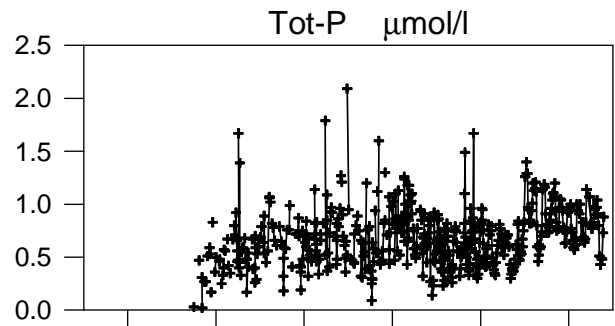
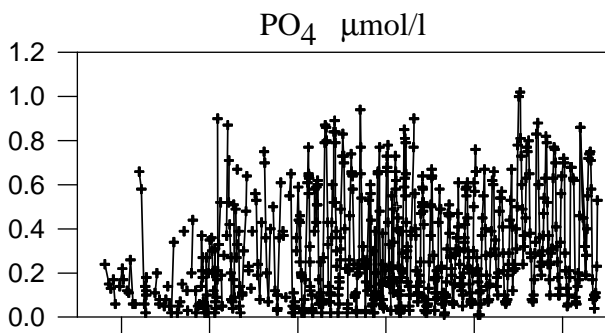
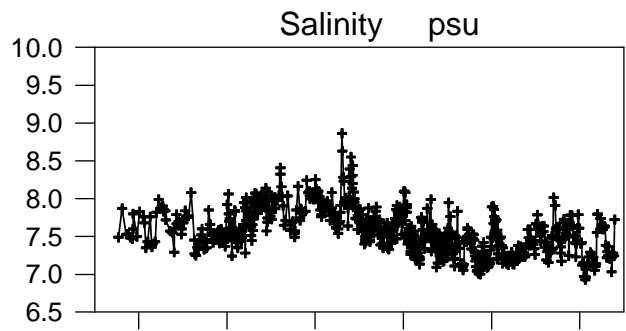
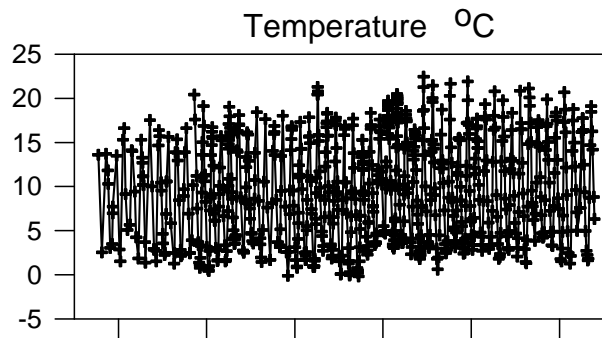


OXYGEN IN BOTTOM WATER (depth >80m)



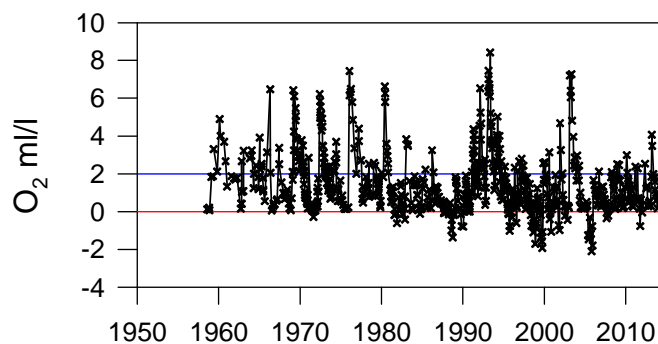
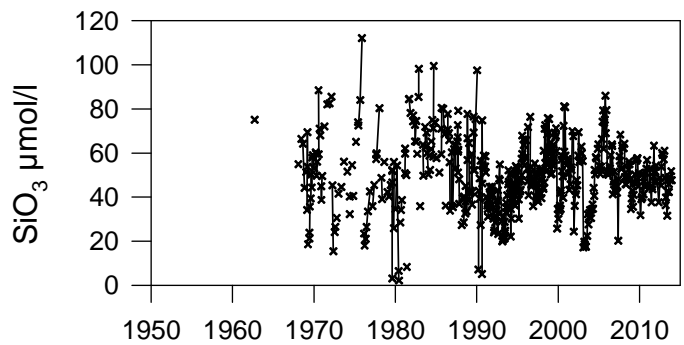
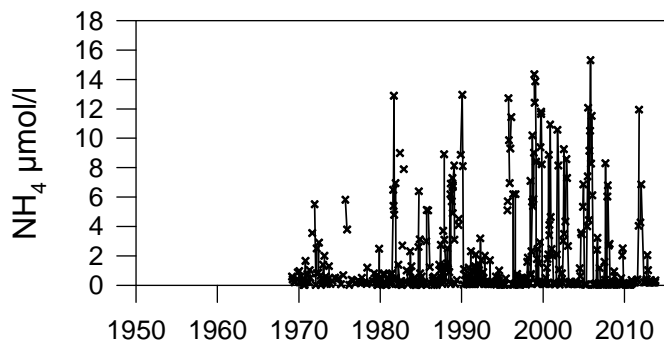
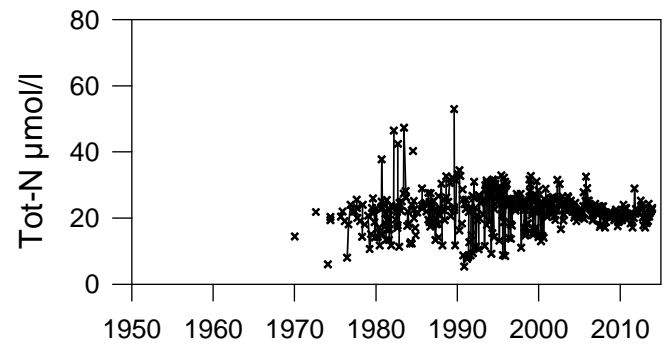
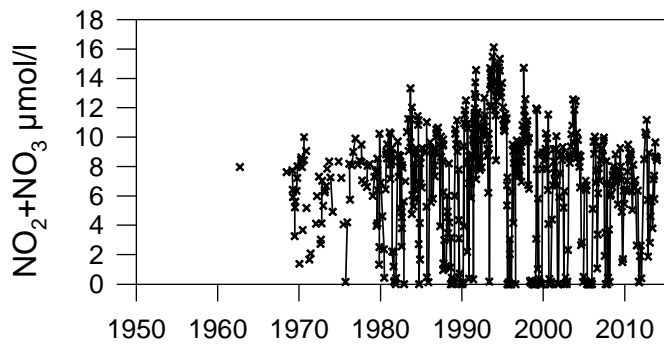
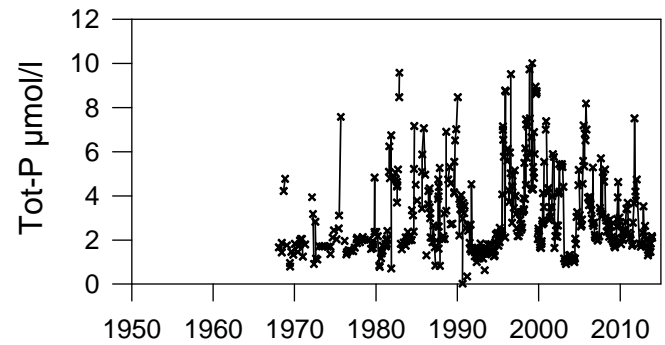
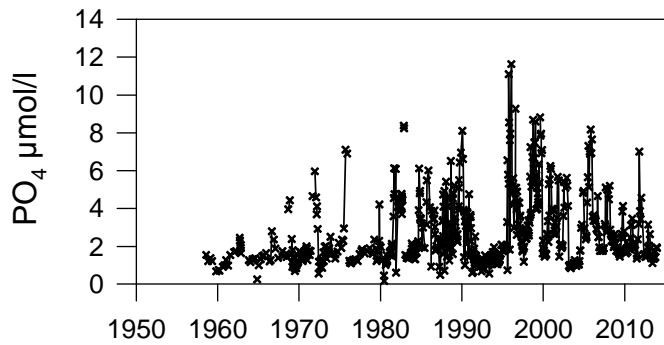
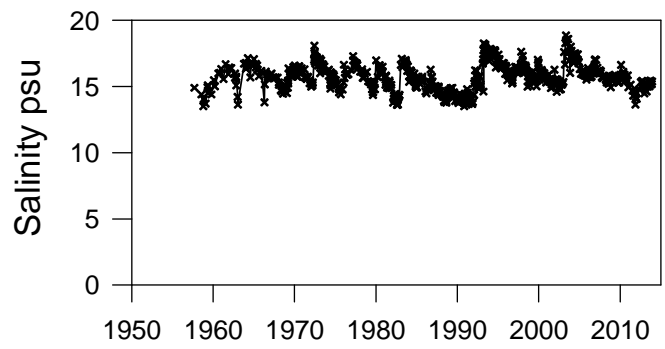
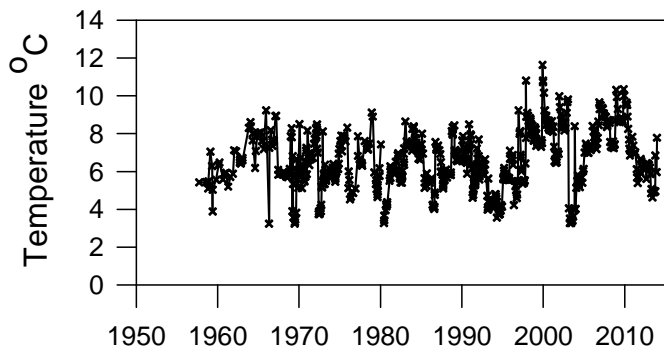


STATION BY5 SURFACE WATER





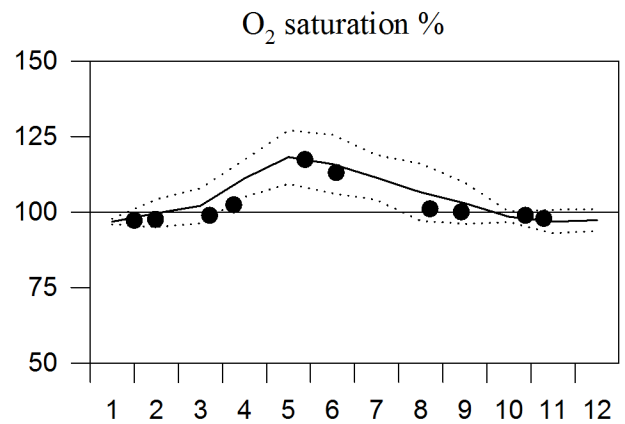
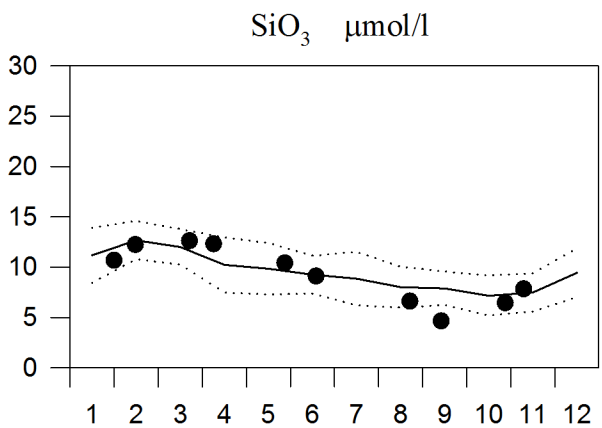
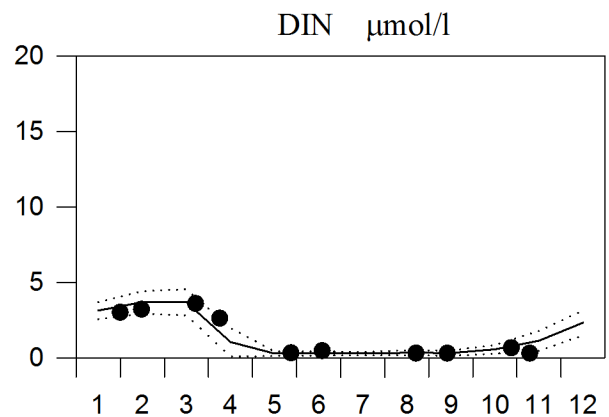
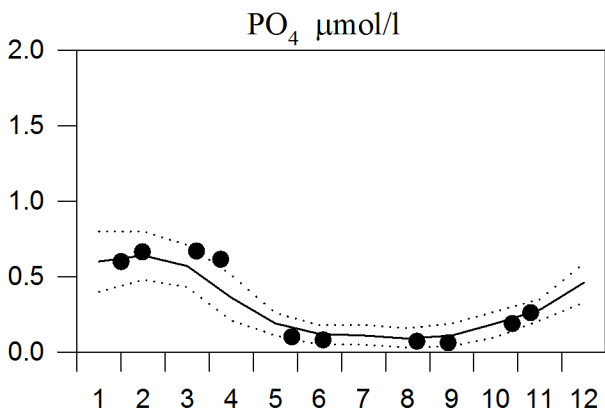
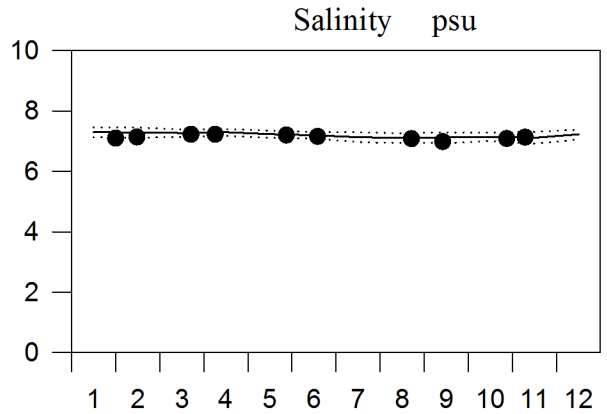
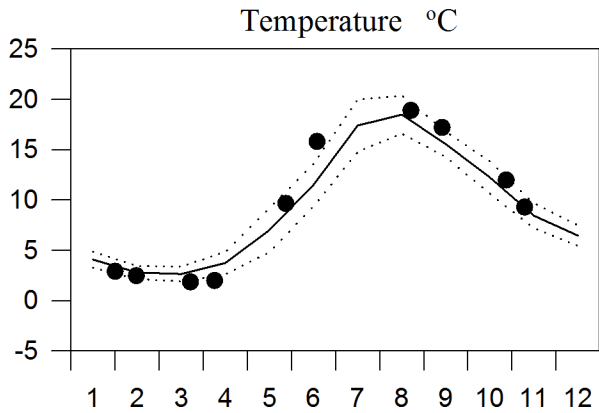
STATION BY5 DEEP WATER (80m)



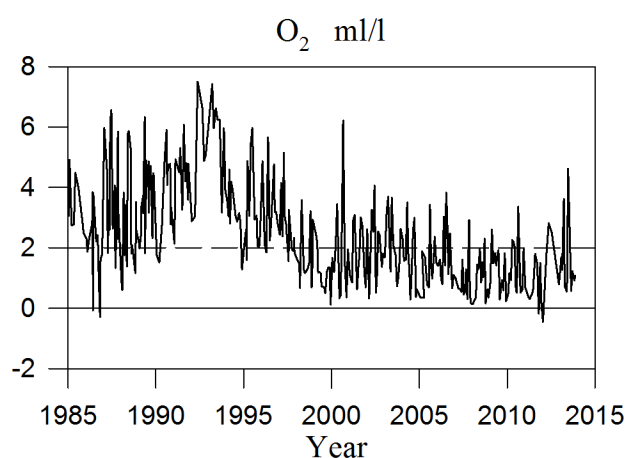
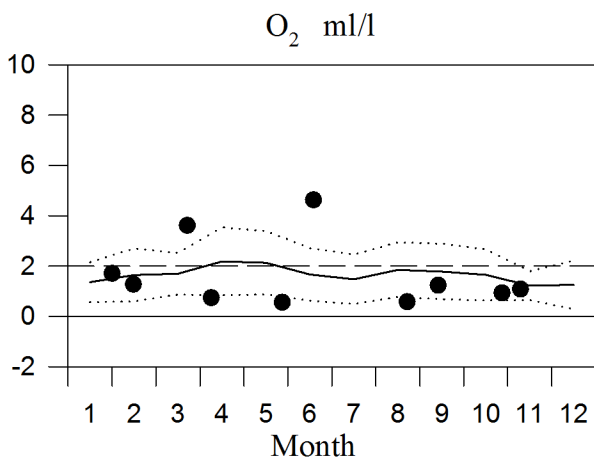
STATION BCS III-10 SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2013

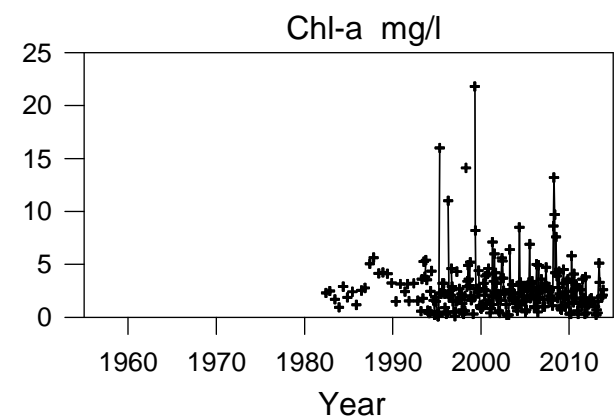
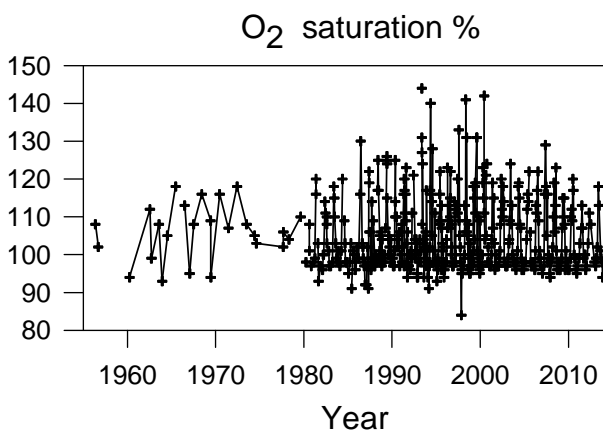
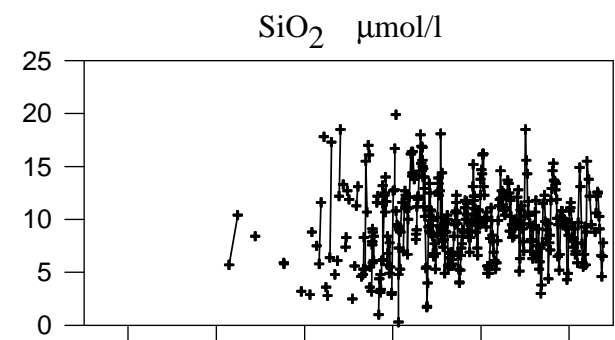
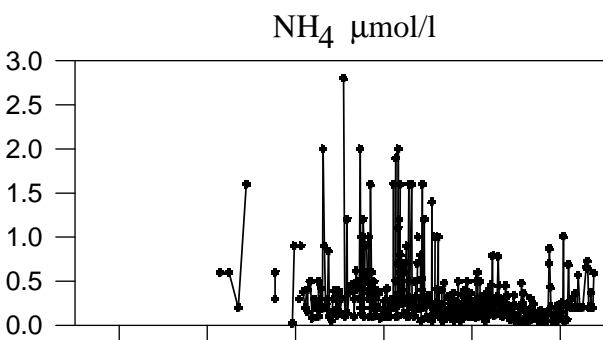
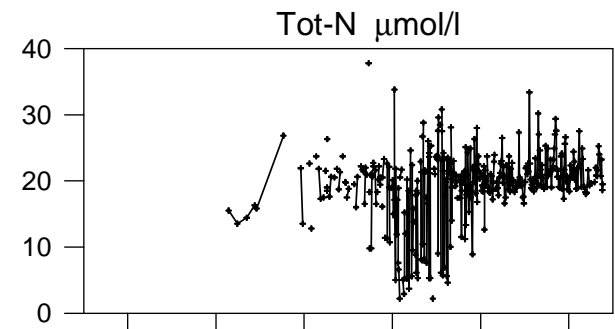
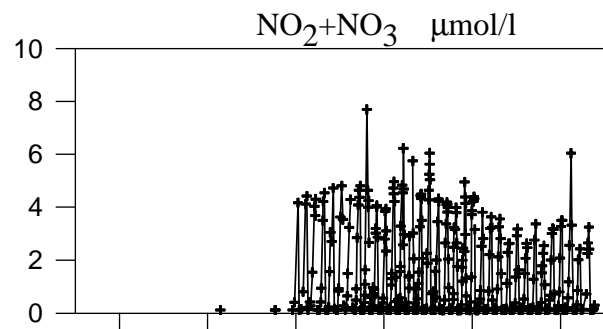
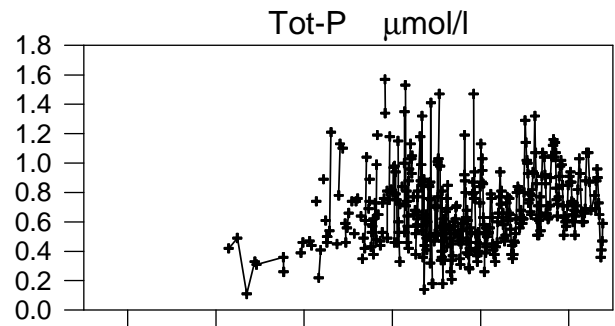
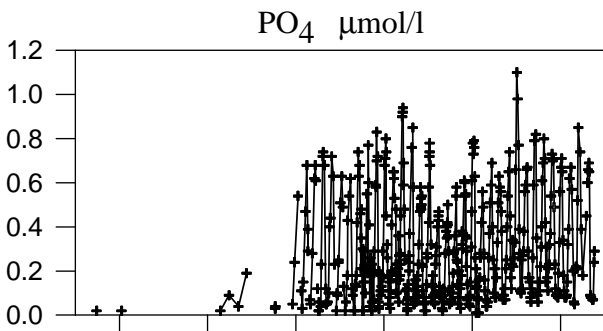
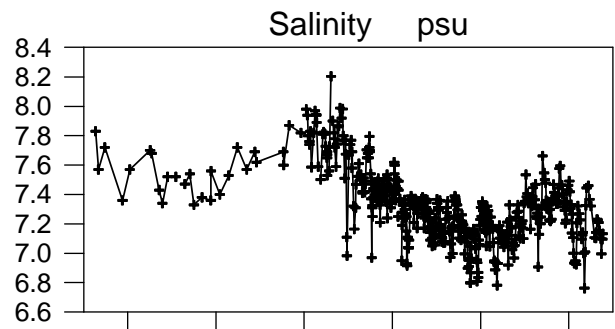
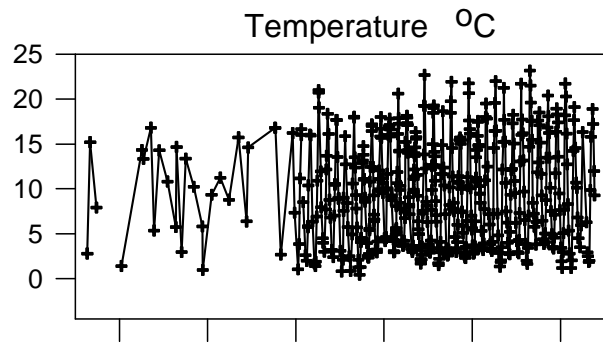


OXYGEN IN BOTTOM WATER (depth > 80m)



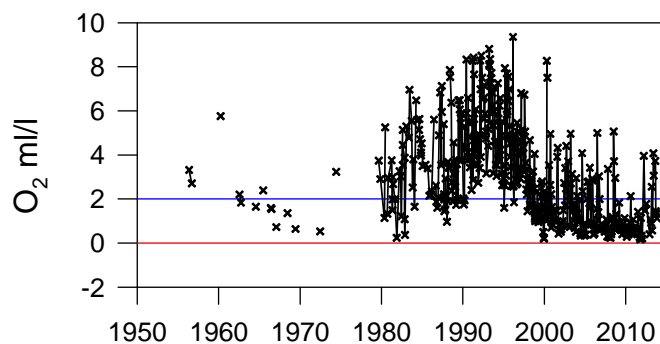
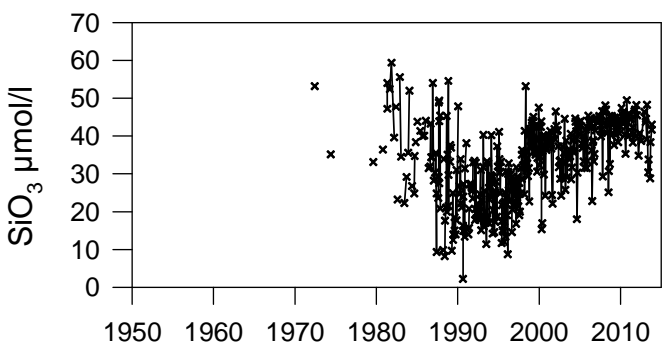
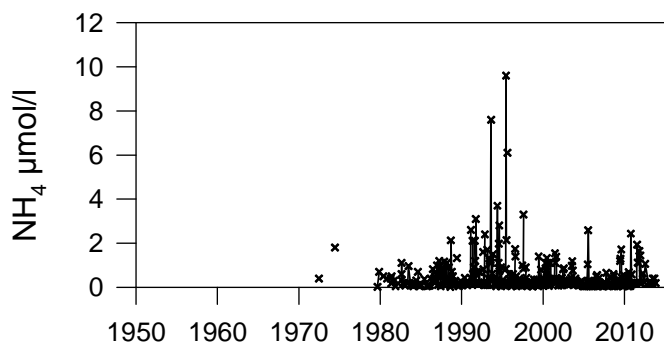
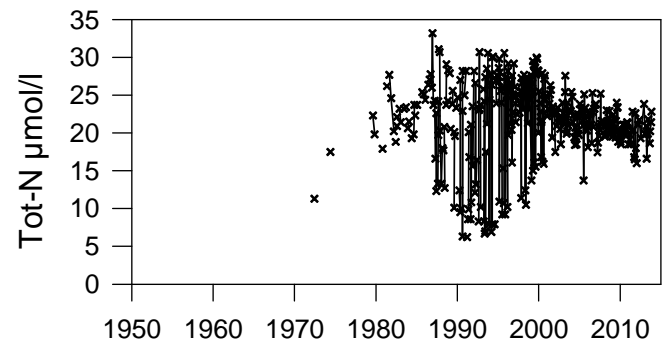
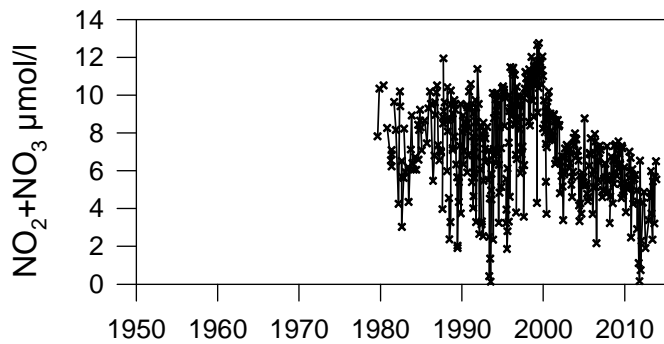
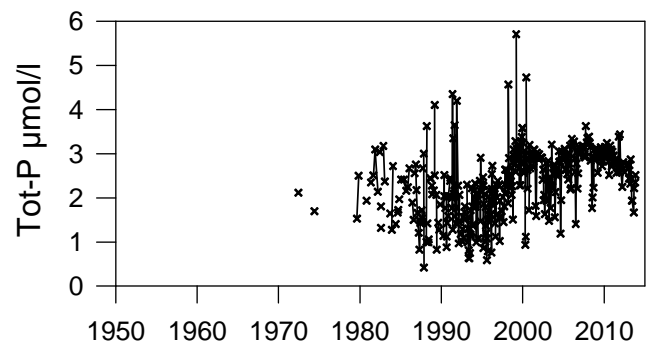
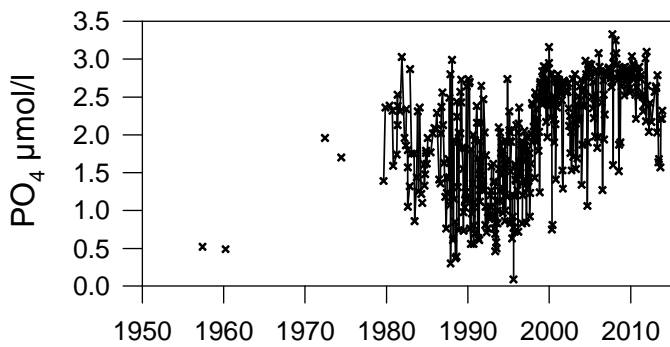
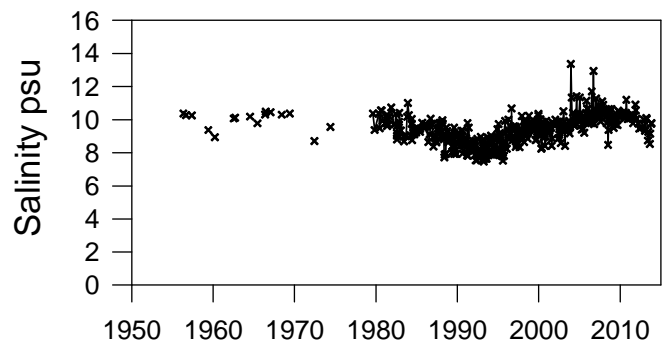
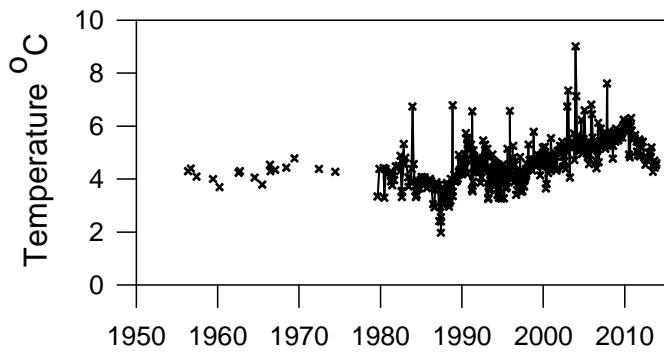


STATION BCS III-10 SURFACE WATER





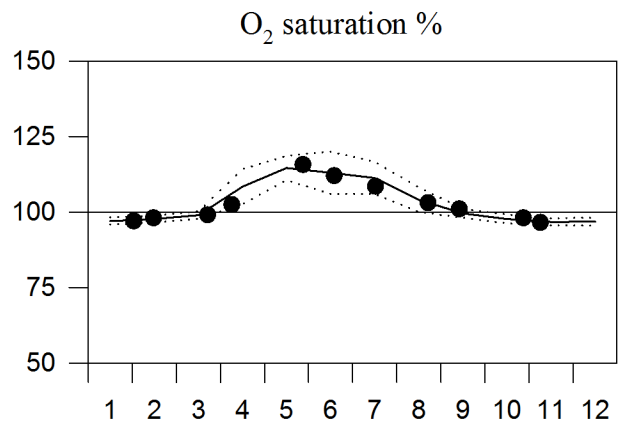
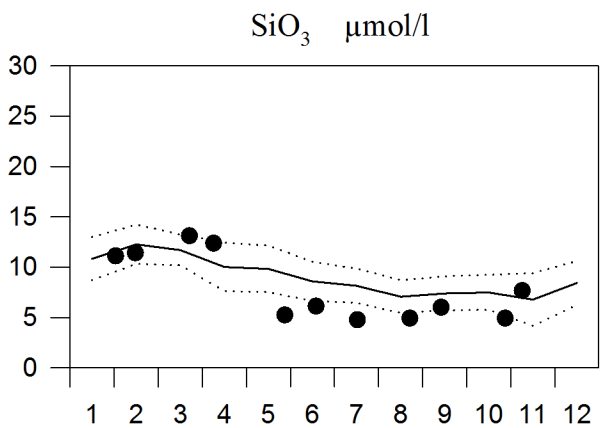
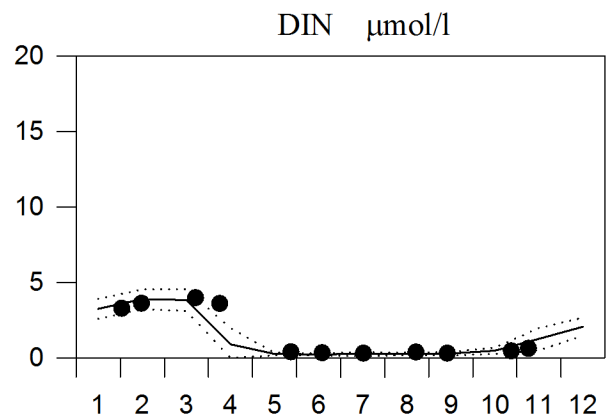
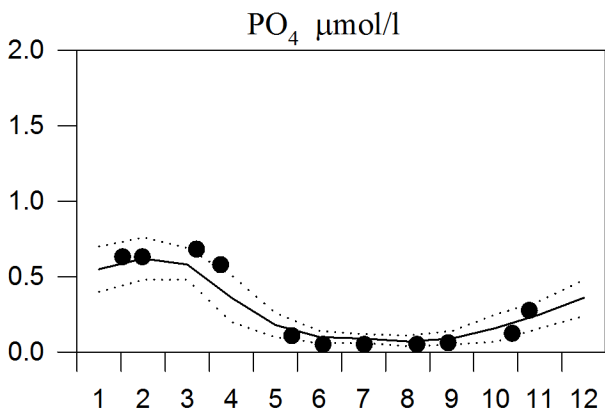
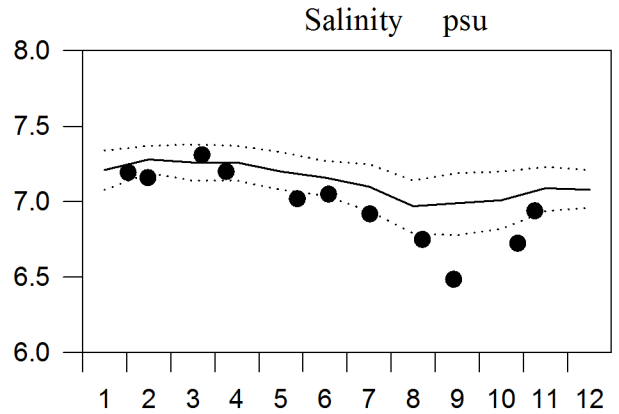
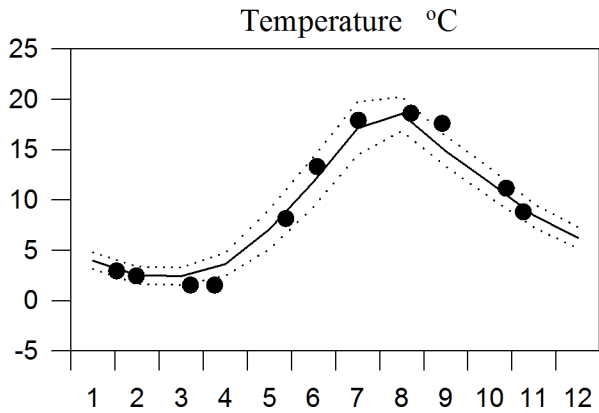
STATION BCS III-10 DEEP WATER (80m)



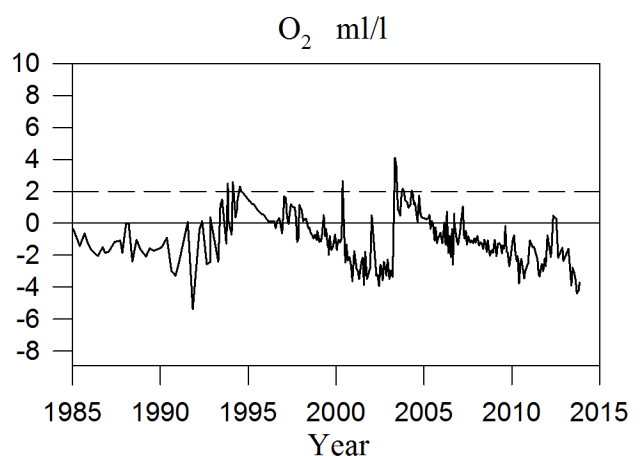
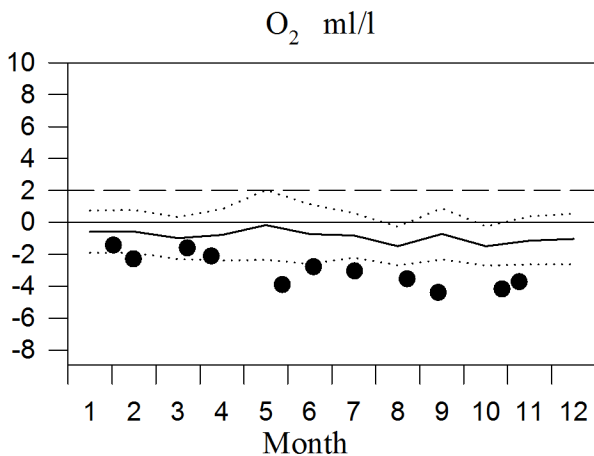
STATION BY10 SURFACE WATER

Annual Cycles

— Mean 1996-2010 ····· St.Dev. ● 2013

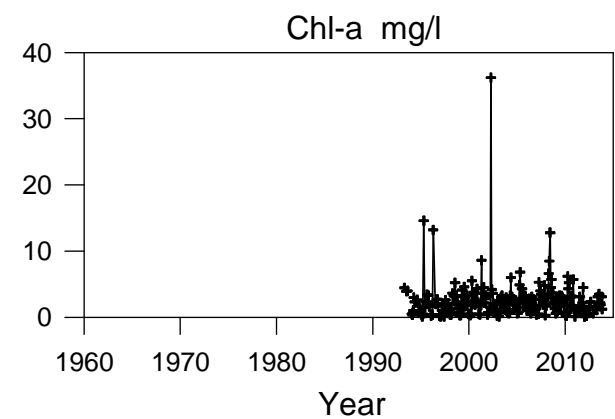
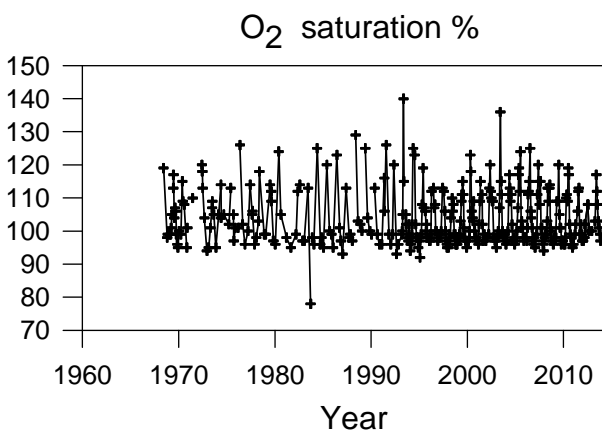
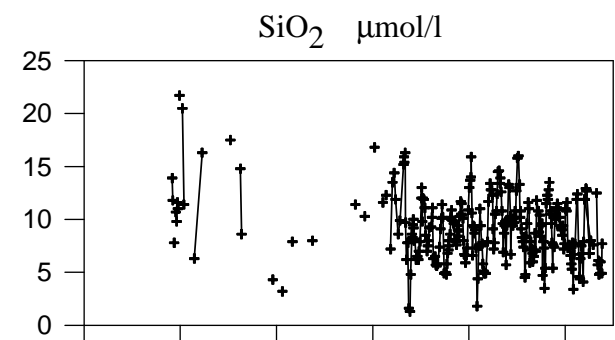
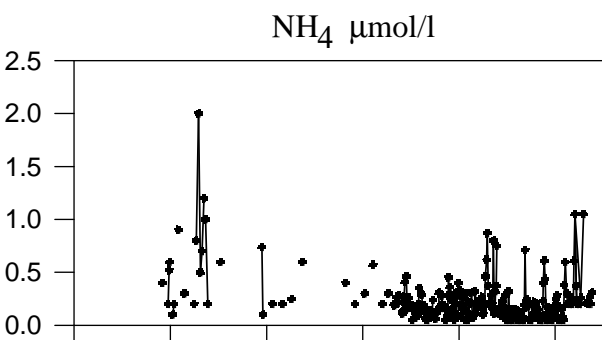
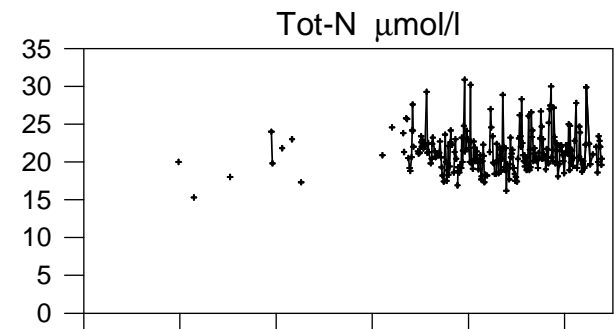
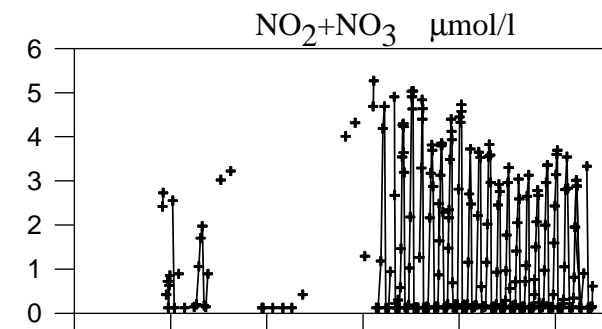
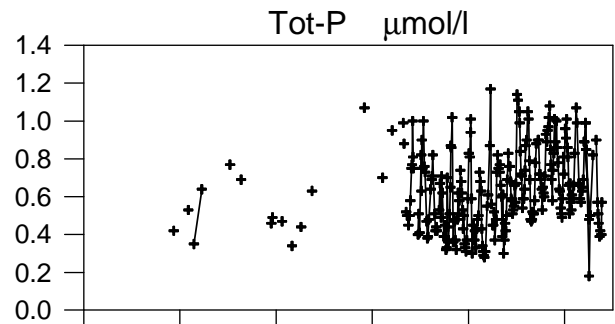
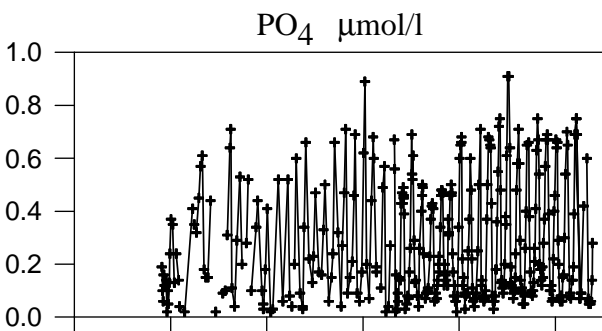
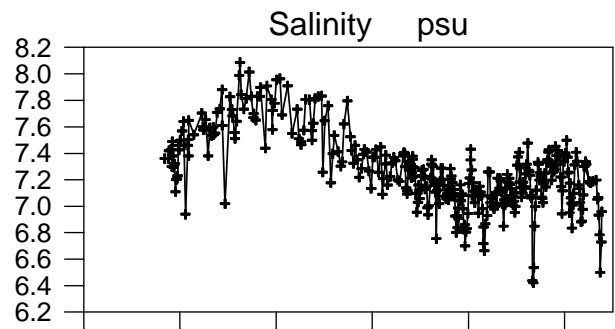
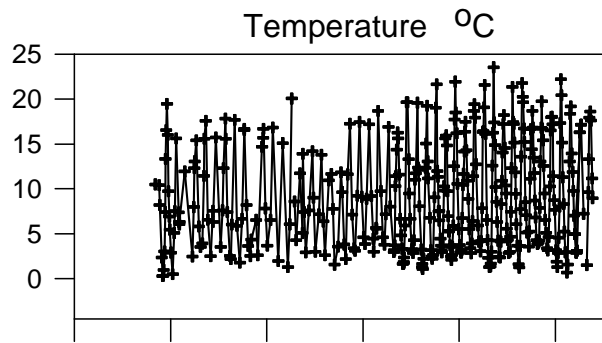


OXYGEN IN BOTTOM WATER (depth >125m)



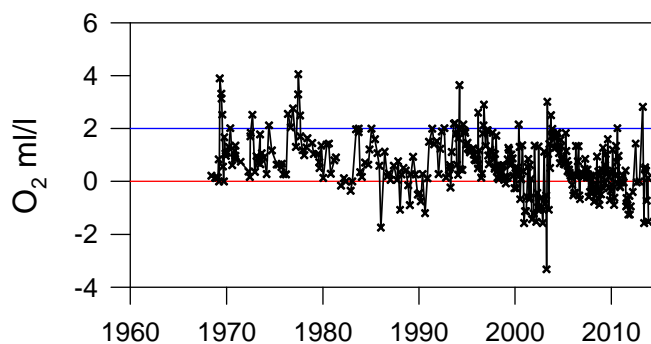
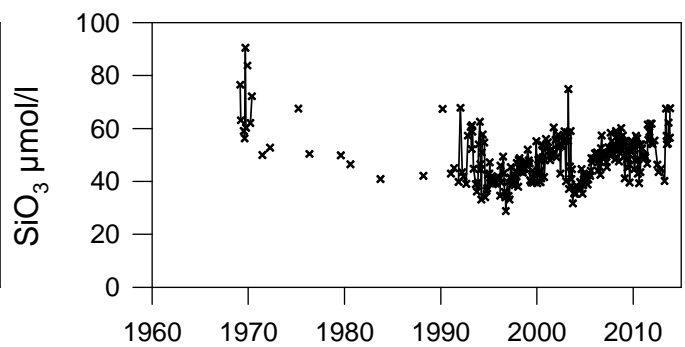
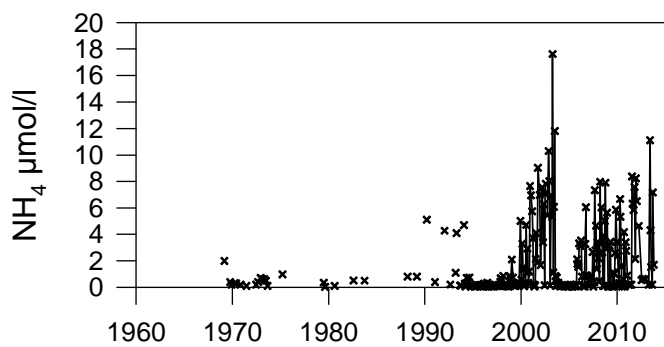
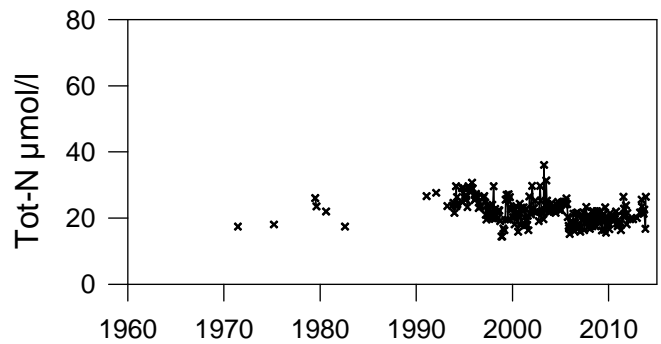
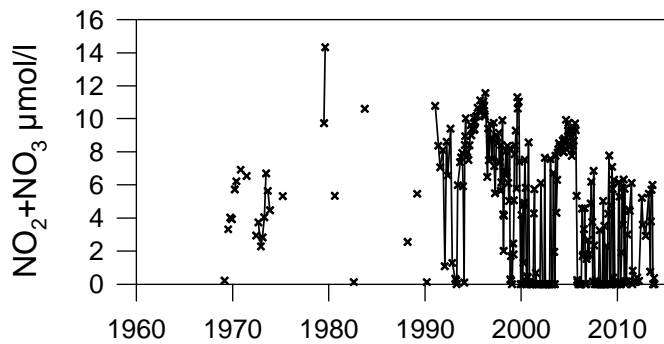
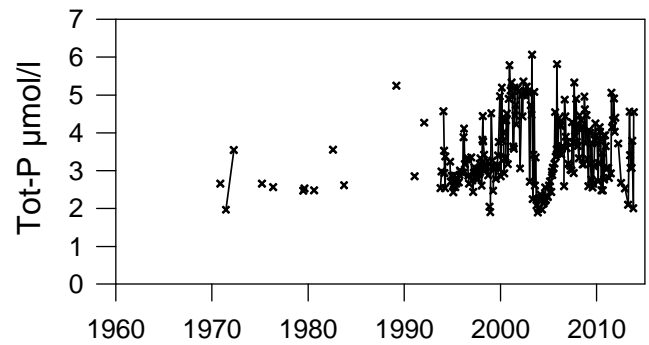
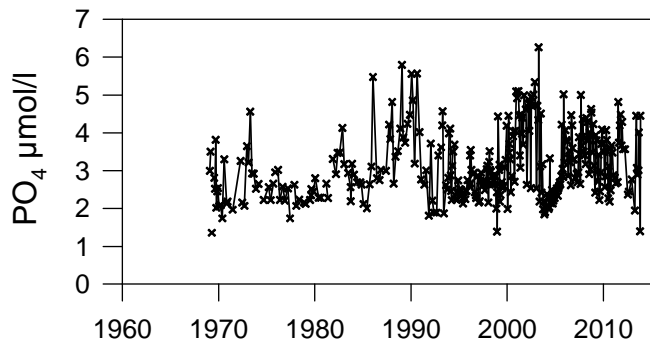
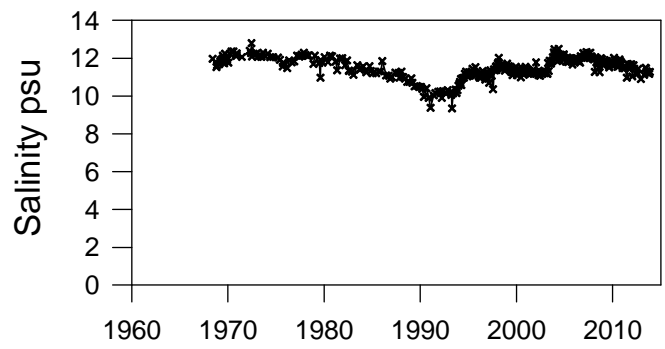
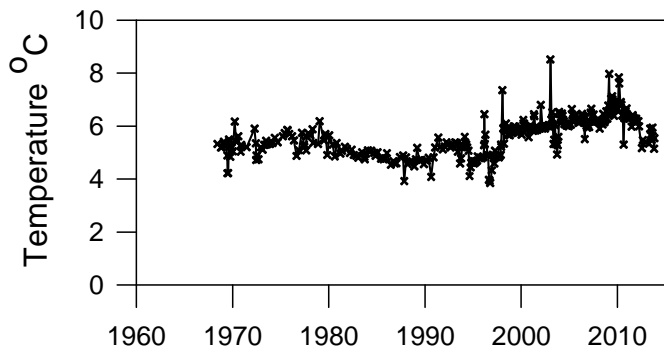


STATION BY10 SURFACE WATER





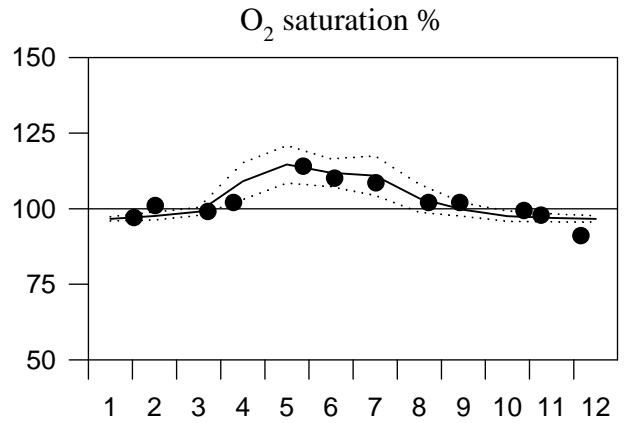
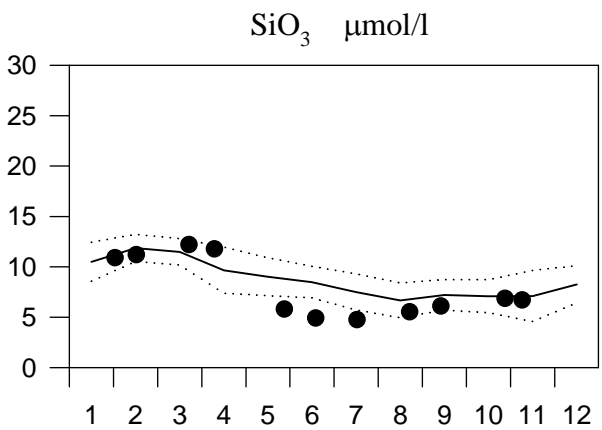
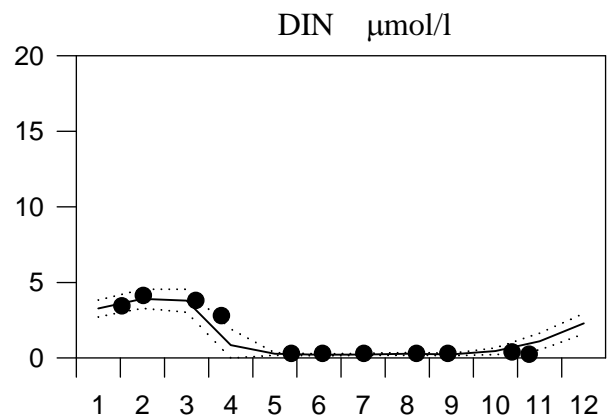
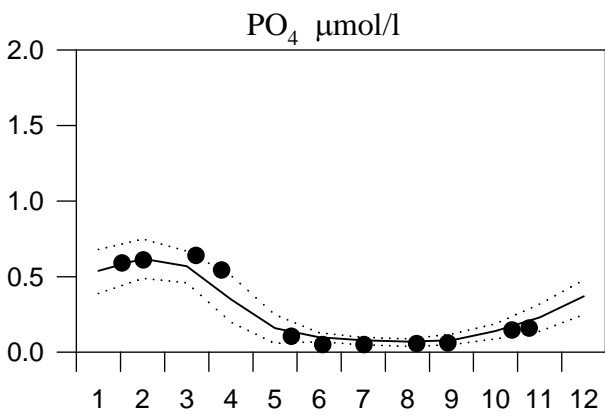
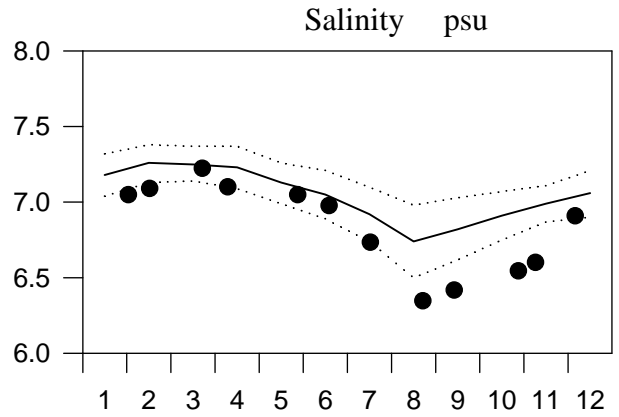
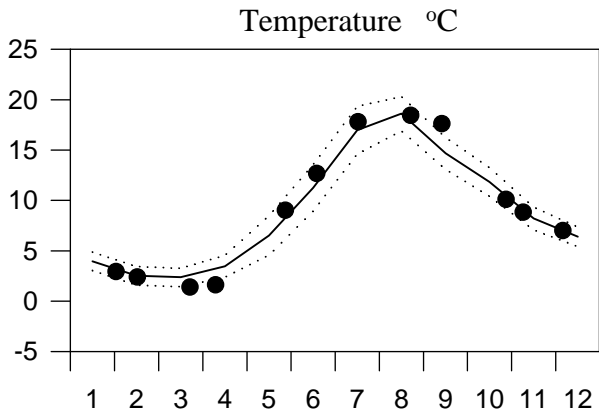
STATION BY10 DEEP WATER (125m)



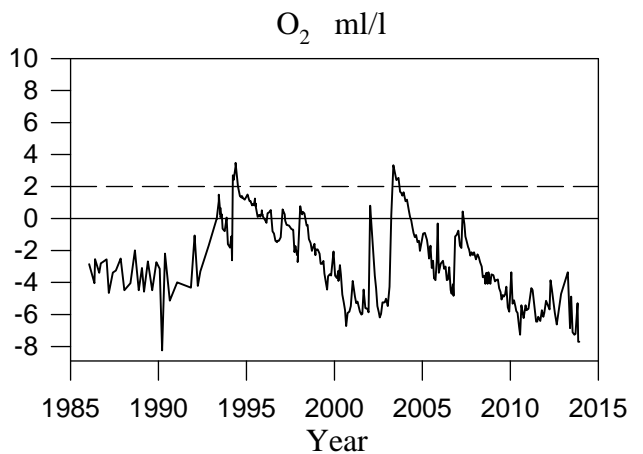
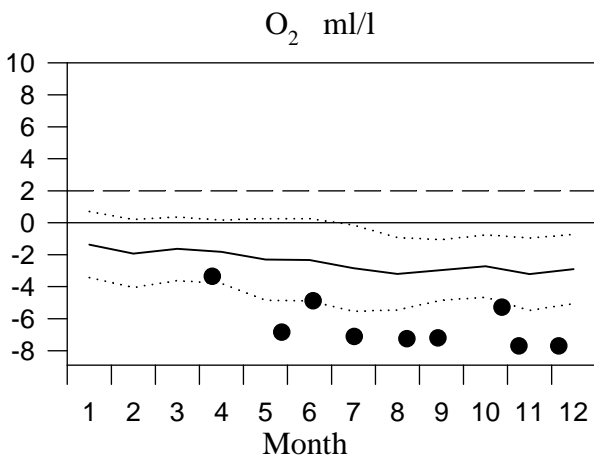
STATION BY15 SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2013

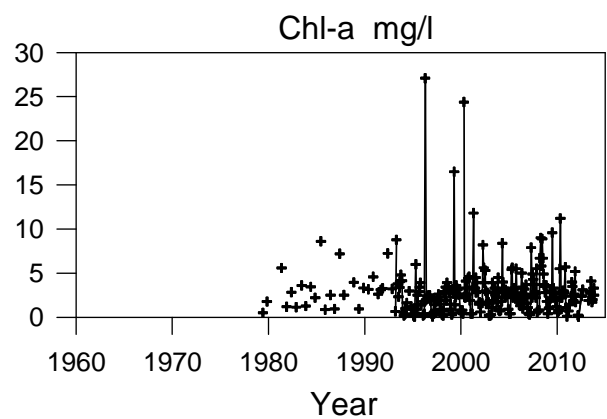
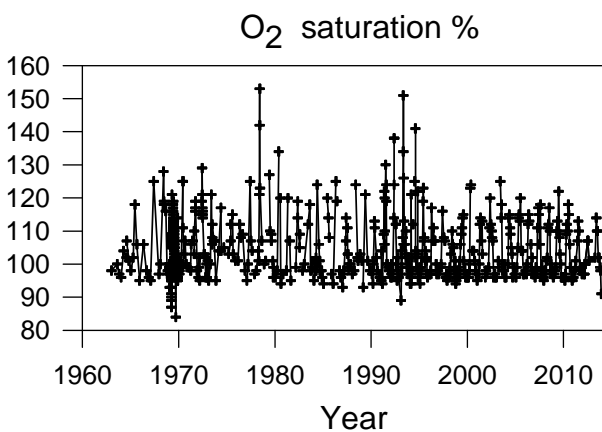
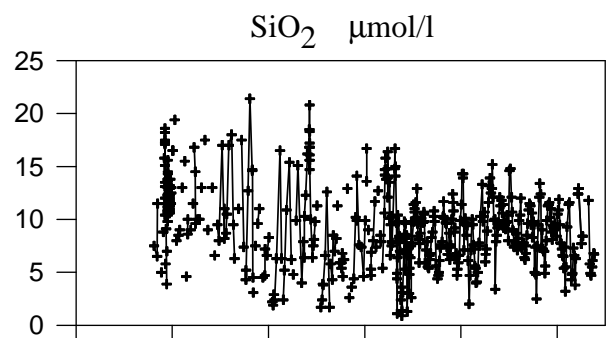
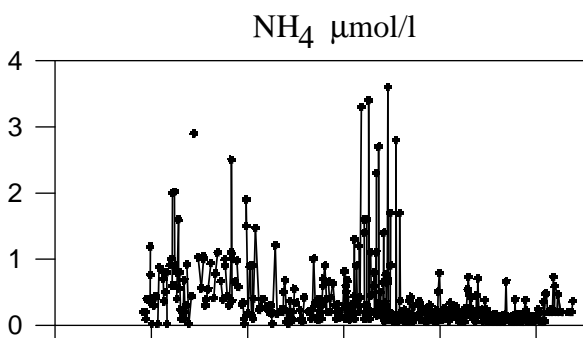
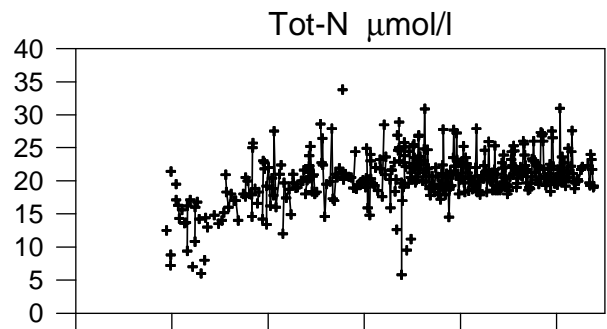
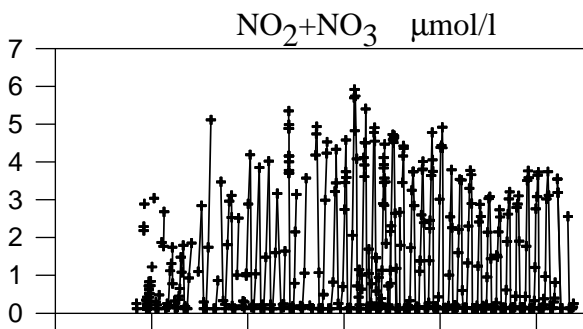
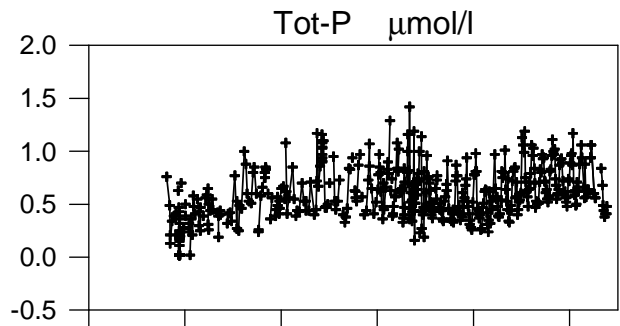
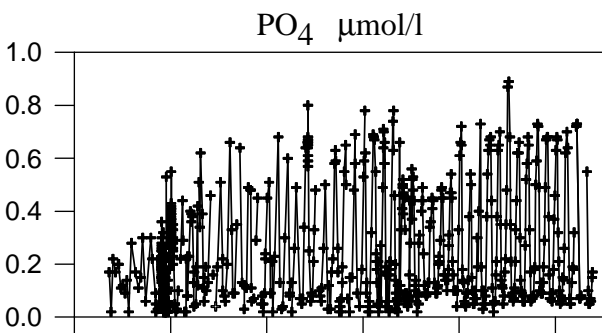
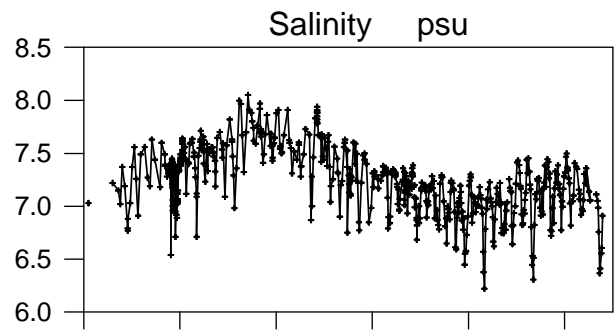
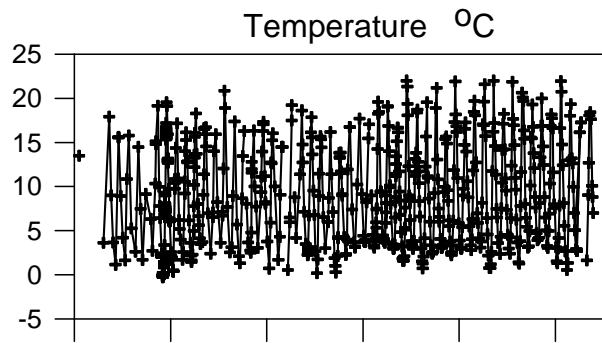


OXYGEN IN BOTTOM WATER (depth >225m)



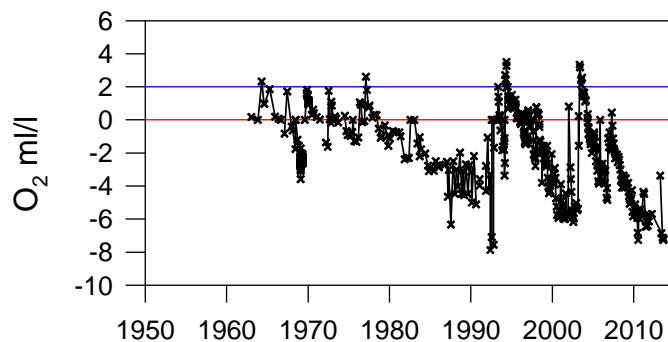
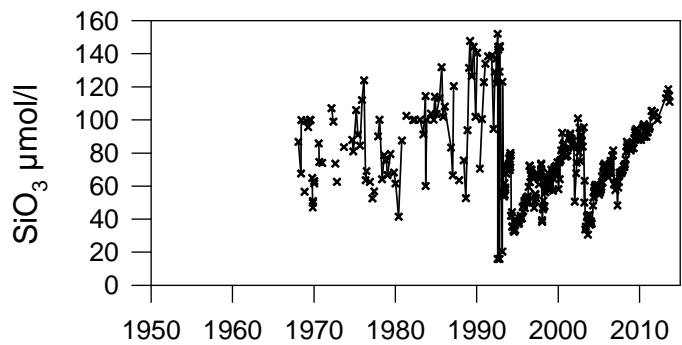
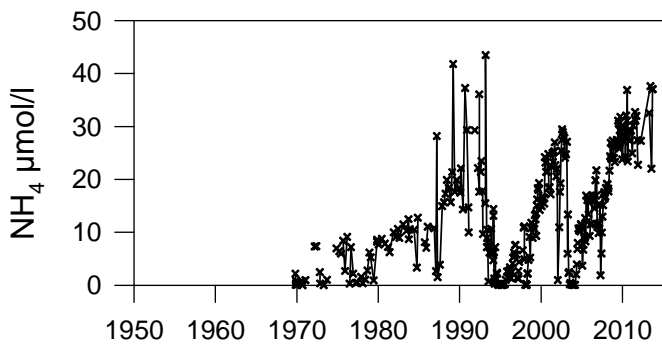
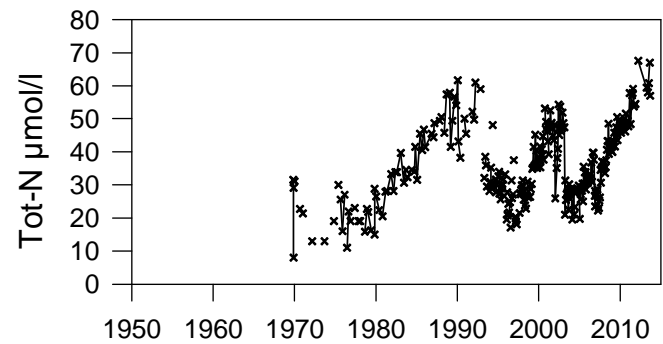
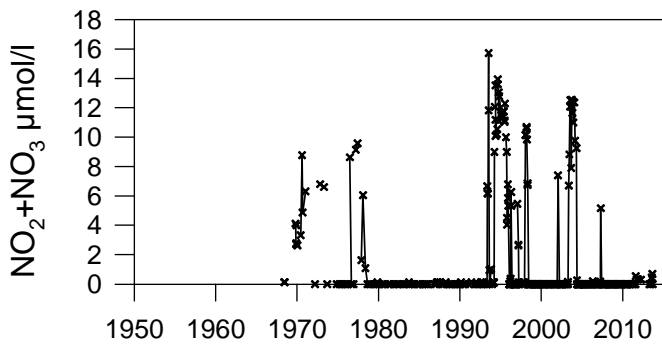
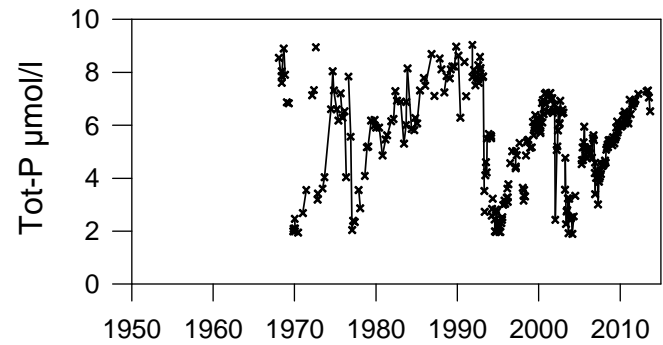
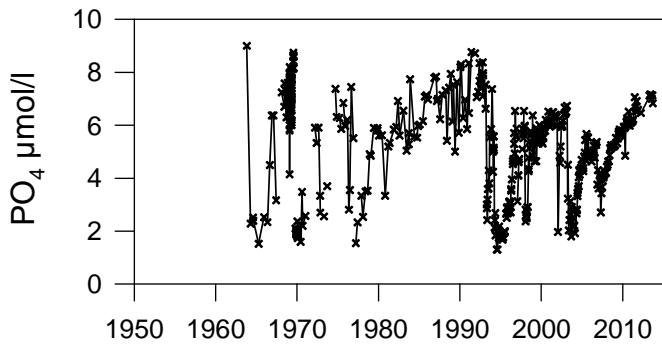
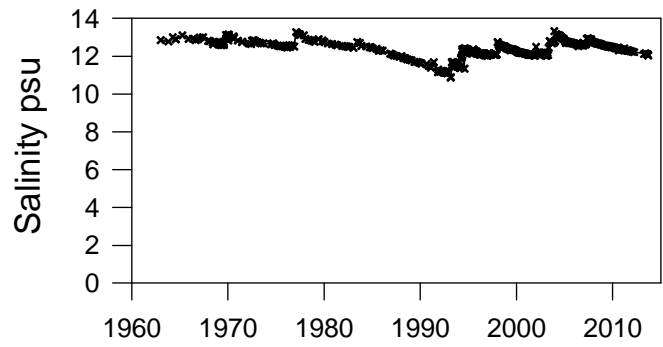
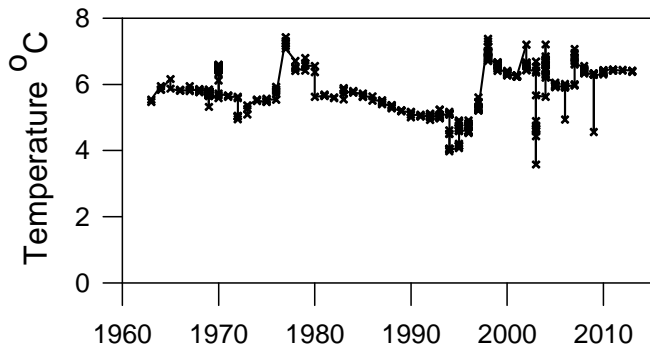


STATION BY15 SURFACE WATER





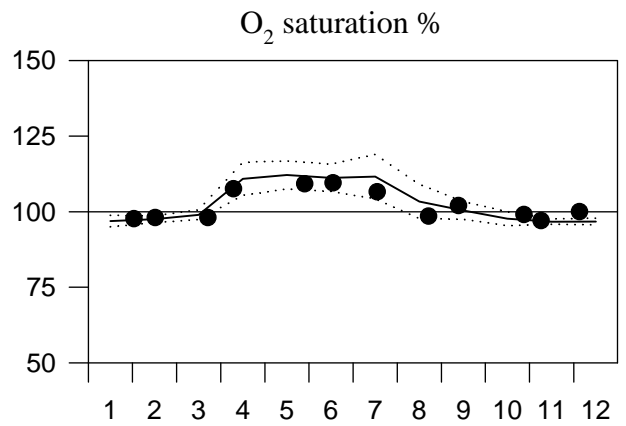
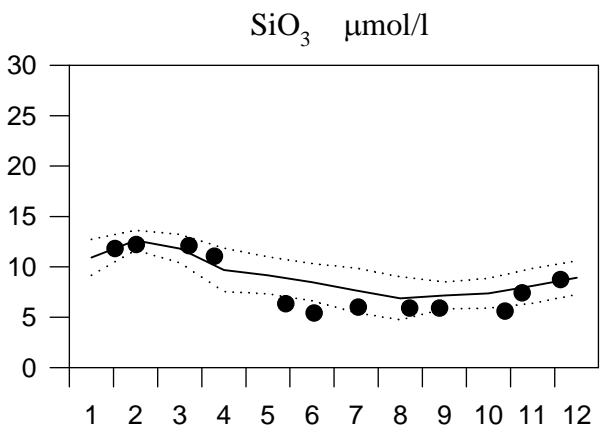
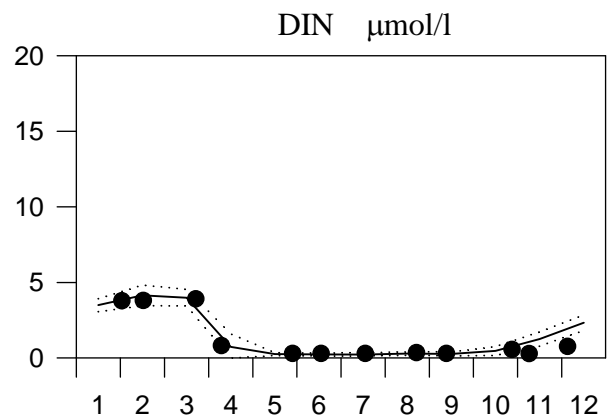
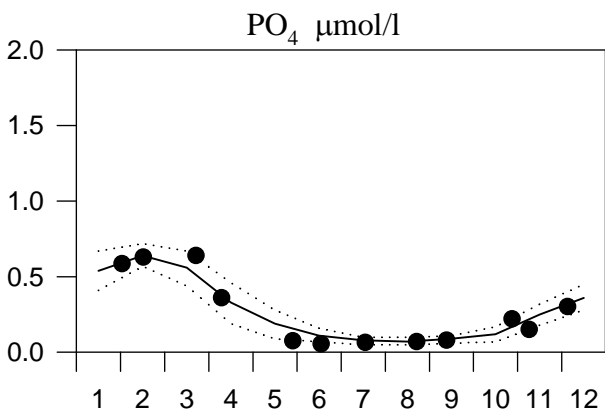
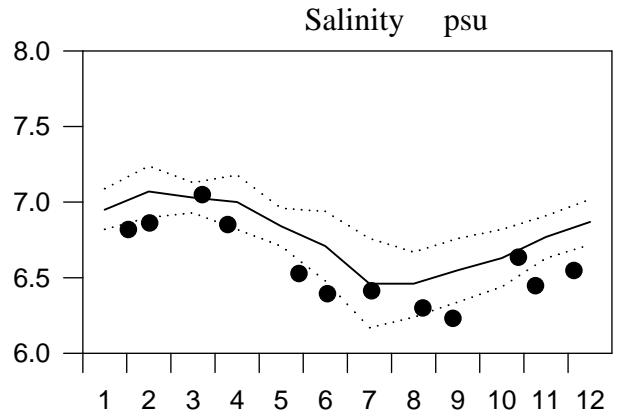
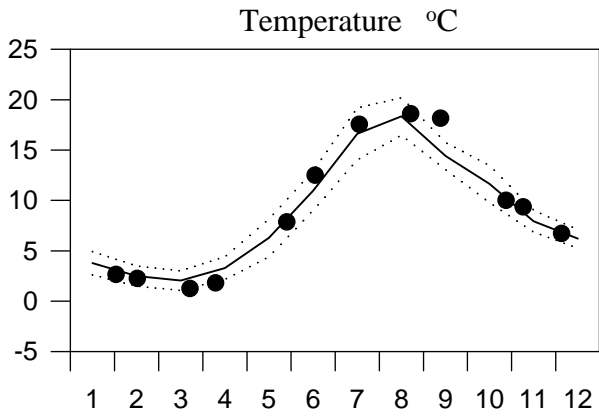
STATION BY15 DEEP WATER (240m)



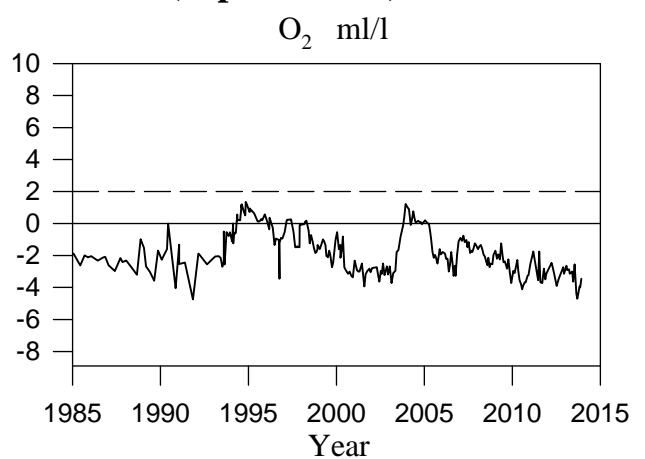
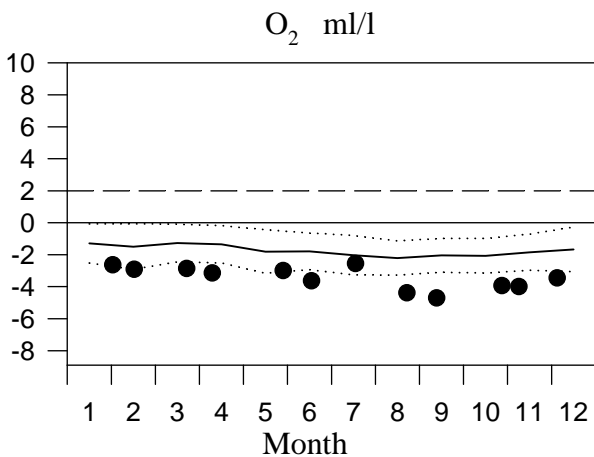
STATION BY20 SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2013

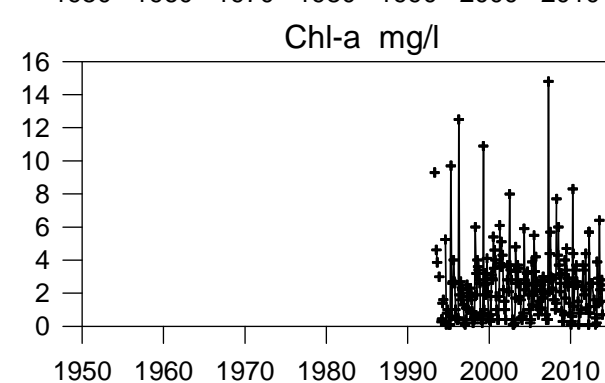
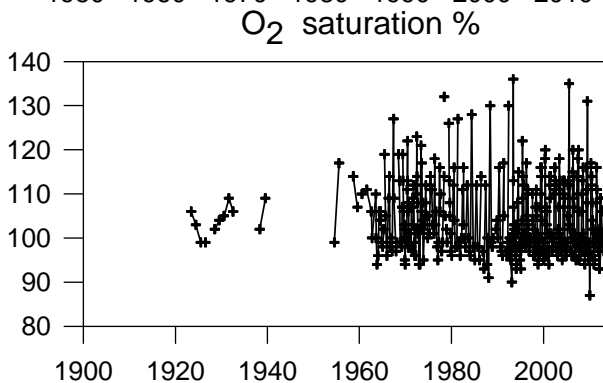
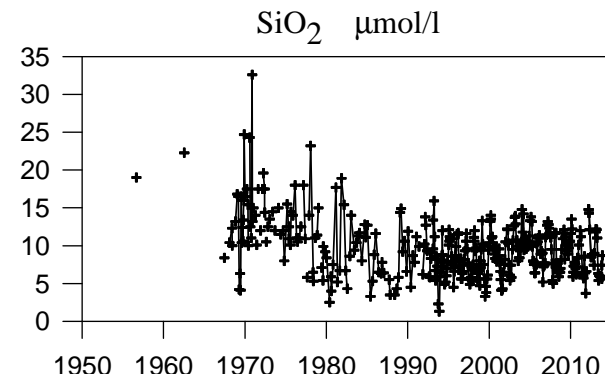
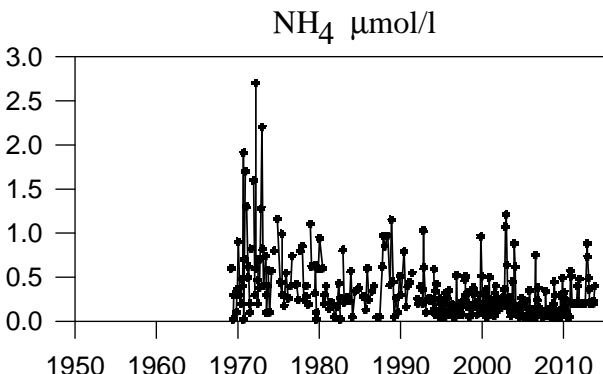
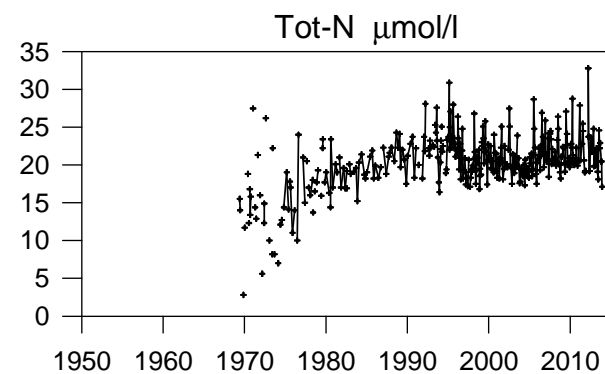
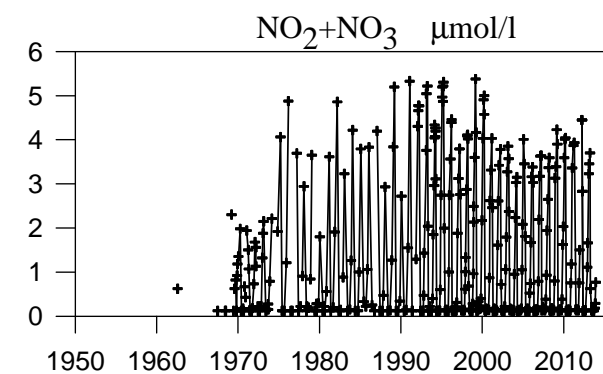
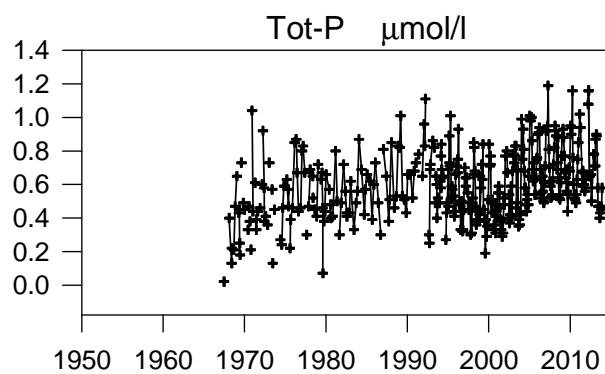
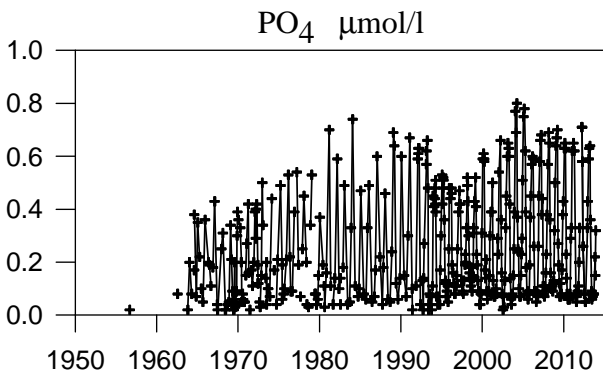
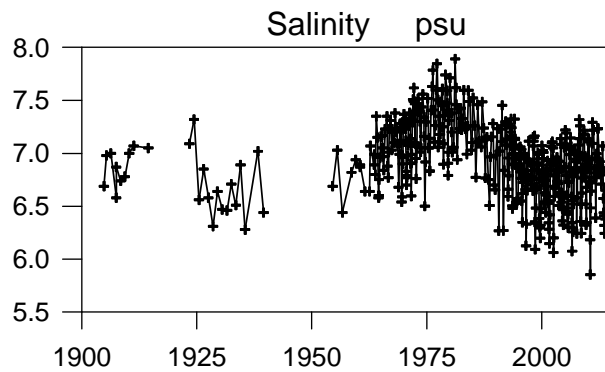
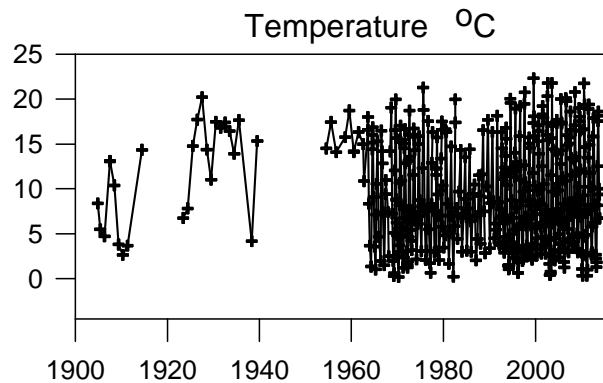


OXYGEN IN BOTTOM WATER (depth >175m)





STATION BY20 SURFACE WATER

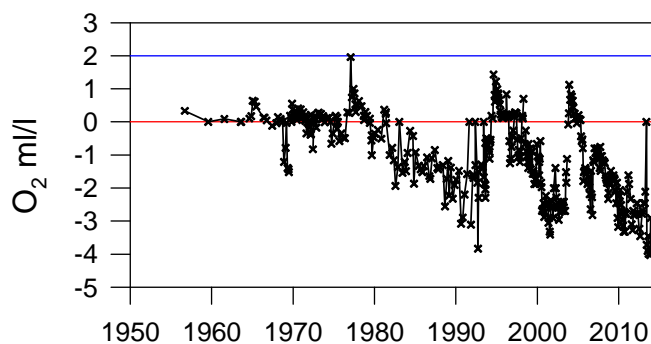
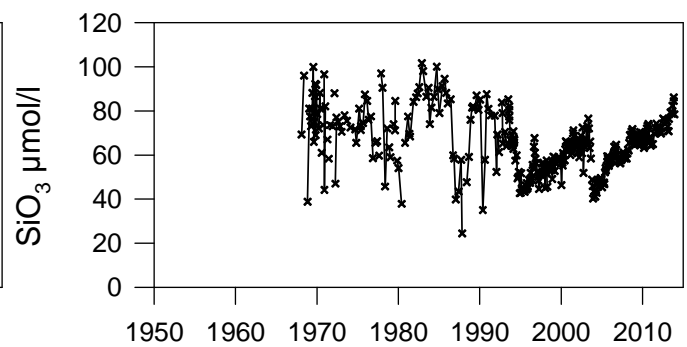
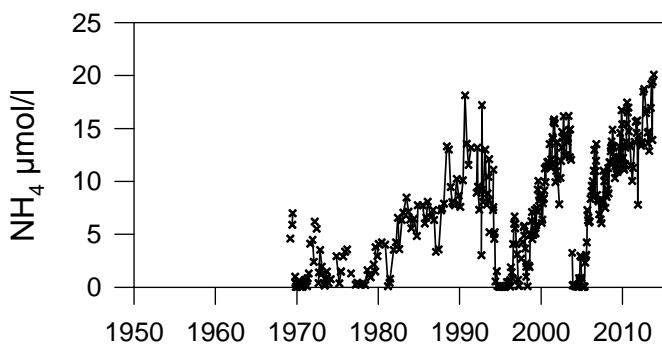
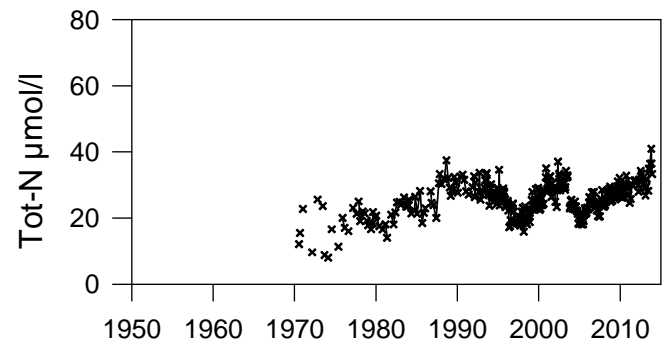
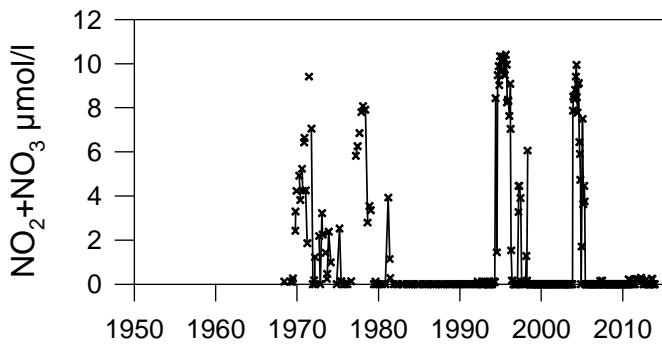
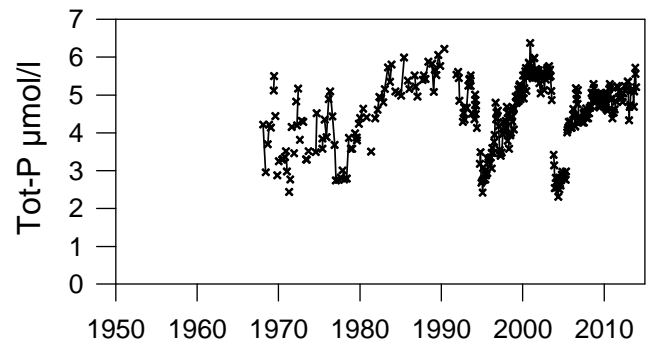
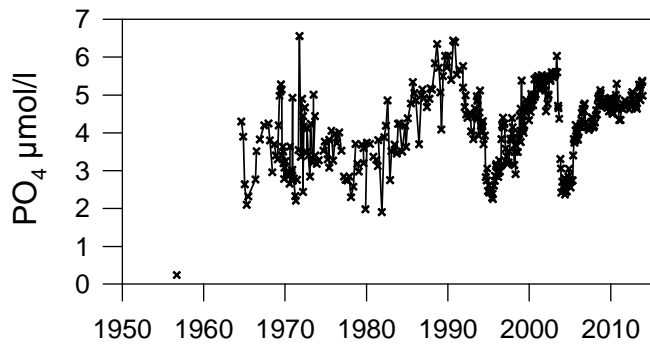
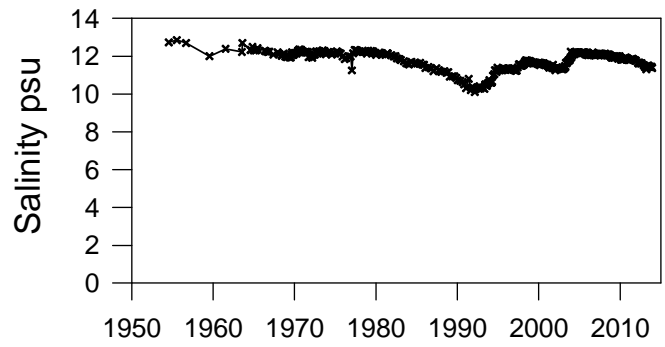
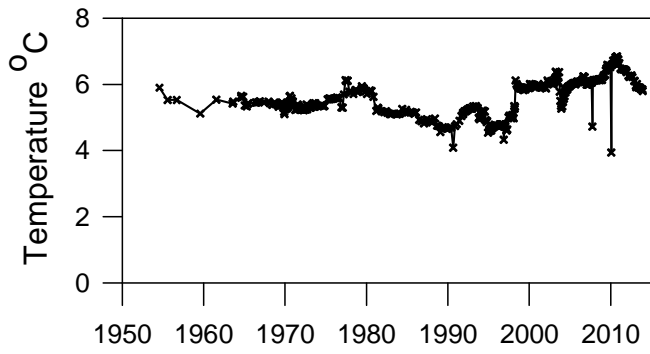


Year

Year



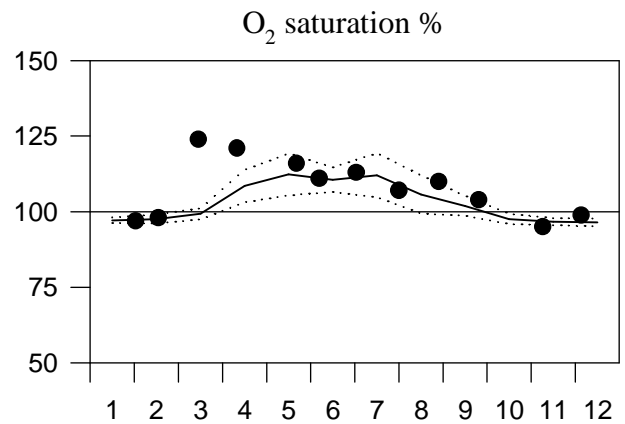
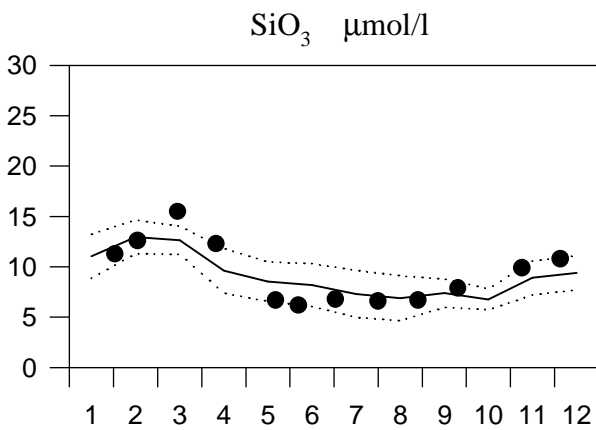
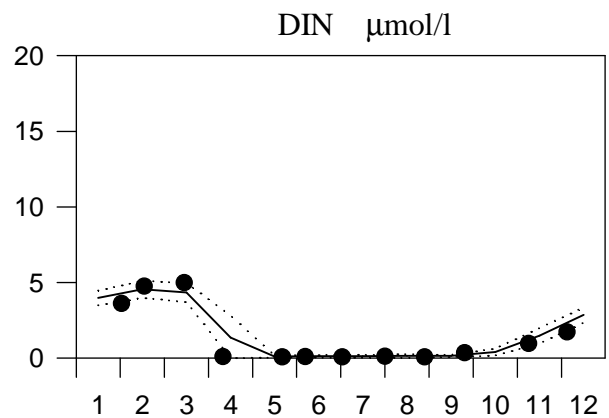
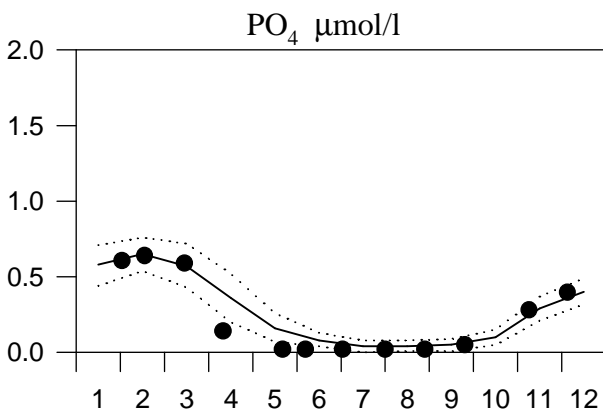
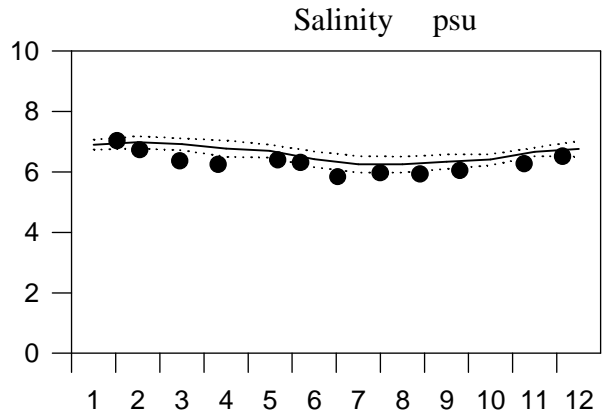
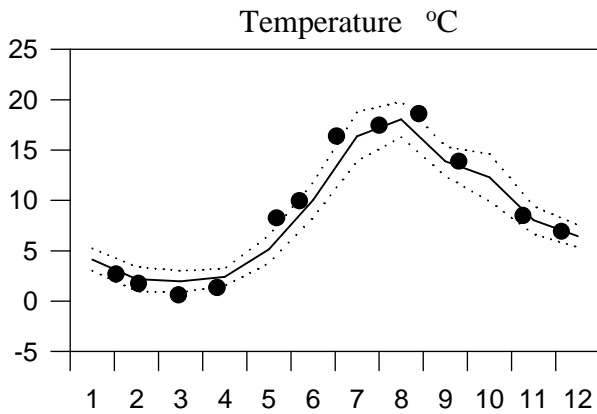
STATION BY20 DEEP WATER (175m)



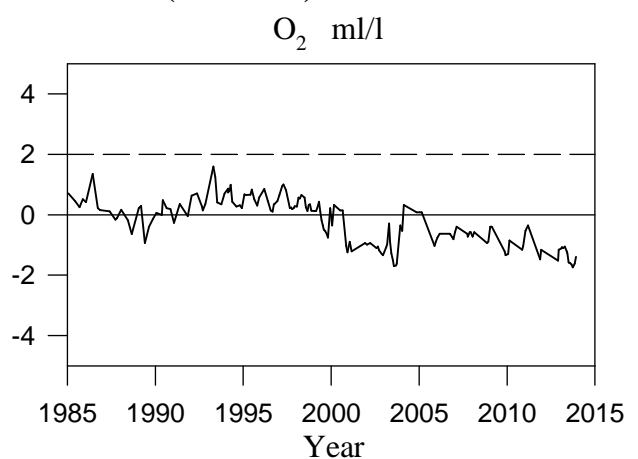
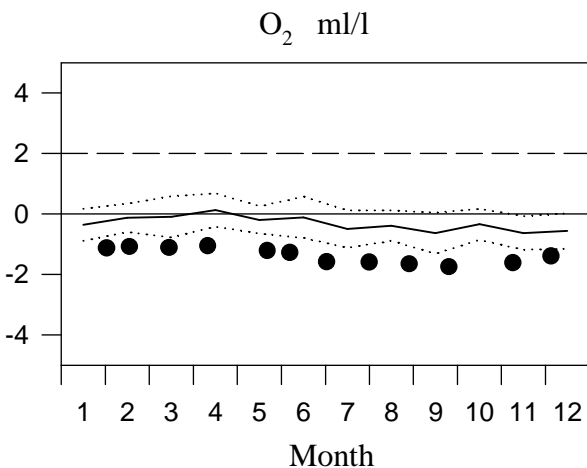
STATION BY29 SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2013

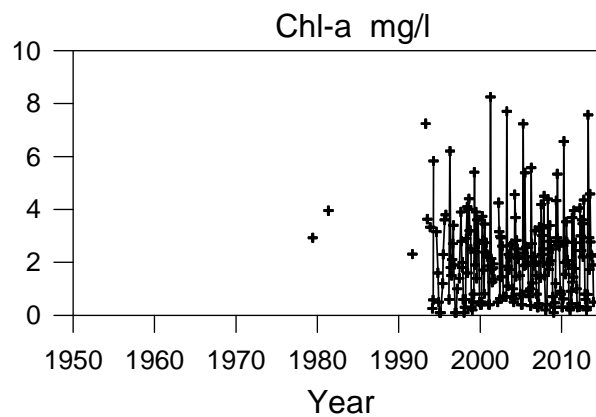
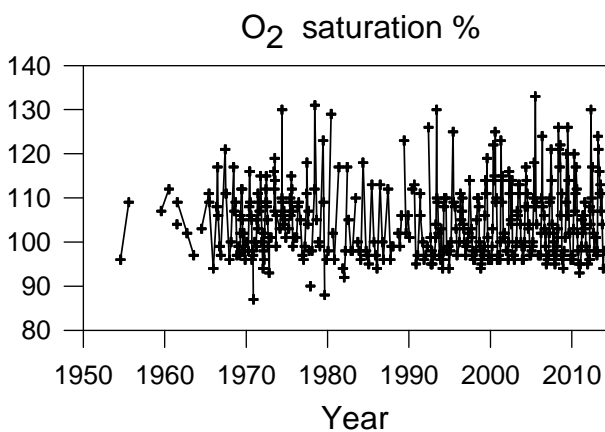
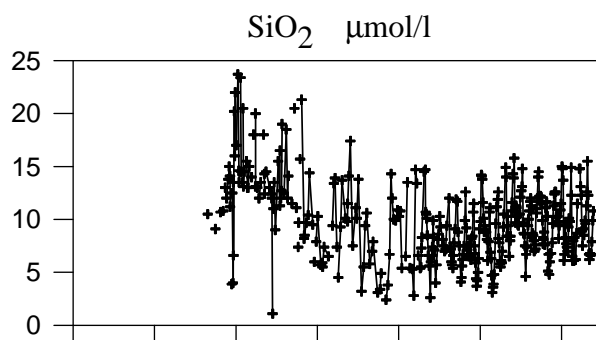
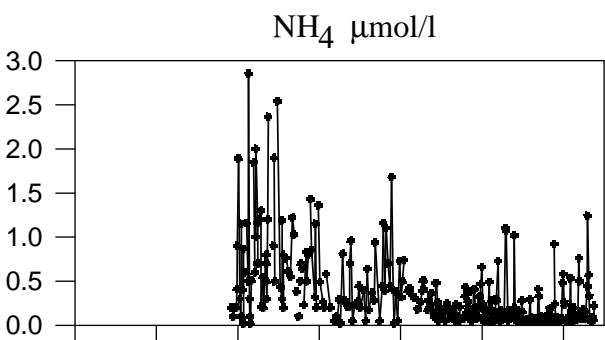
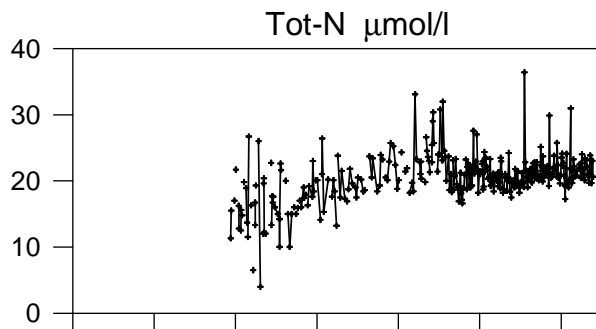
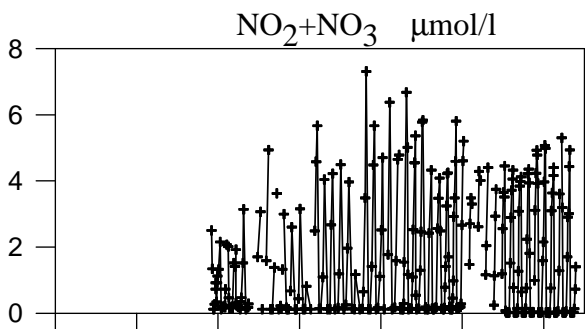
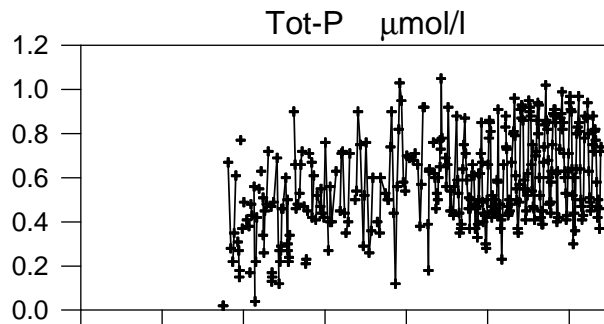
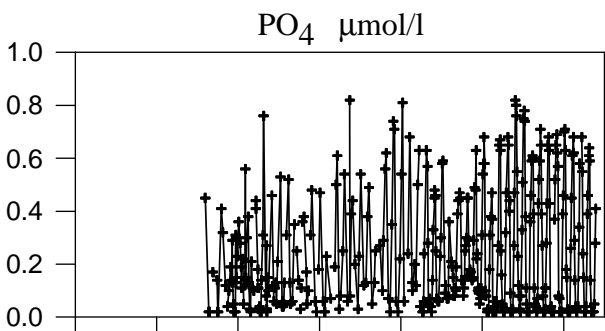
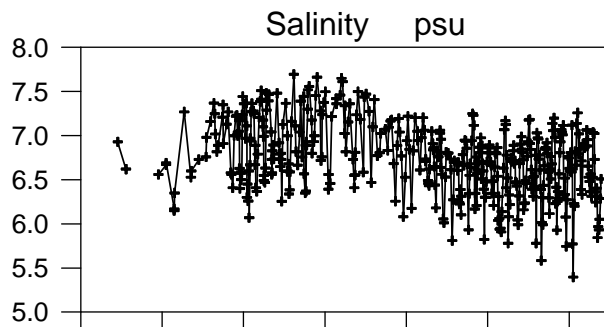
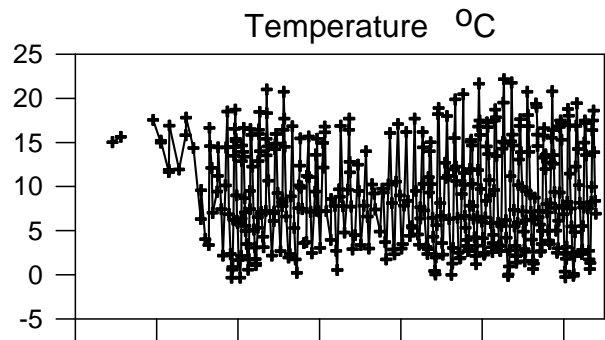


OXYGEN IN BOTTOM WATER (>=150m)



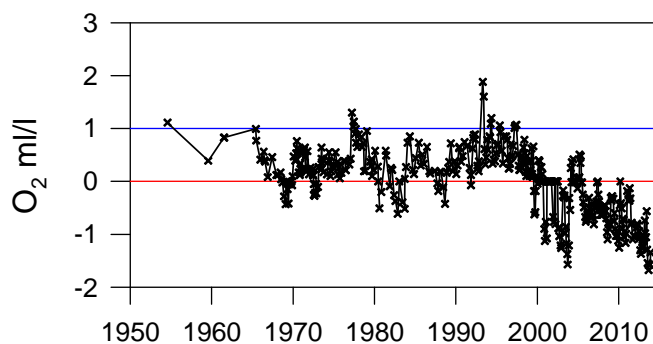
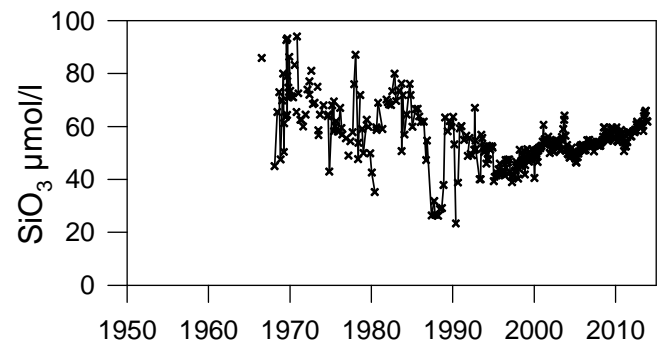
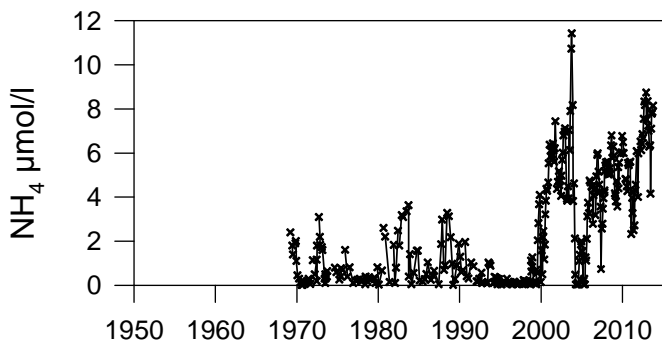
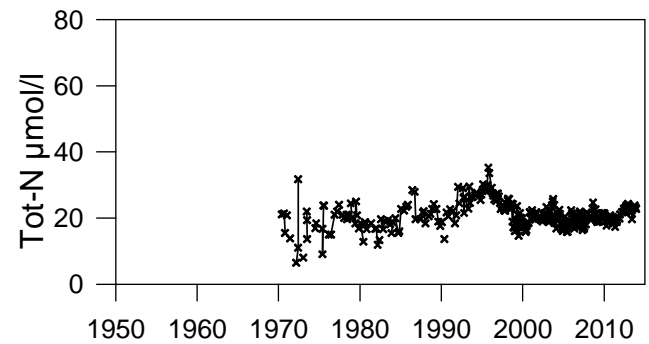
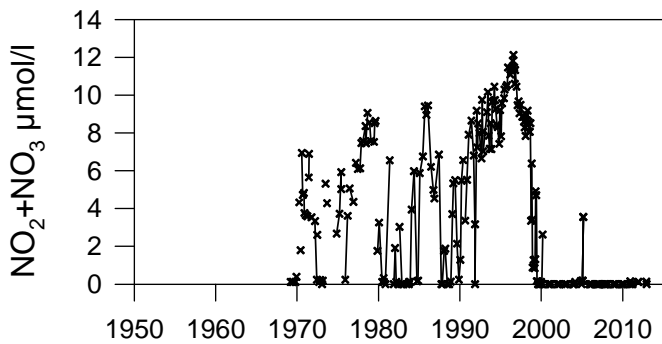
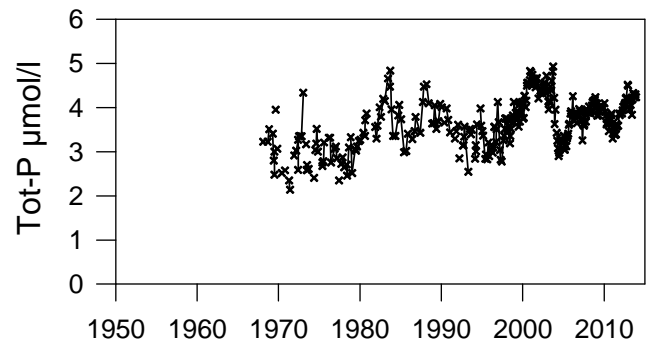
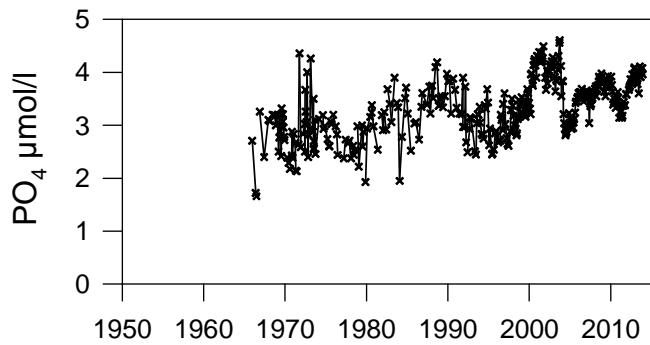
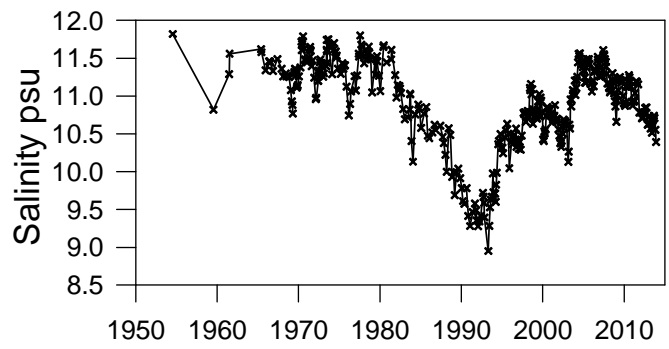
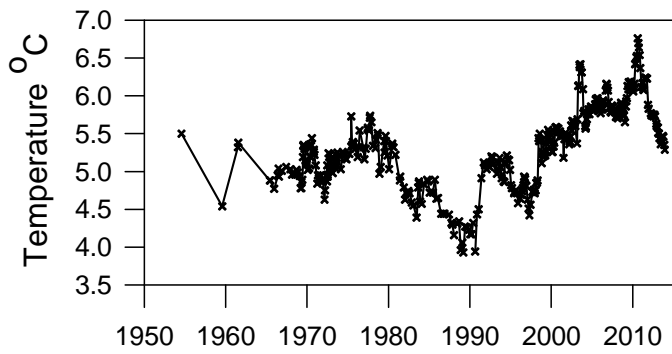


STATION BY29 SURFACE WATER





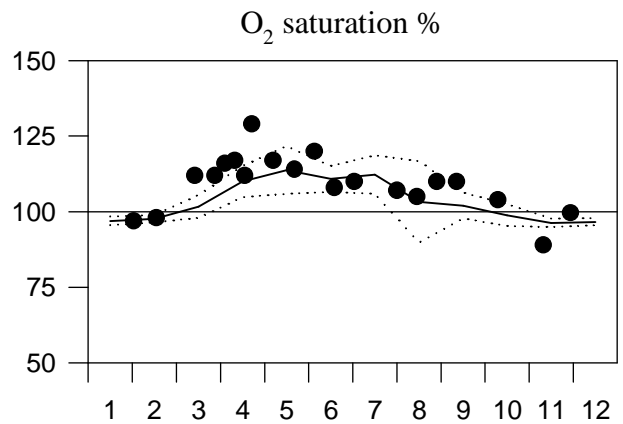
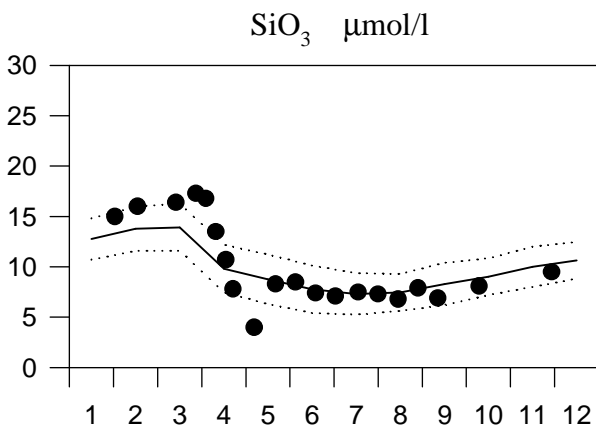
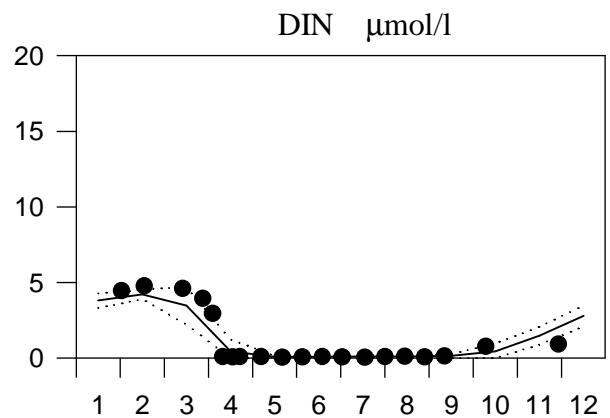
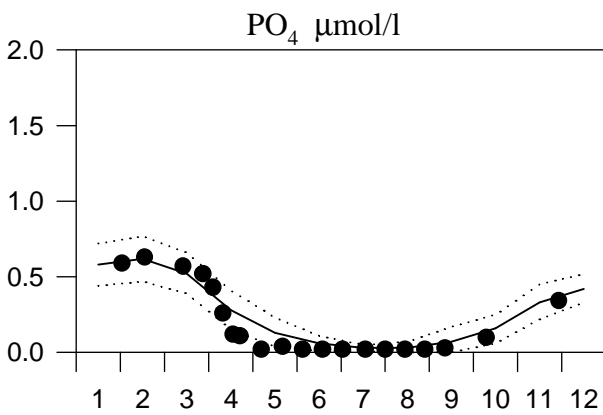
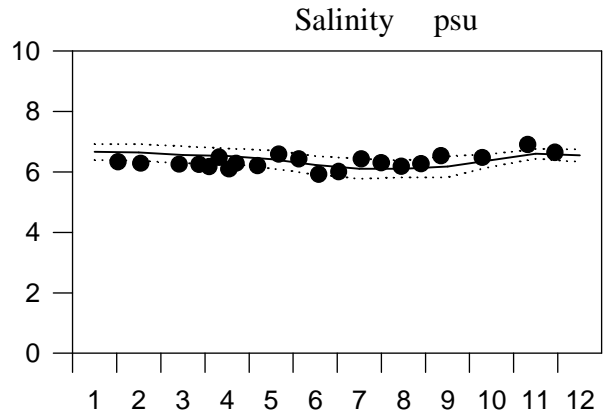
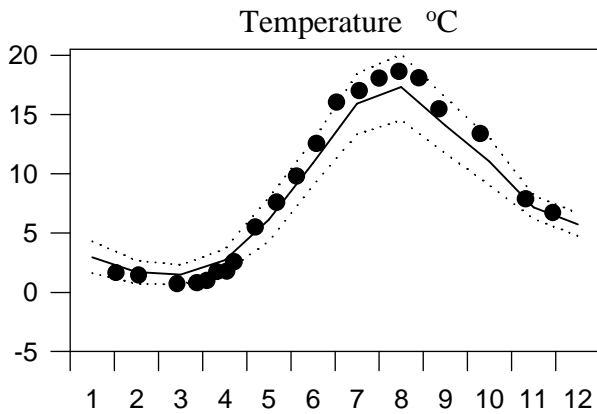
STATION BY29 DEEP WATER (150m)



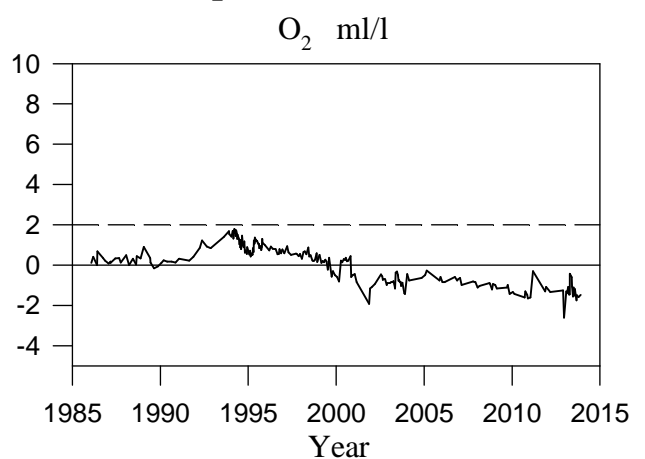
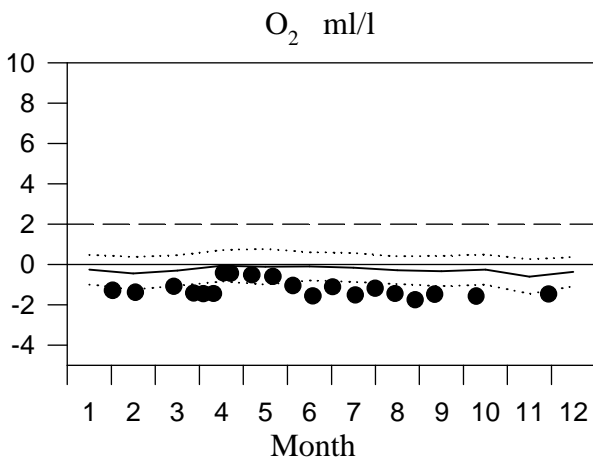
STATION BY31 SURFACE WATER

Annual Cycles

— Mean 1996-2010 ····· St.Dev. ● 2013

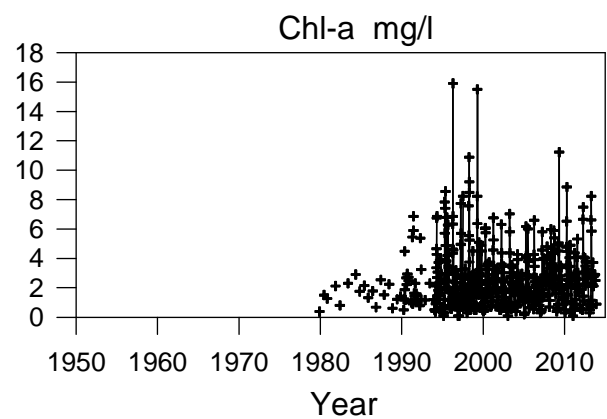
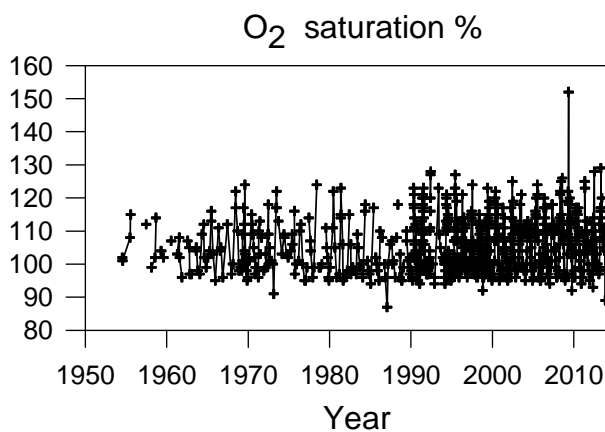
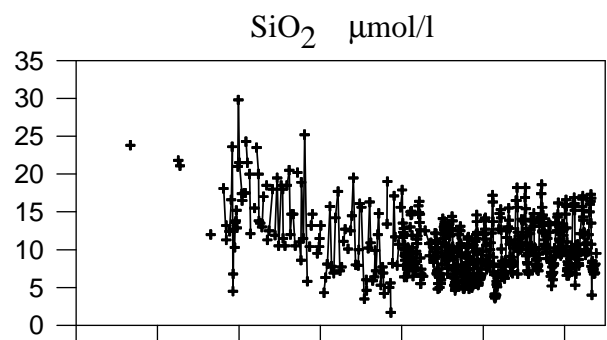
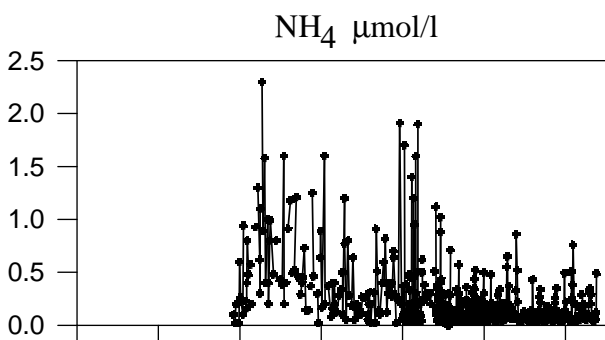
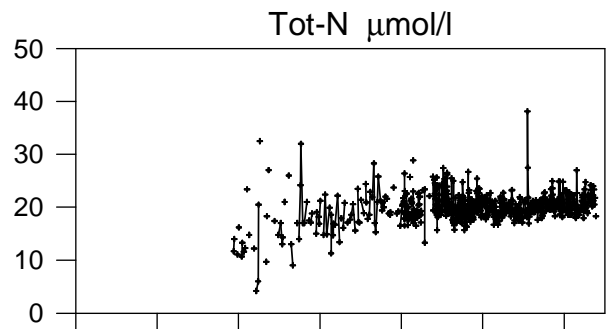
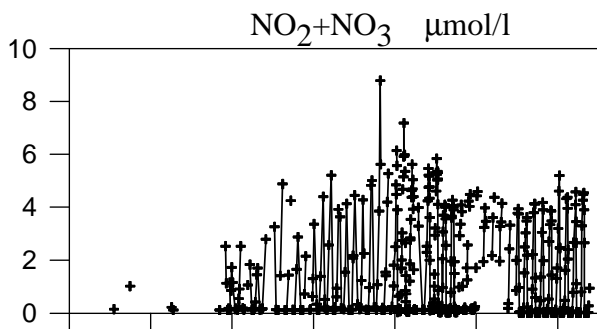
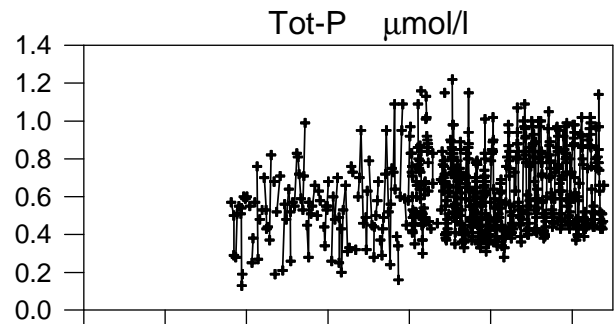
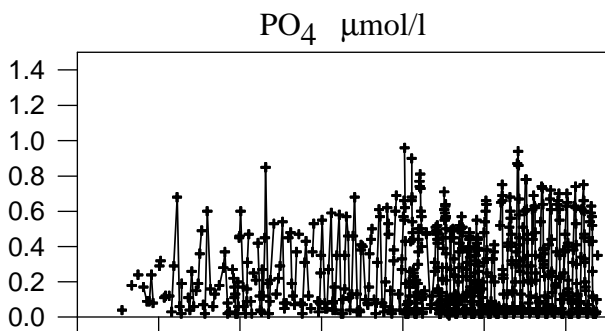
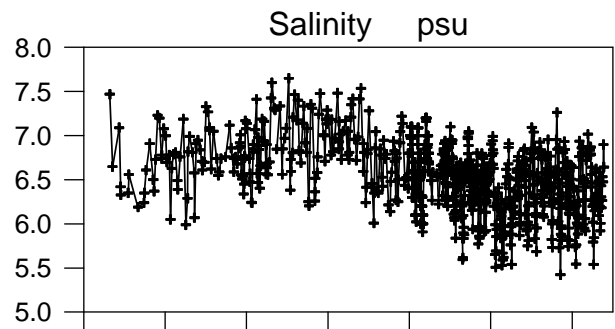
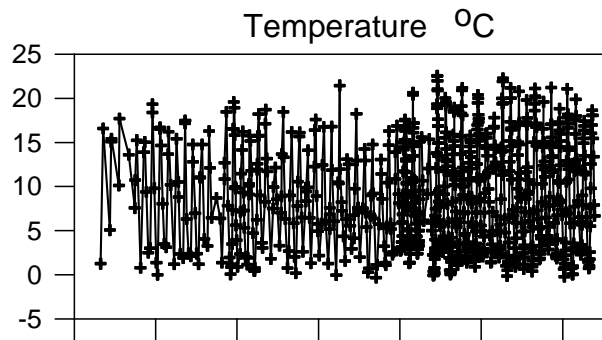


OXYGEN IN BOTTOM WATER (depth = 440m)



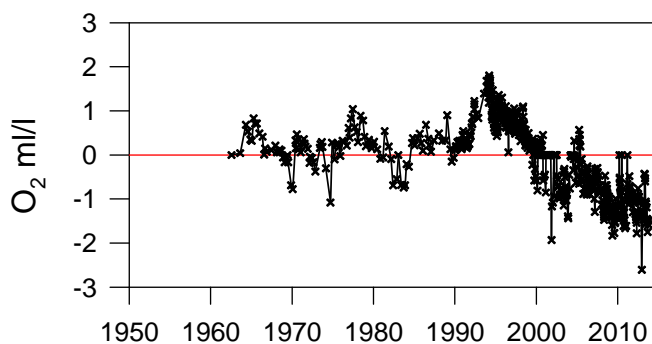
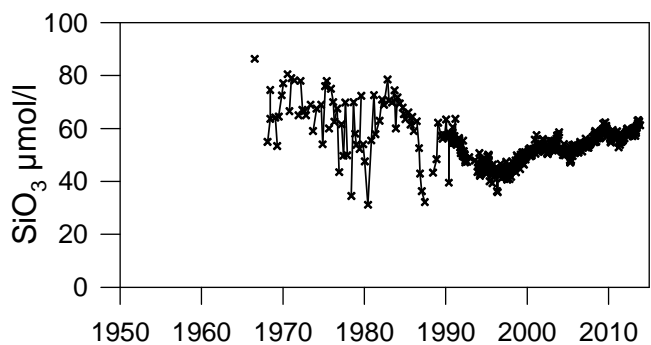
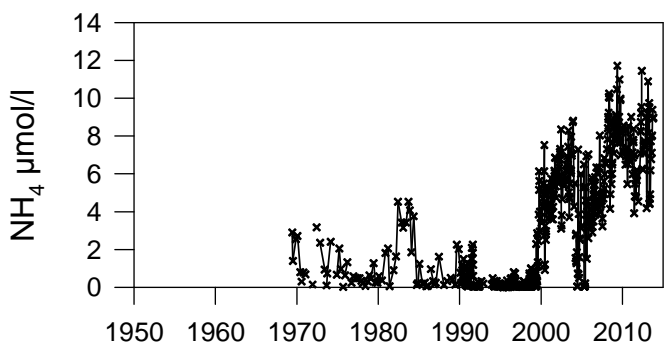
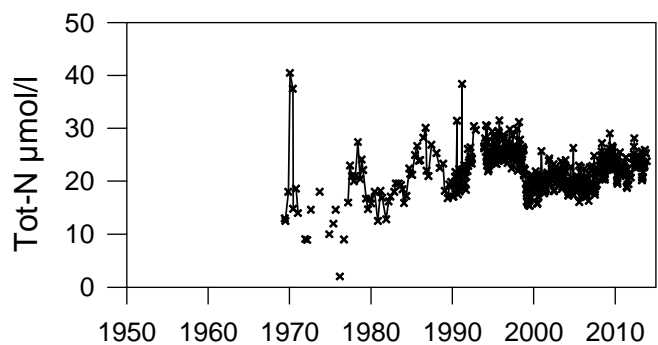
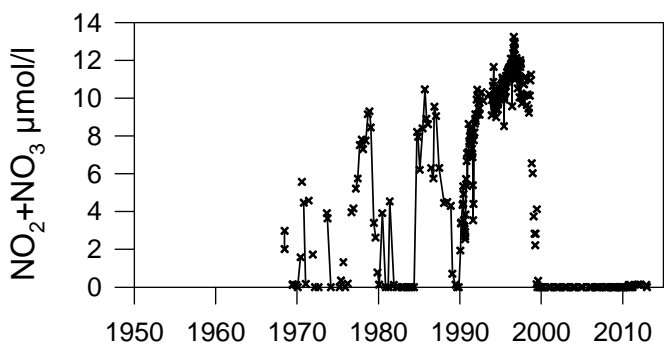
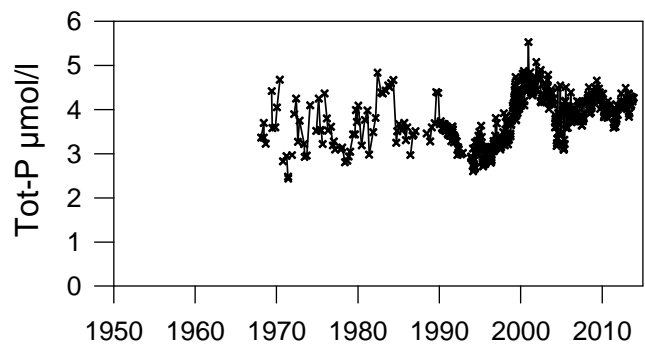
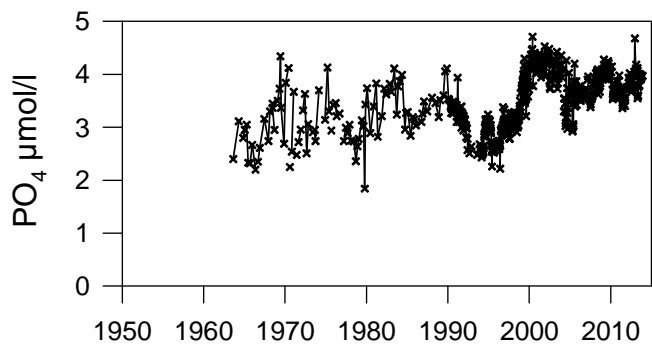
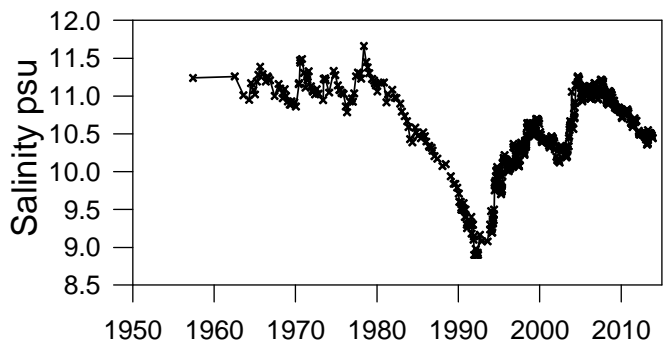
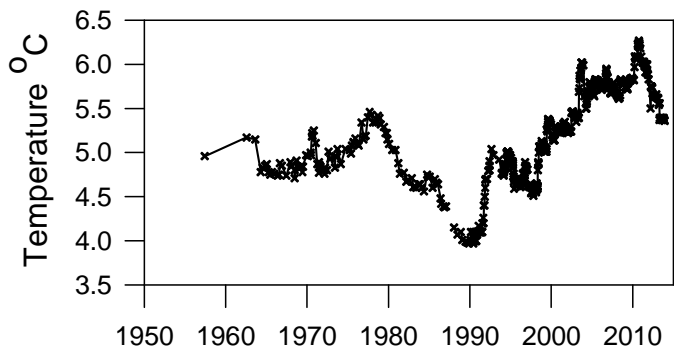


STATION BY31 SURFACE WATER





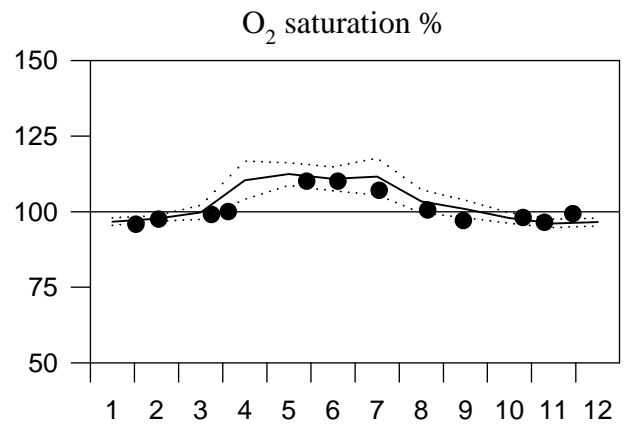
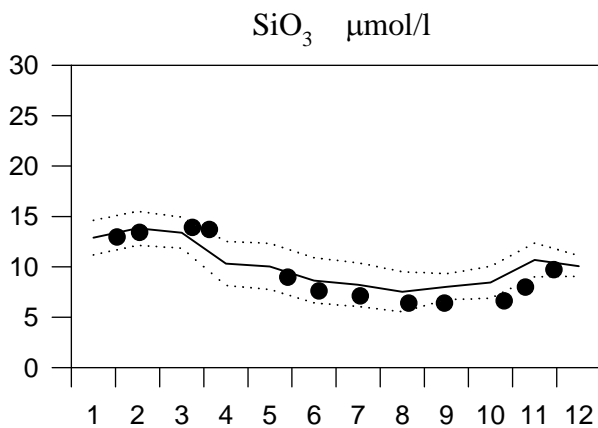
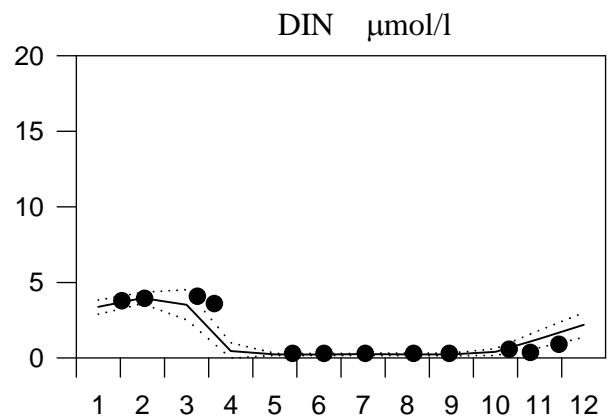
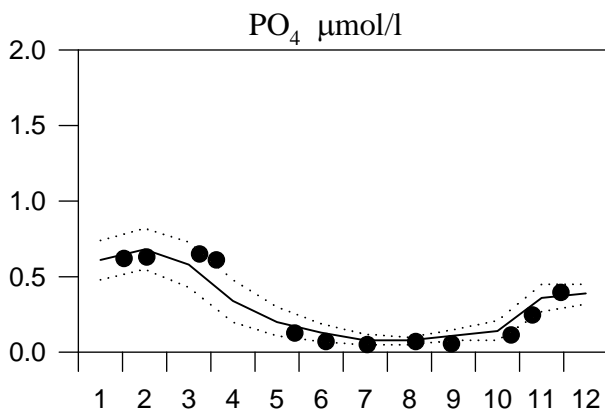
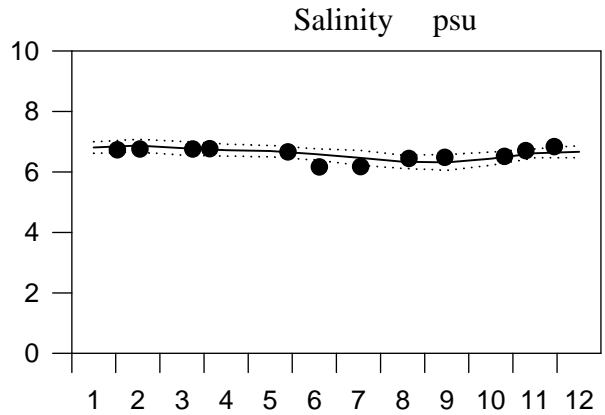
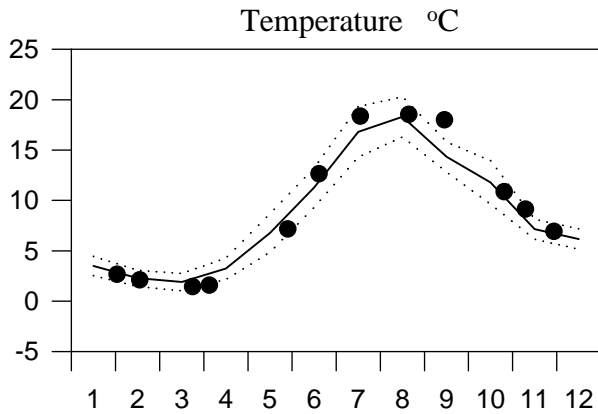
STATION BY31 DEEP WATER (440m)



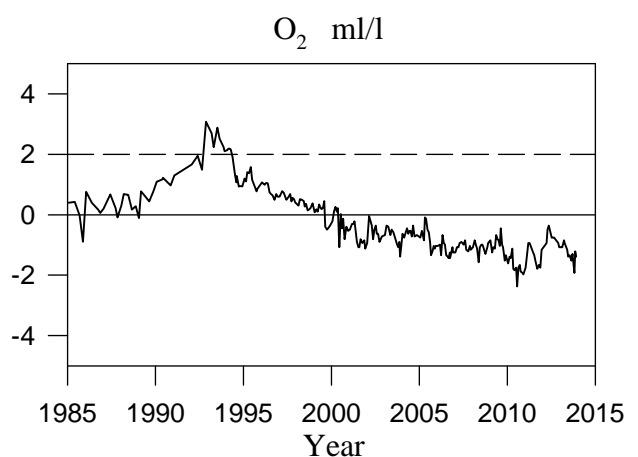
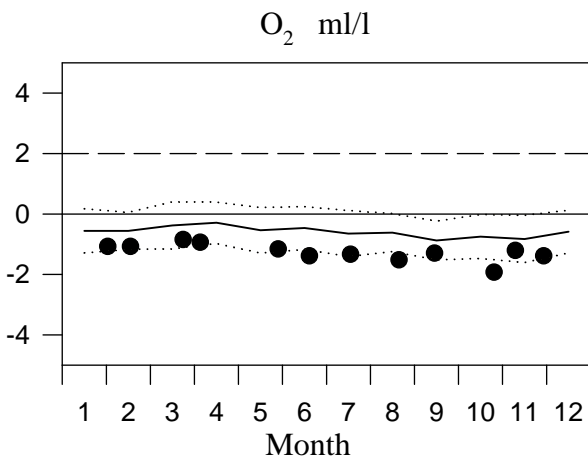
STATION BY32 SURFACE WATER

Annual Cycles

— Mean 1996-2010 ····· St.Dev. ● 2013

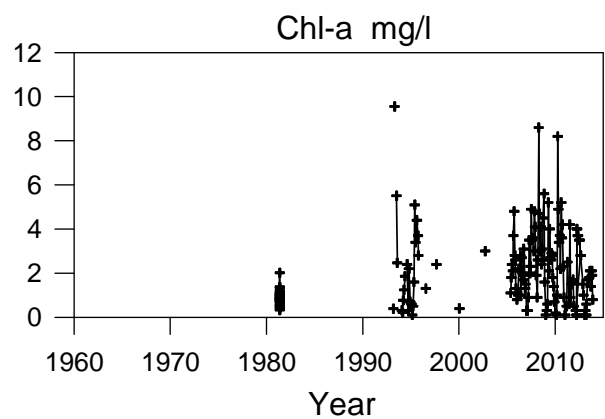
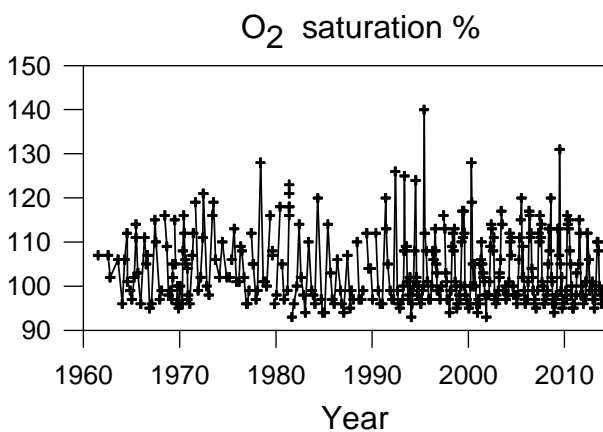
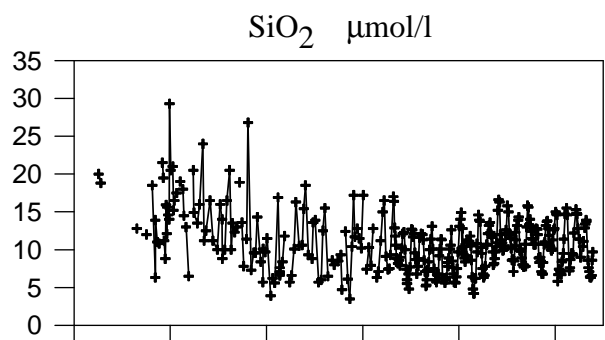
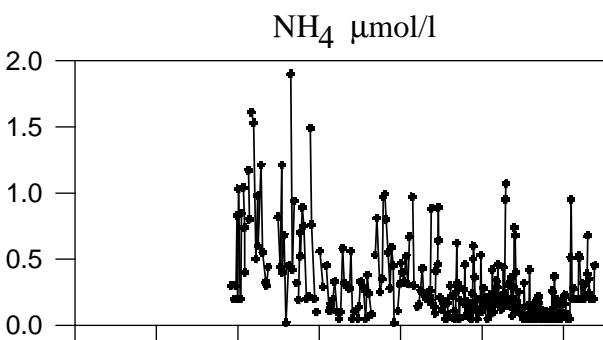
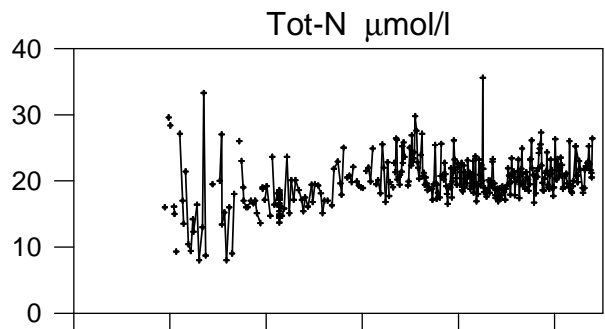
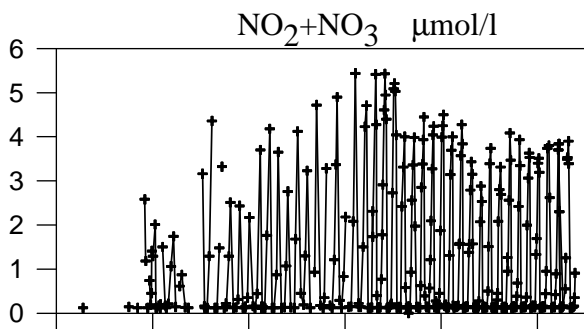
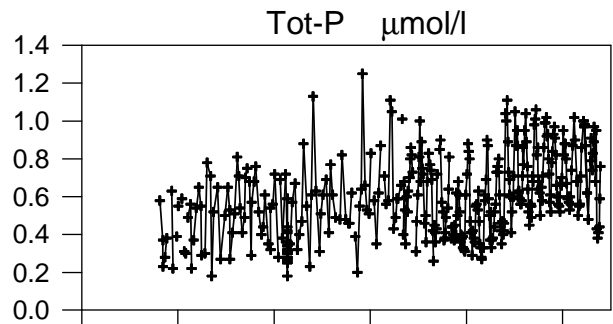
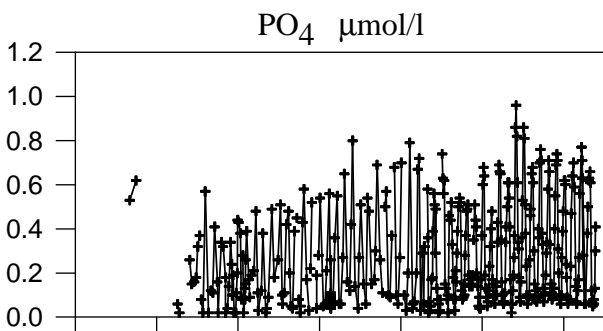
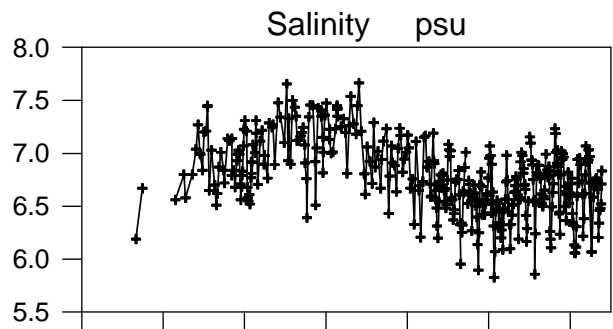
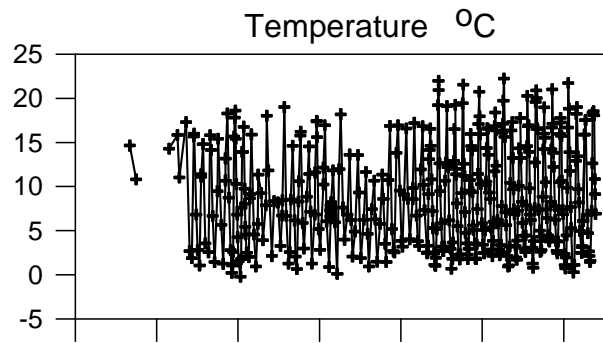


OXYGEN IN BOTTOM WATER (depth > 175m)



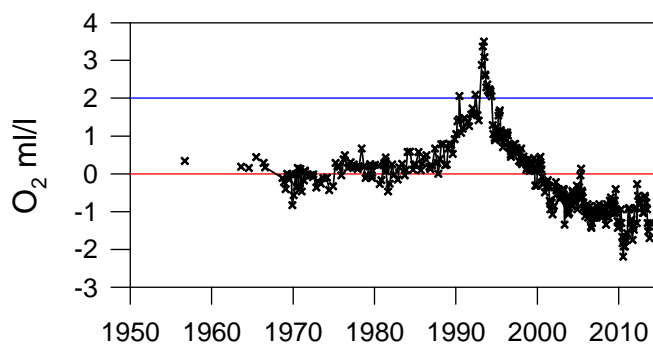
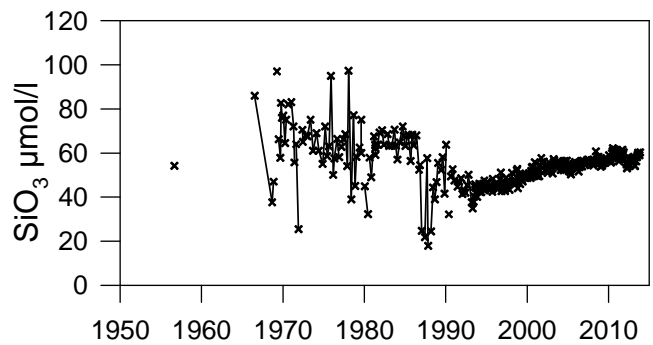
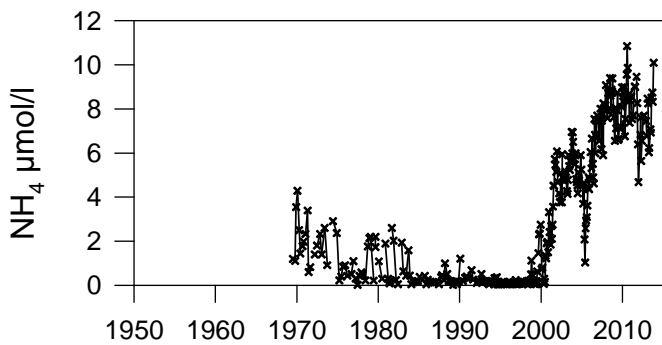
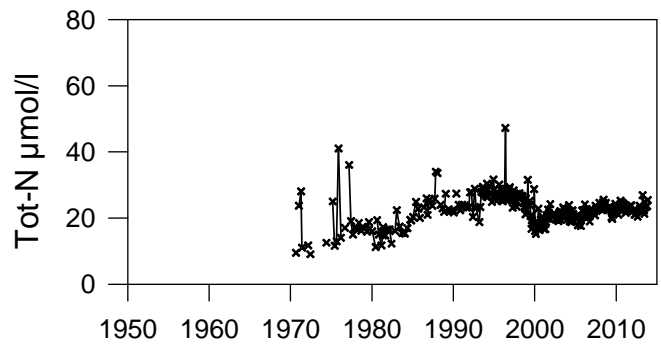
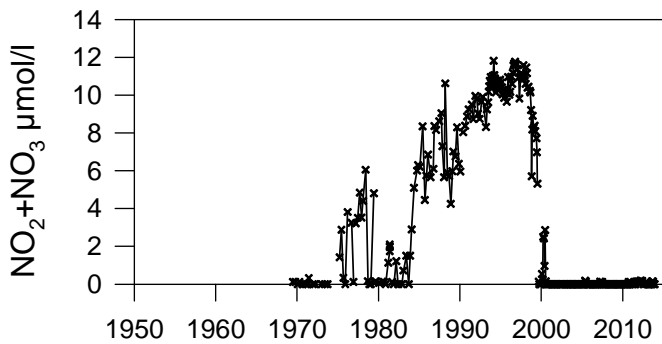
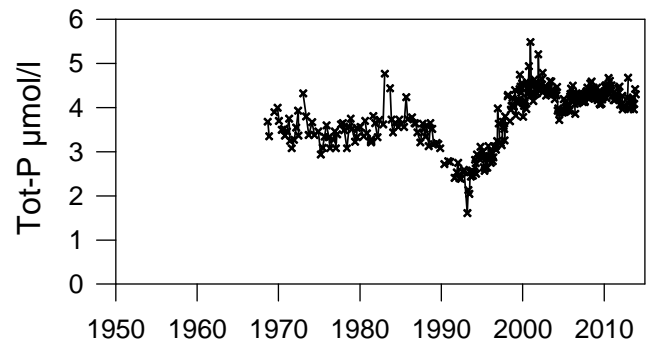
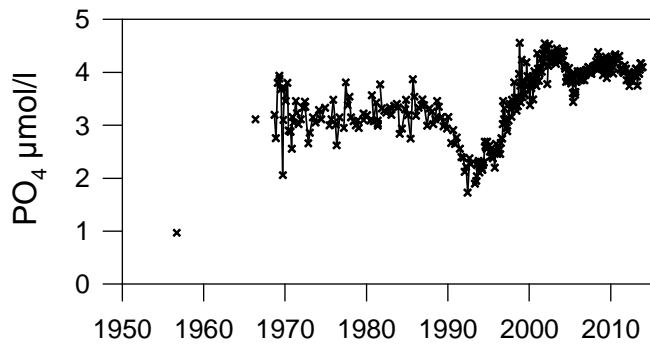
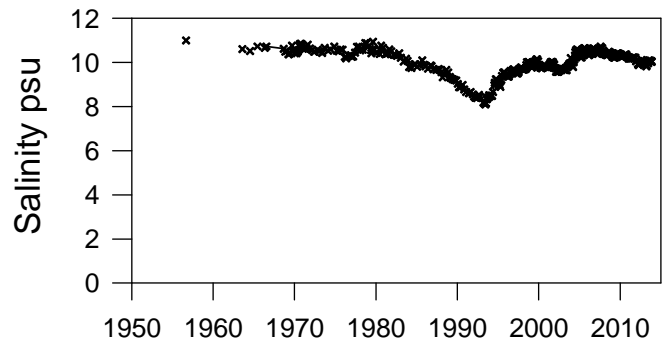
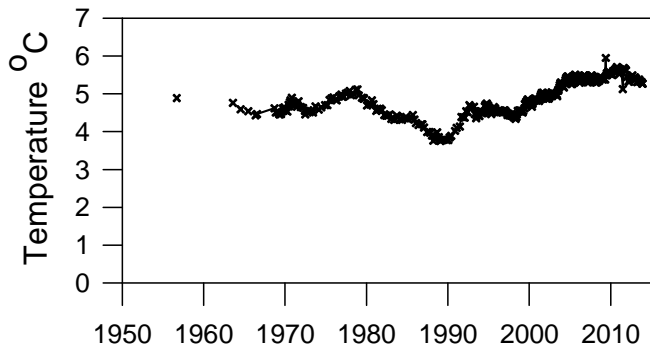


STATION BY32 SURFACE WATER





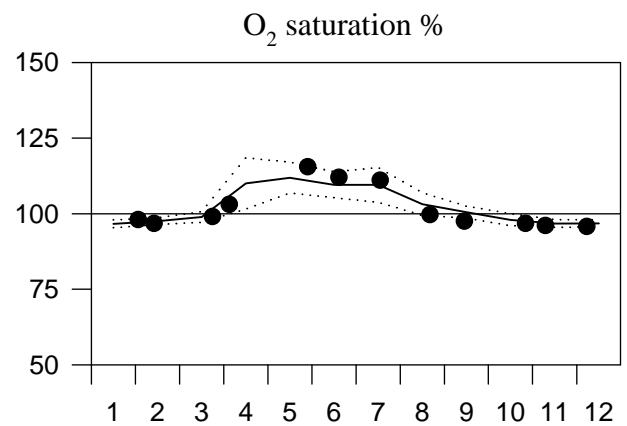
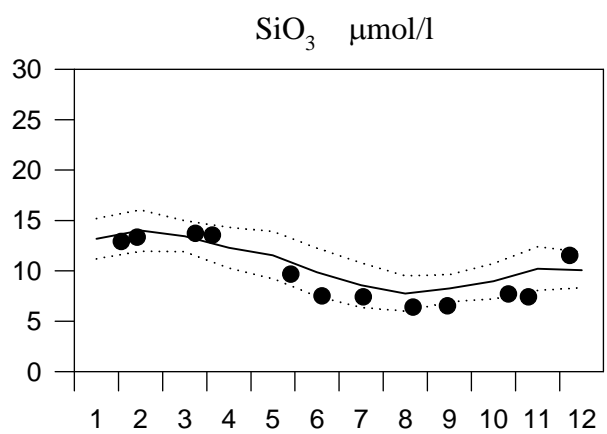
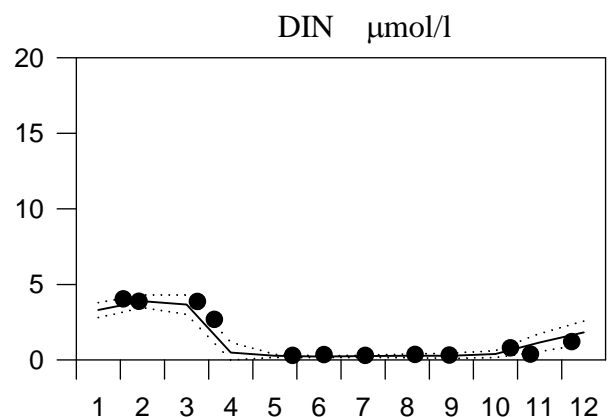
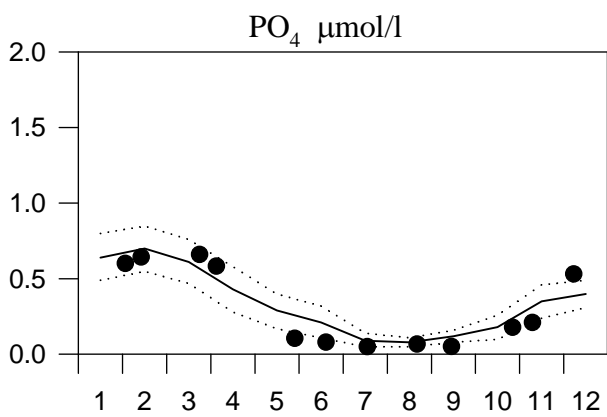
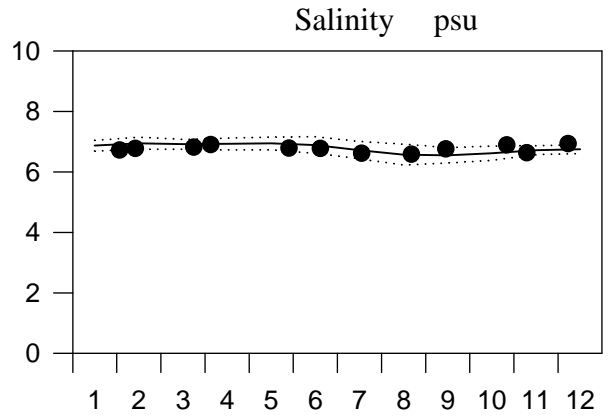
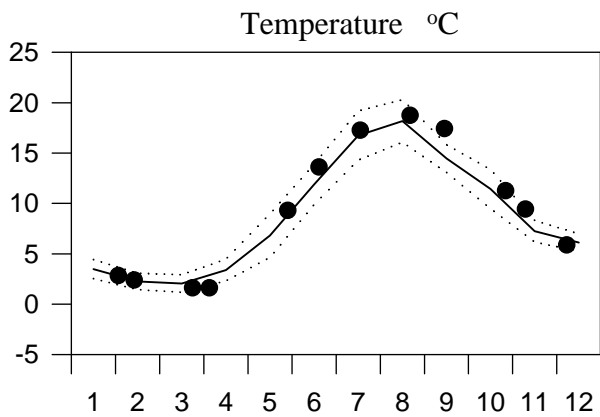
STATION BY32 DEEP WATER (175m)



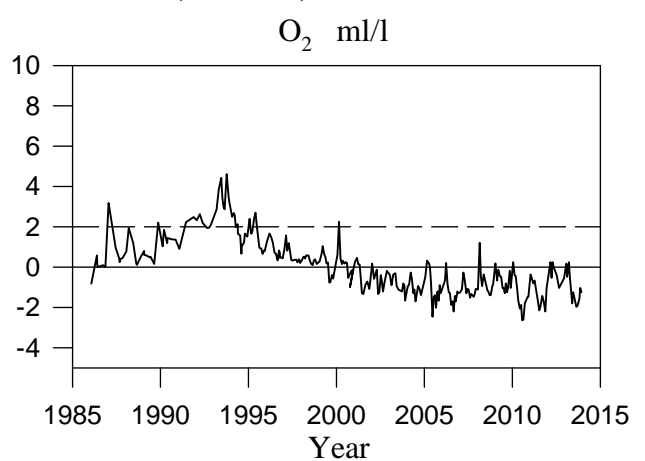
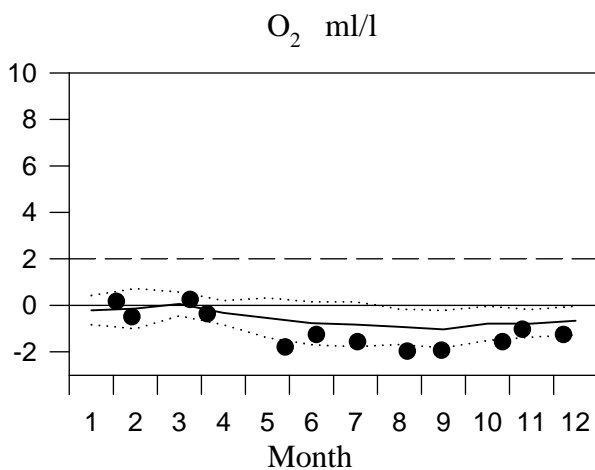
STATION BY38 SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2013

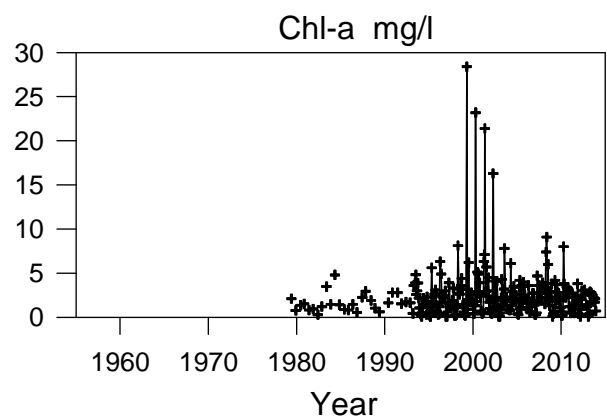
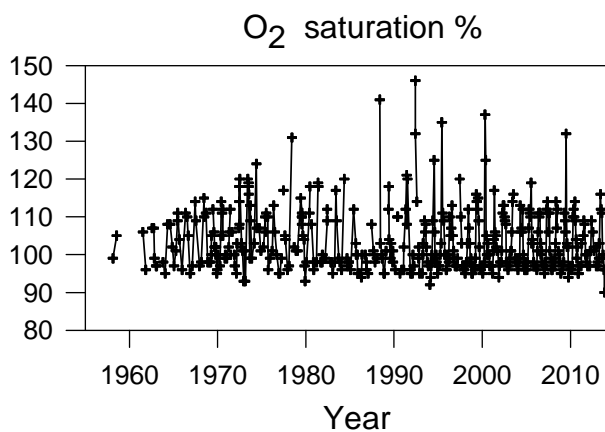
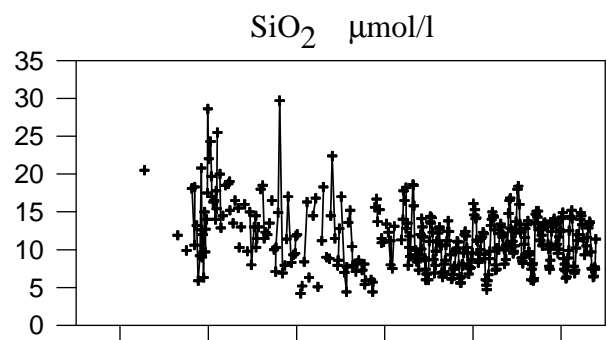
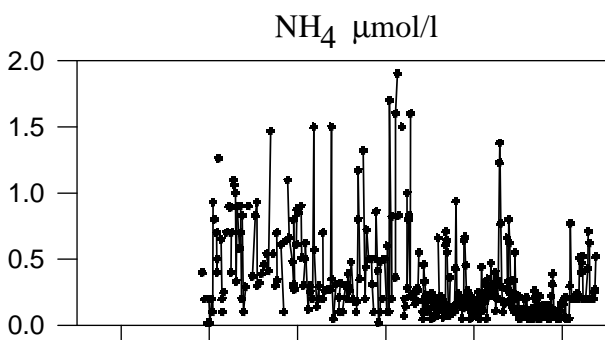
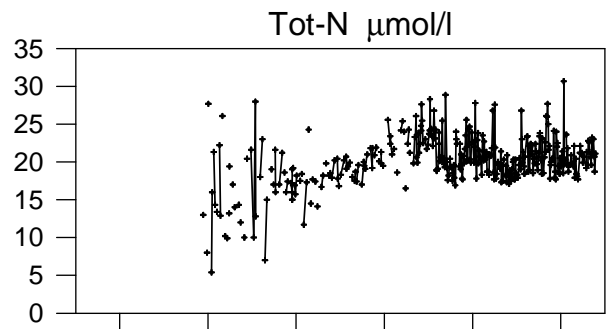
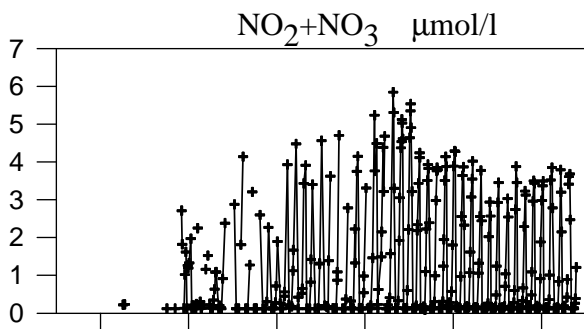
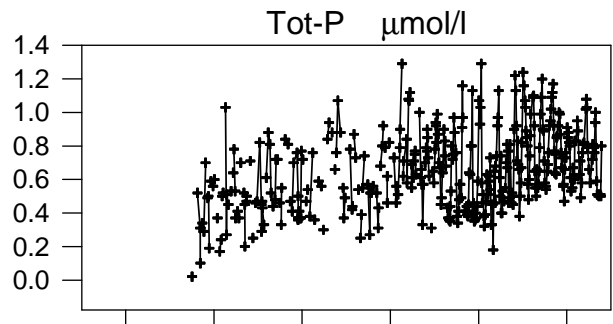
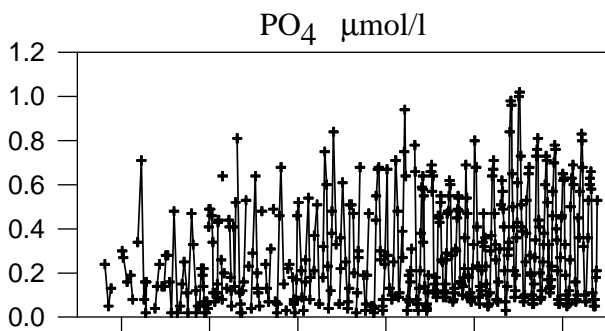
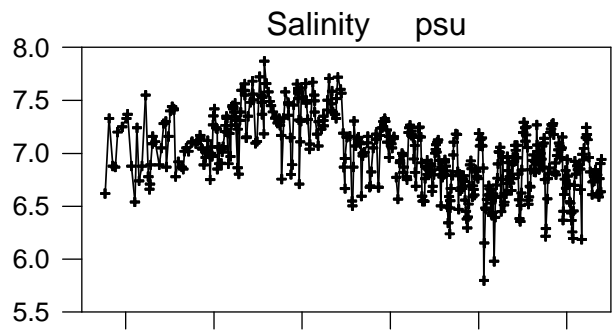
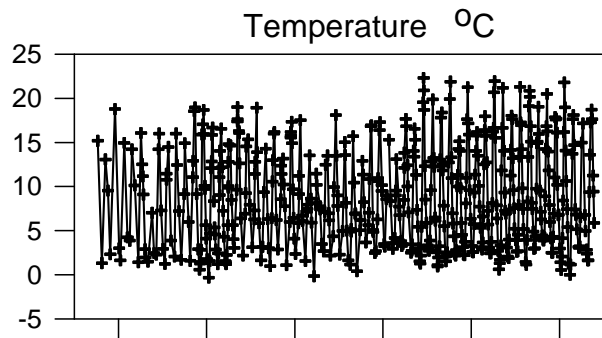


OXYGEN IN BOTTOM WATER (> 100m)



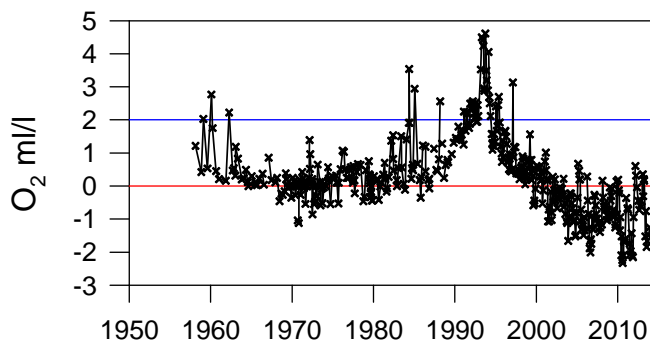
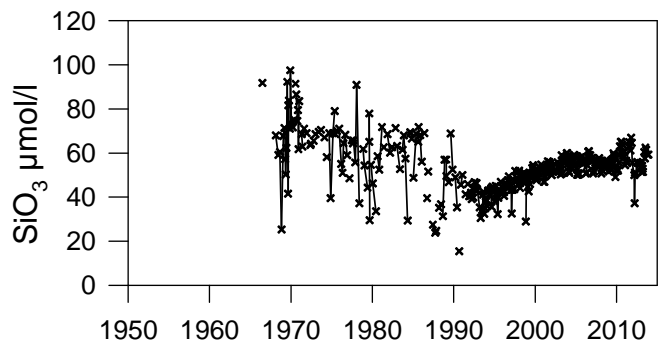
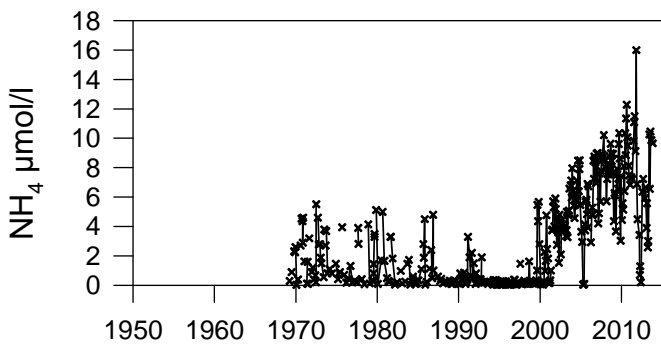
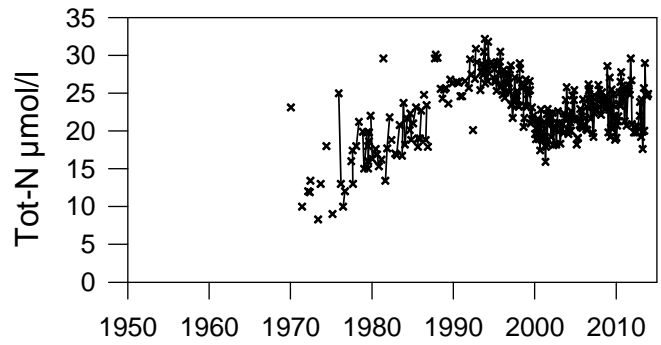
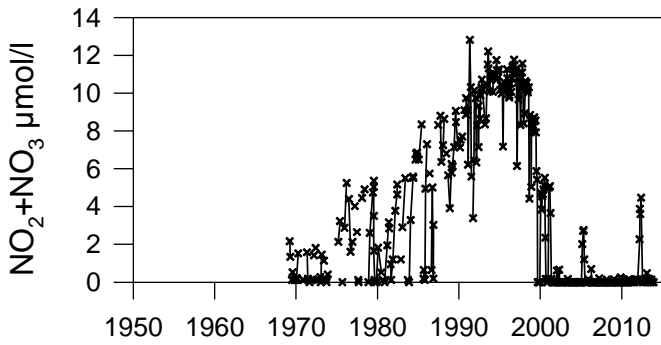
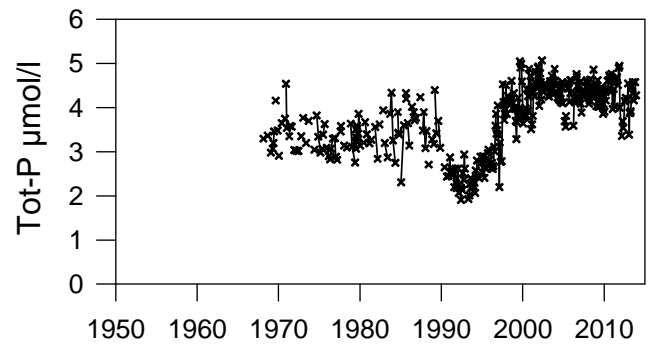
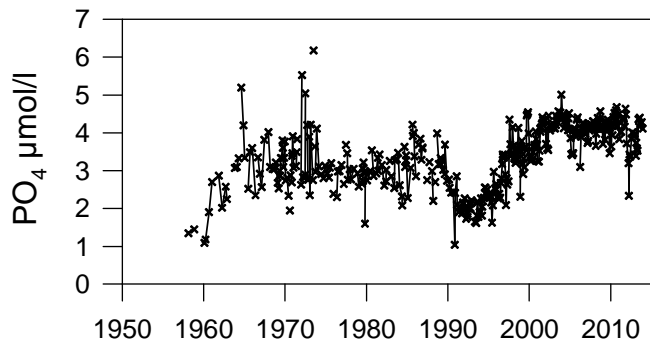
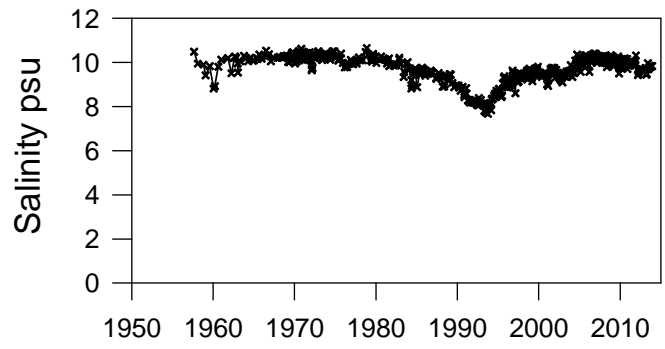
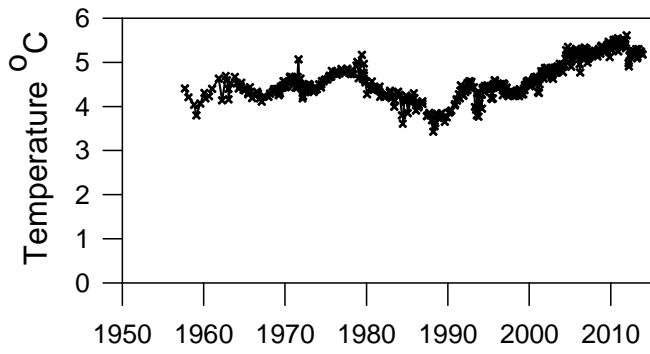


STATION BY38 SURFACE WATER





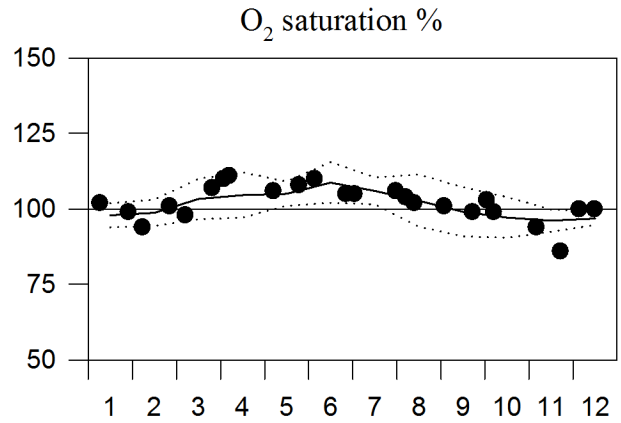
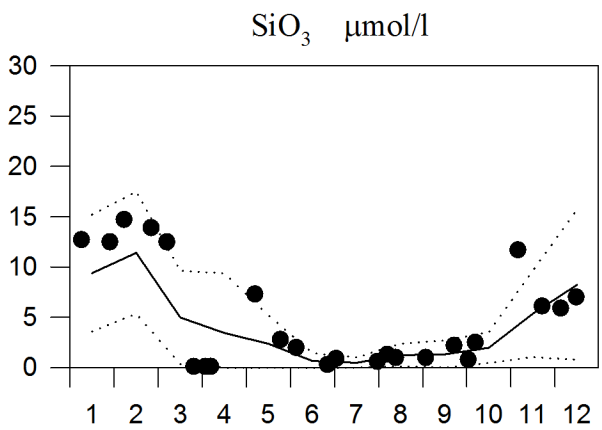
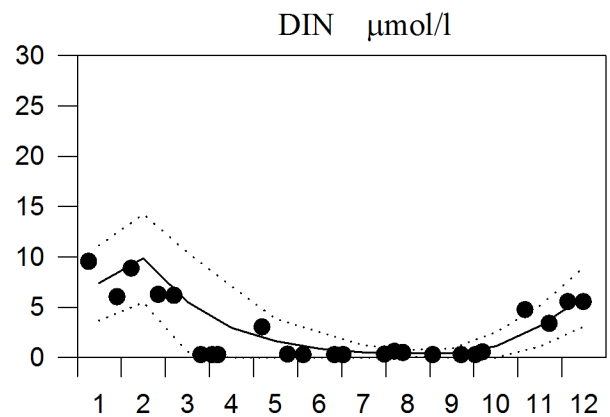
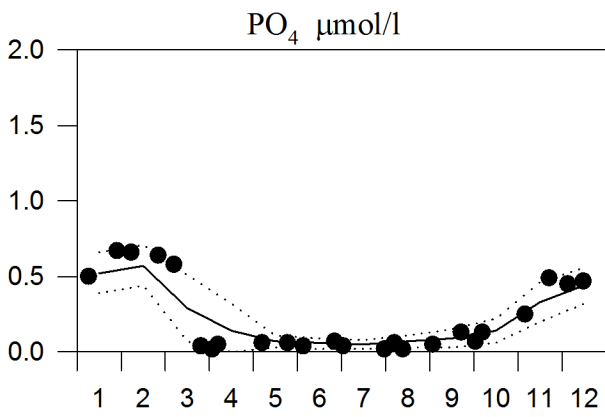
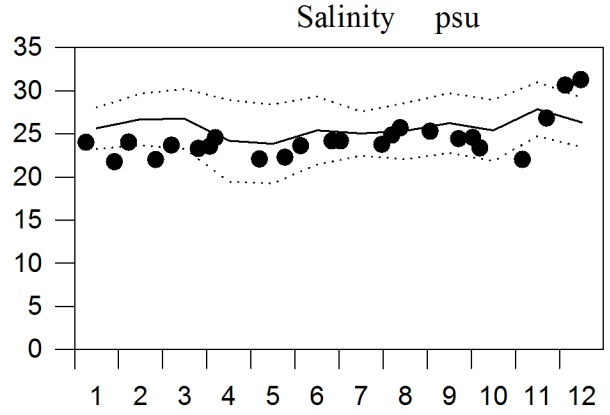
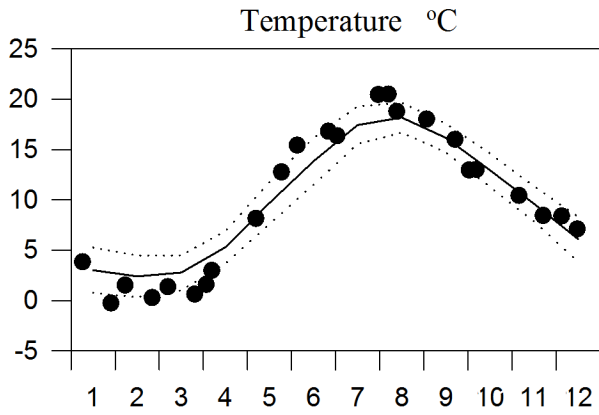
STATION BY38 DEEP WATER (100m)



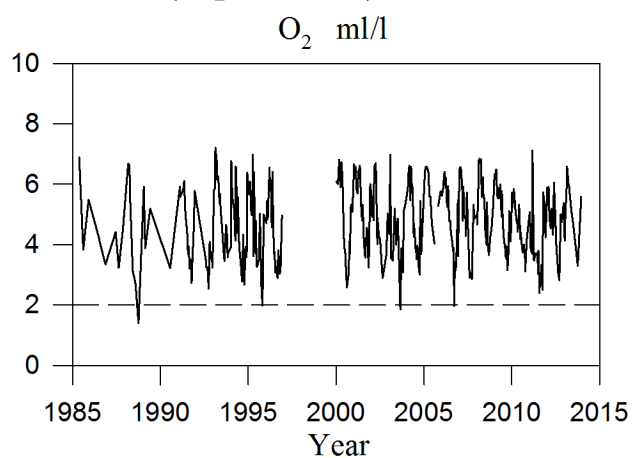
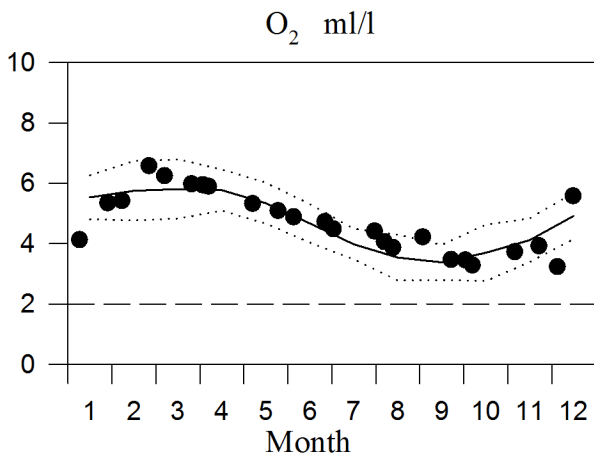
STATION SLÄGGÖ SURFACE WATER

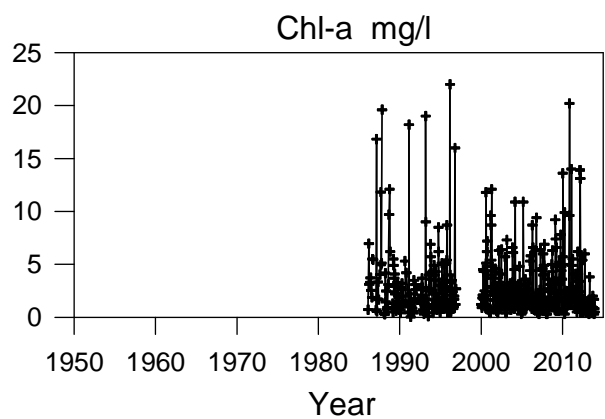
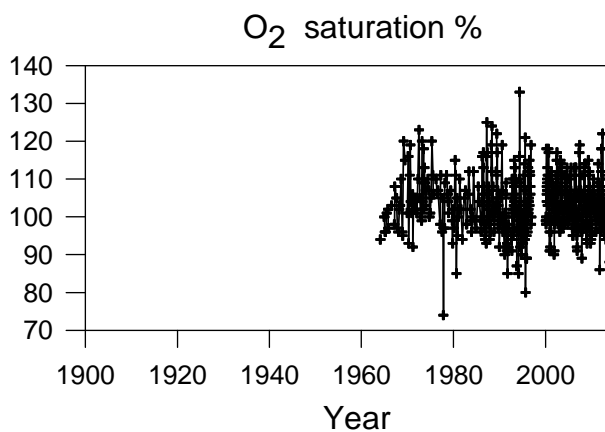
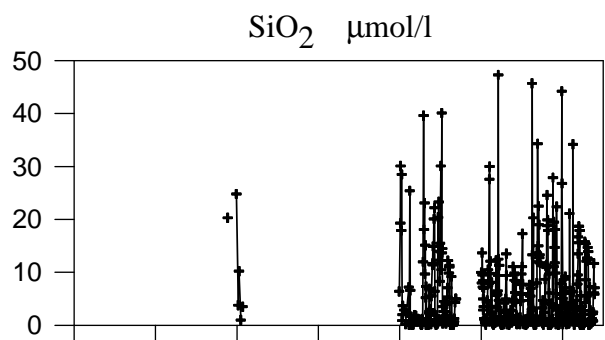
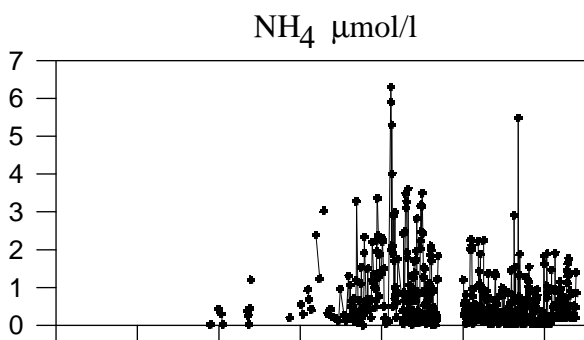
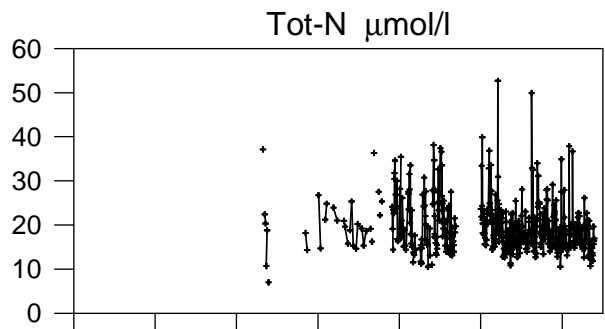
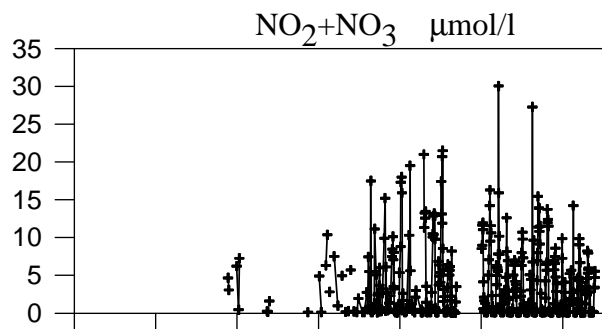
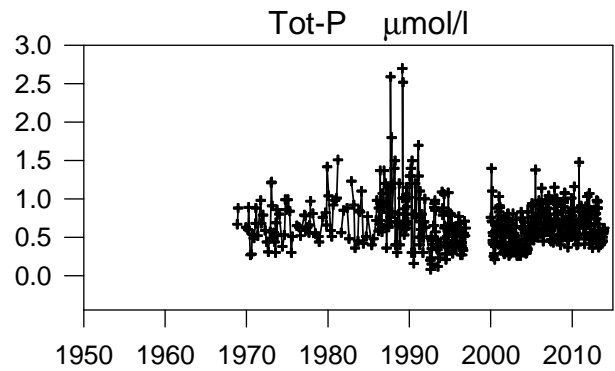
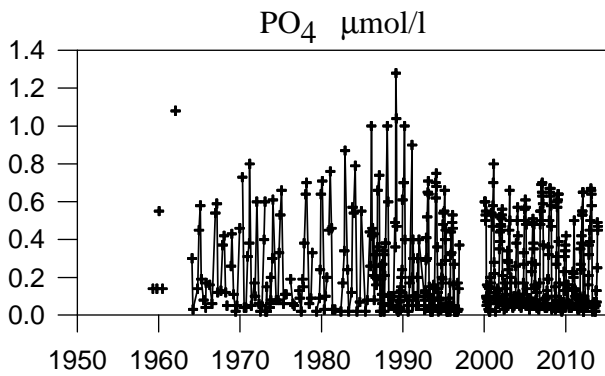
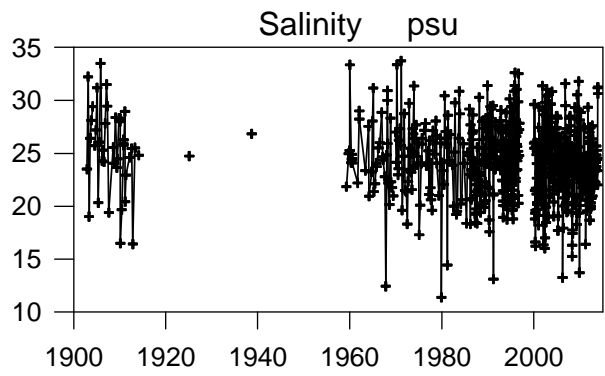
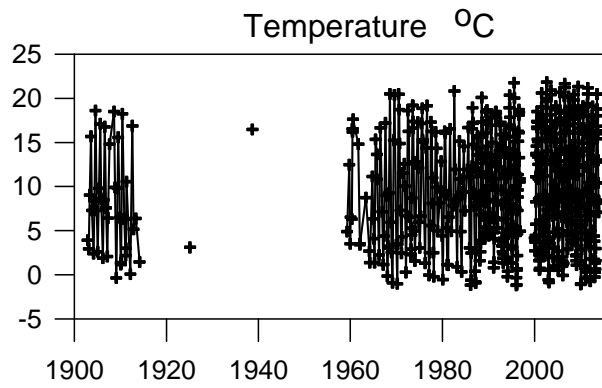
Annual Cycles

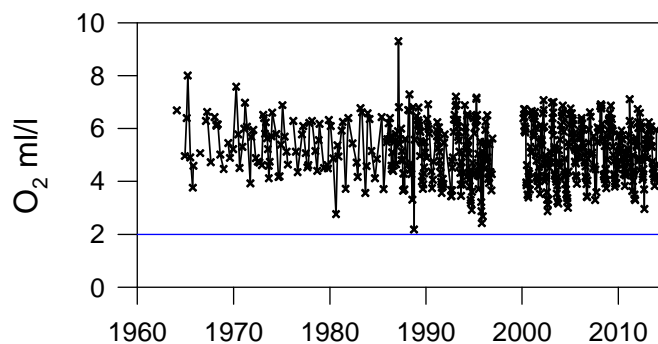
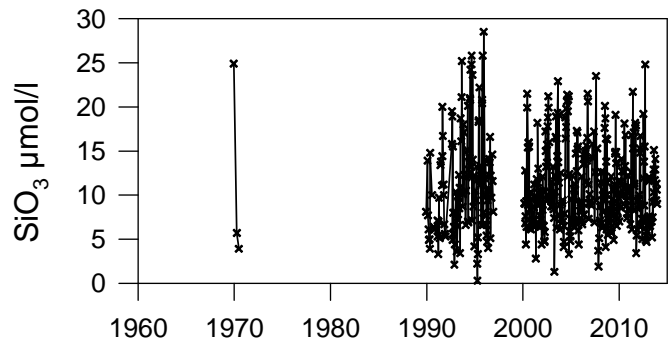
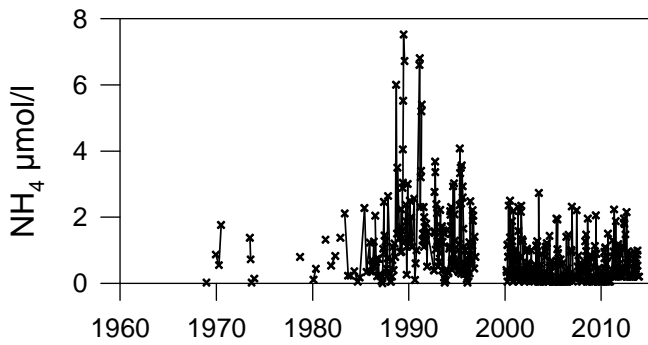
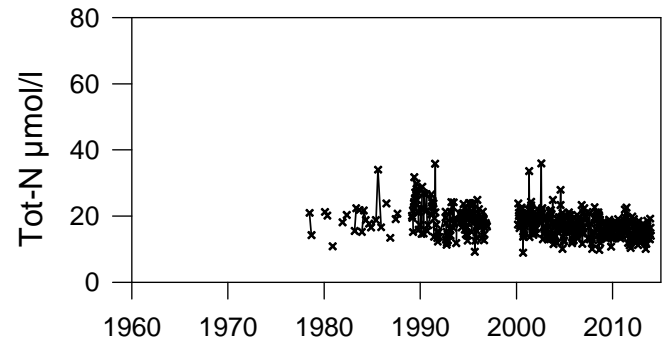
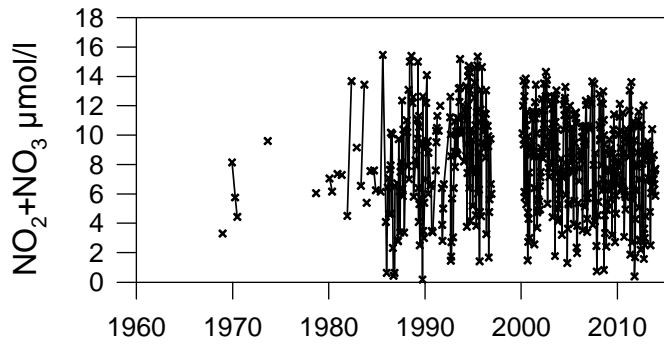
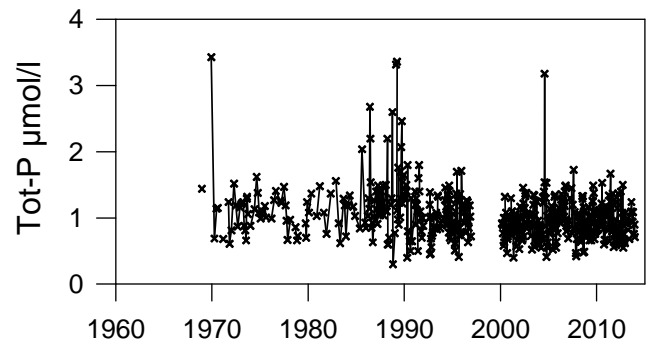
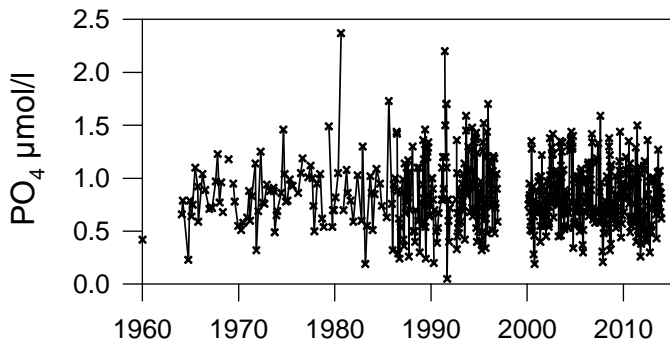
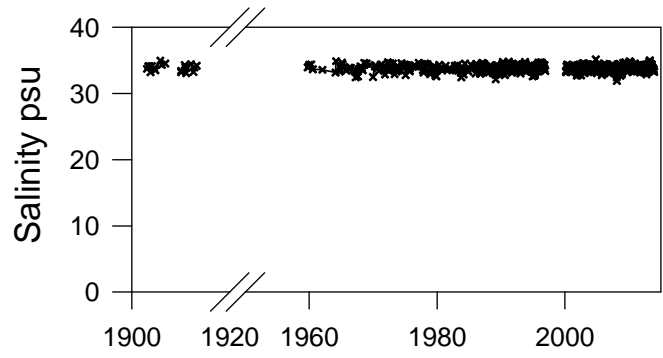
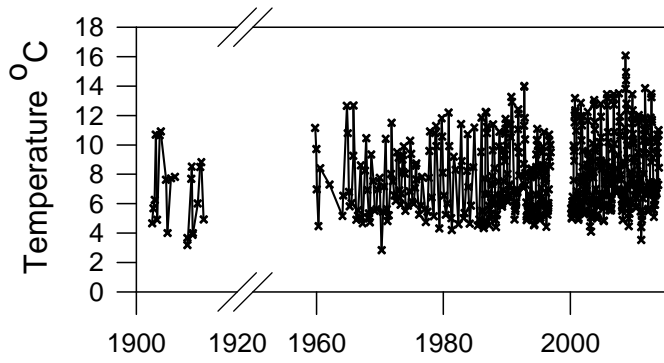
— Mean 1996-2010 St.Dev. ● 2013



OXYGEN IN BOTTOM WATER (depth >50m)







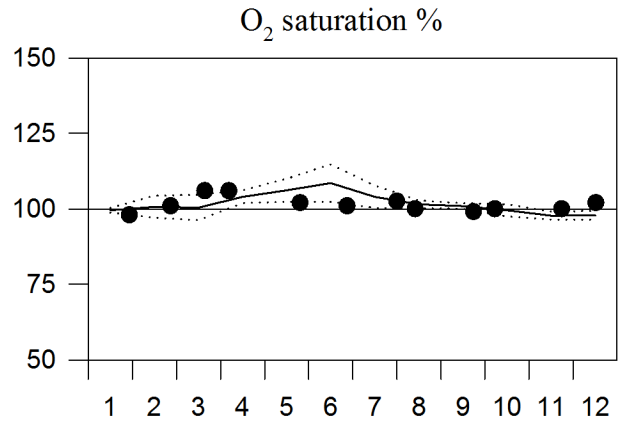
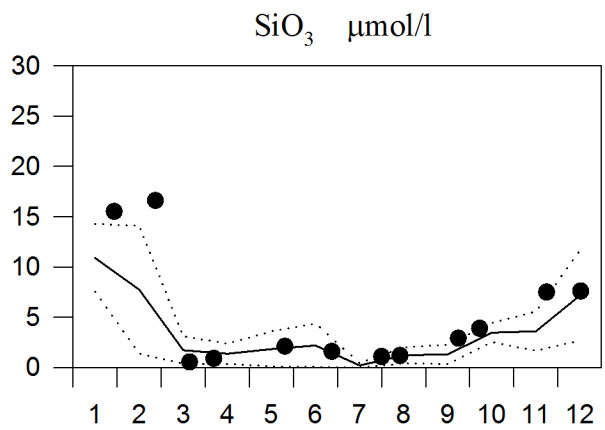
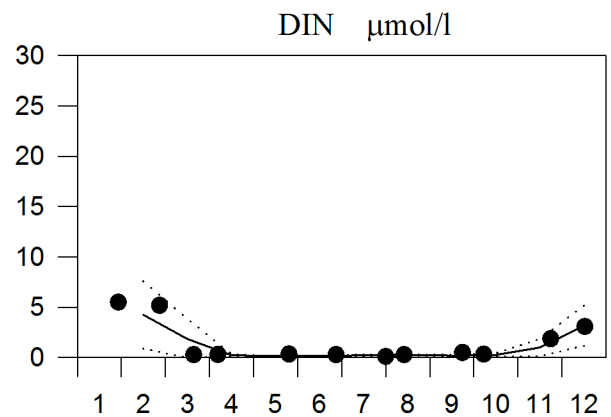
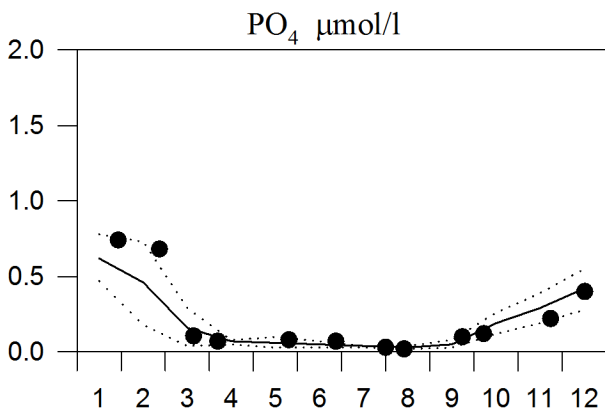
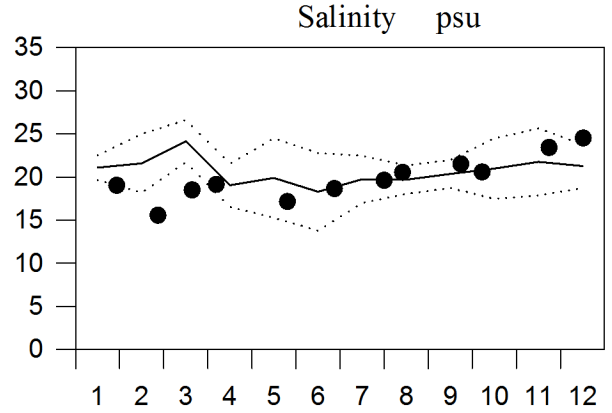
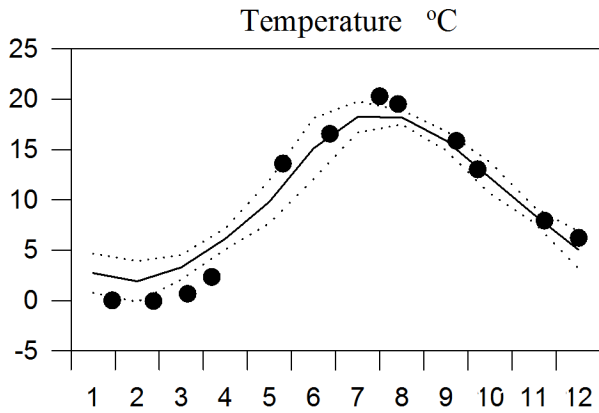
STATION N14 Falkenberg SURFACE WATER

Annual Cycles

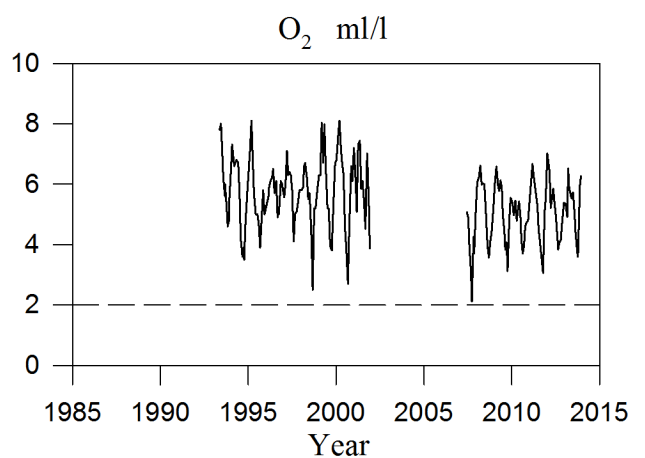
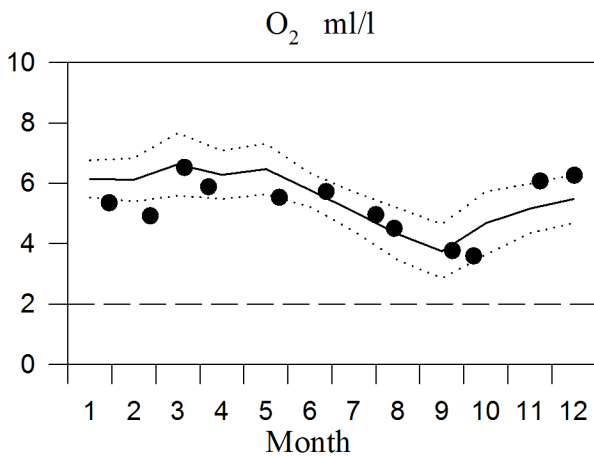
— Mean 2007-2010

..... St.Dev.

● 2013



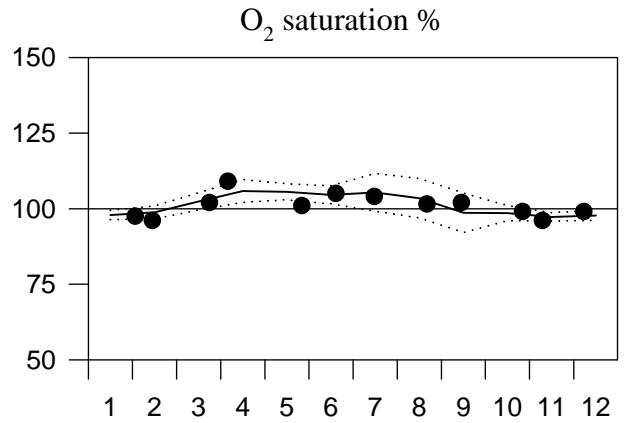
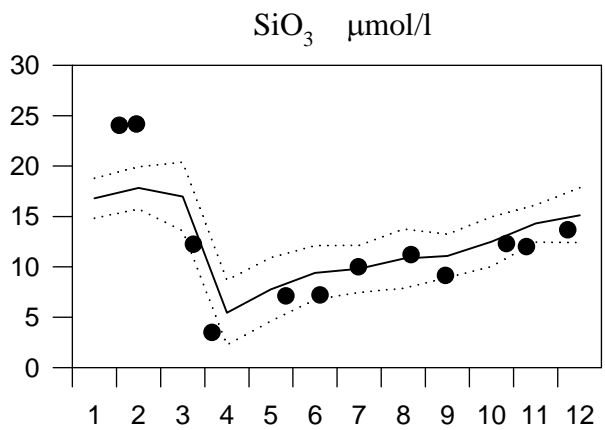
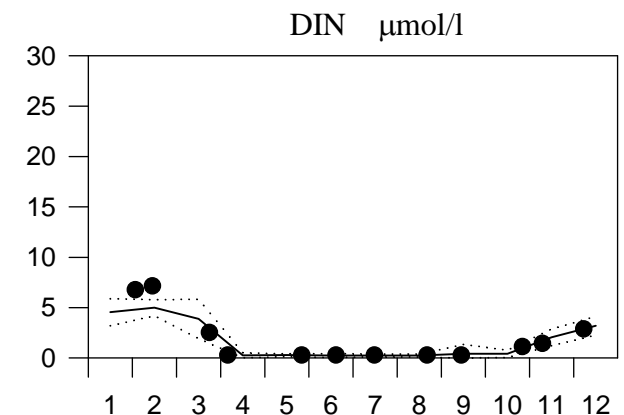
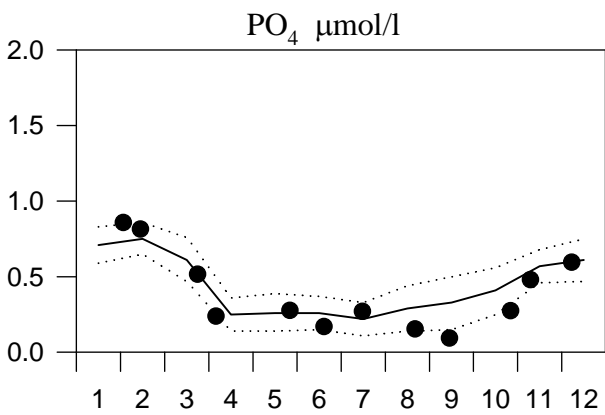
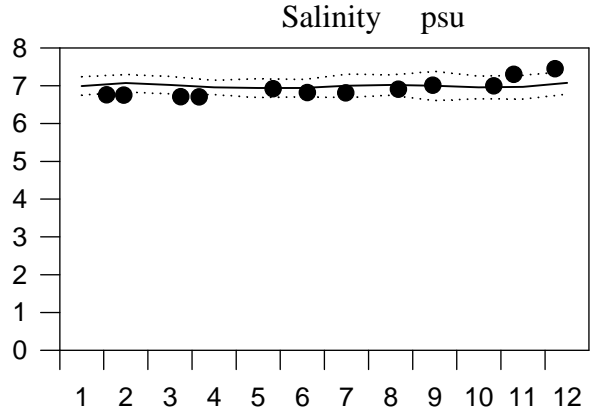
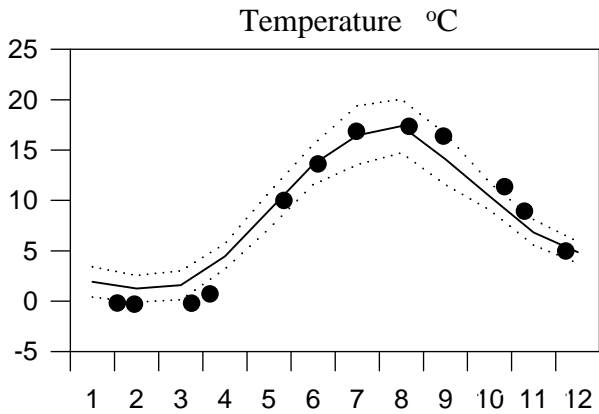
OXYGEN IN BOTTOM WATER (depth > 25m)



STATION REF M1V1 SURFACE WATER

Annual Cycles

— Mean 1996-2010 St.Dev. ● 2013



OXYGEN IN BOTTOM WATER (depth >15m)

