

Appendix III

Nutrient content per basin in the Baltic Sea and the Gulf of Bothnia

Method

The basin content of nutrients was calculated for the winter season from the same data set that was used for the time series presented in Appendix II. Each profile was interpolated (linearly) to retrieve concentrations in 1 m depth resolution from each station. Only complete profiles with data in the surface, intermediary and deep waters are used.

The winter season includes the months December, January and February. Note that winter 2022 was calculated from data collected in December 2021, January 2022 and February 2022. Parameters included are dissolved inorganic phosphorus (DIP), total phosphorus, sum of ammonium, nitrate and nitrite (DIN), total nitrogen and dissolved silica.

For each basin the concentration at each depth is multiplied by the volume of that depth layer, thereby getting the content of each nutrient in that depth layer. All depth layers are then summed to give the content for the whole basin. In Bornholm Basin, Arkona Basin, Bothnian Sea and Bothnian Bay the average concentration of two stations is used for the calculation, assuming little horizontal variations in all depth layers. The Western Gotland Basin and the Eastern Gotland Basin are divided into three and four sub-basins respectively because the horizontal variations, especially in the deep waters, are larger here. The sub-basins are chosen based on bathymetry around the monitoring stations. Calculated content is shown both for the sub-basins and the whole basins.

The last page shows all basins together in one figure. Note that the difference in content between the basins depends largely on their difference in size and not only the nutrient concentration.

The volume of each depth layer was calculated from the bathymetry dataset iowotopo2 available by IOW at <https://www.io-warnemuende.de/topography-of-the-baltic-sea.html> and by using the open sea basin subdivision set by HELCOM. The sub-basin divisions were made with GIS-software and lines for these divisions were drawn with guidance from the bathymetry map. All basin subdivisions used are shown in the first figure of this Appendix (Figure 1).

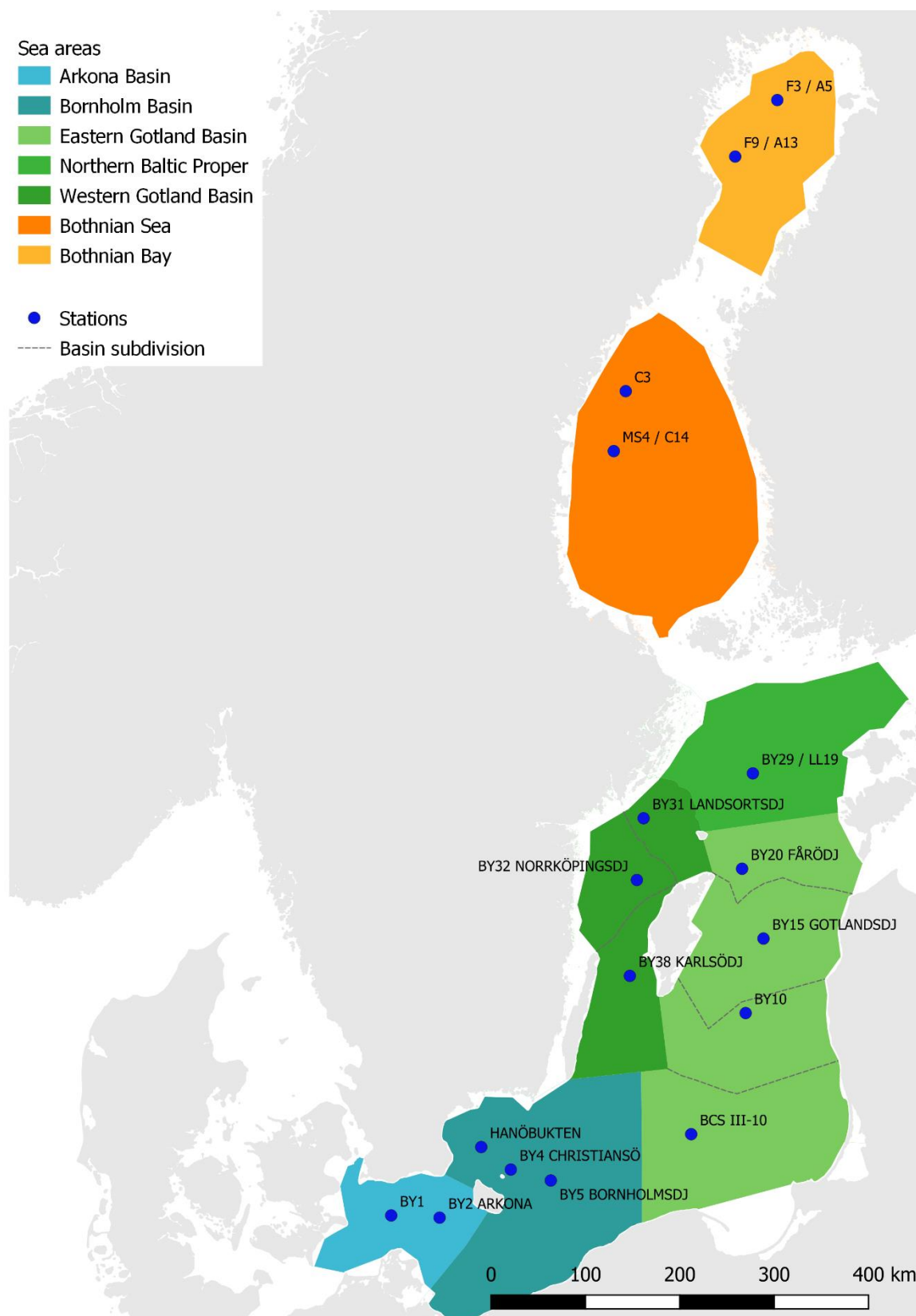


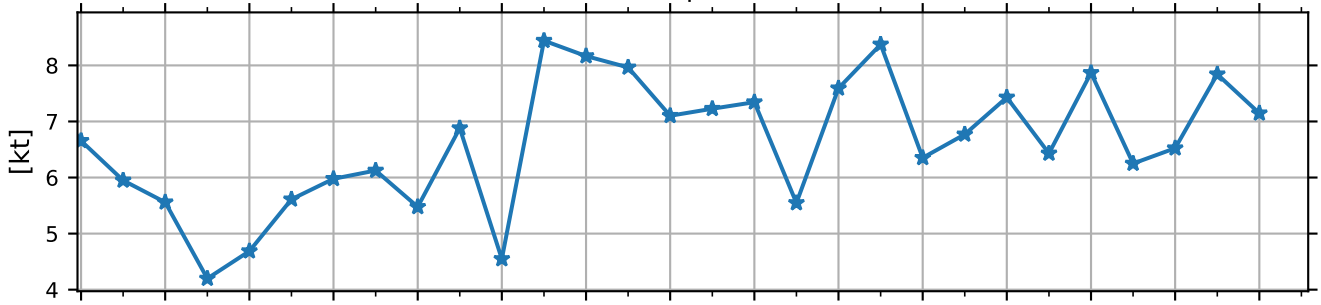
Figure 1 Basin subdivisions used for calculating hypsography and then basin content of sub-basins. The major basins shown in different colours are the HELCOM basin division revised in 2018. The previous basin division placed the station BY31 in the Northern Baltic Proper. The dashed lines showing the sub-basins were drawn to follow the bathymetry to get a smaller basin that the individual monitoring station better represents.

ARKONA BASIN

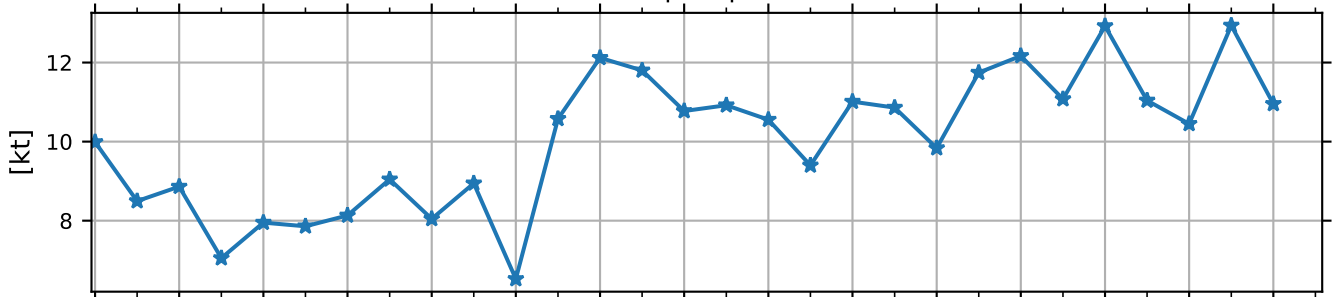
Offshore volume of basin: 353 km³

—*— winter

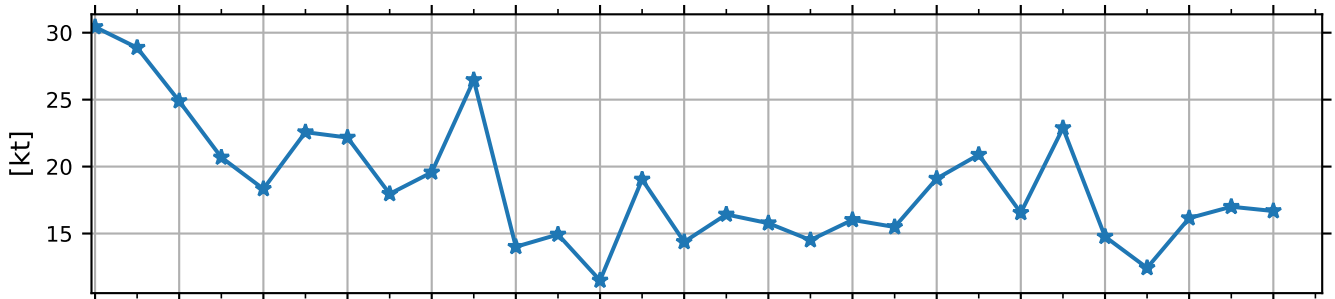
Phosphate



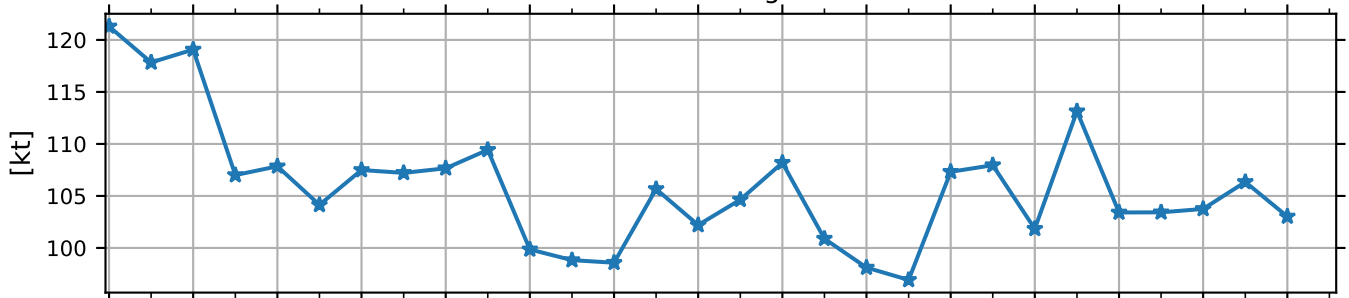
Total phosphorus



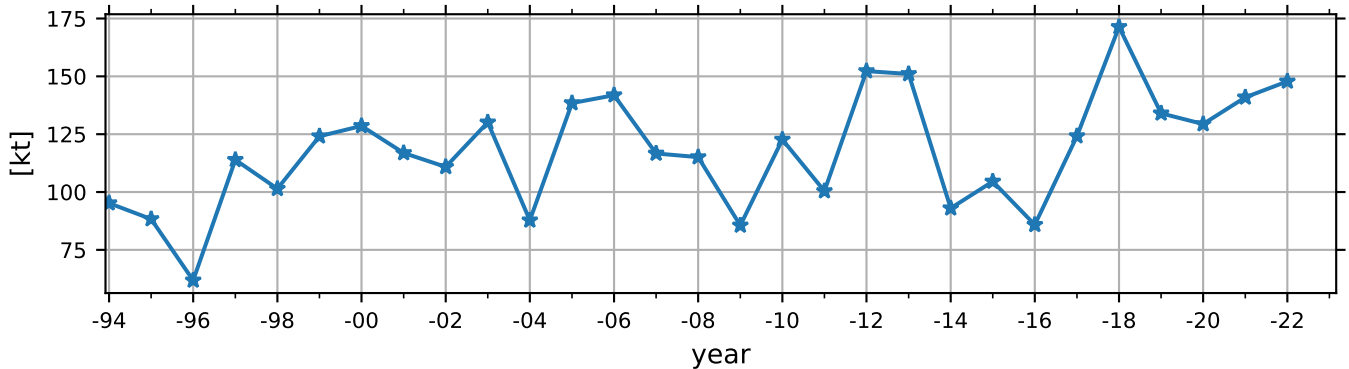
DIN



Total Nitrogen



Dissolved Silica

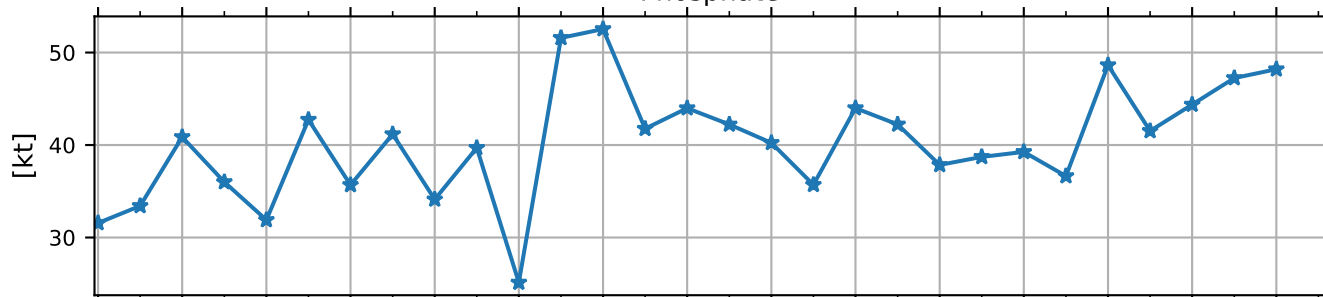


BORNHOLM BASIN

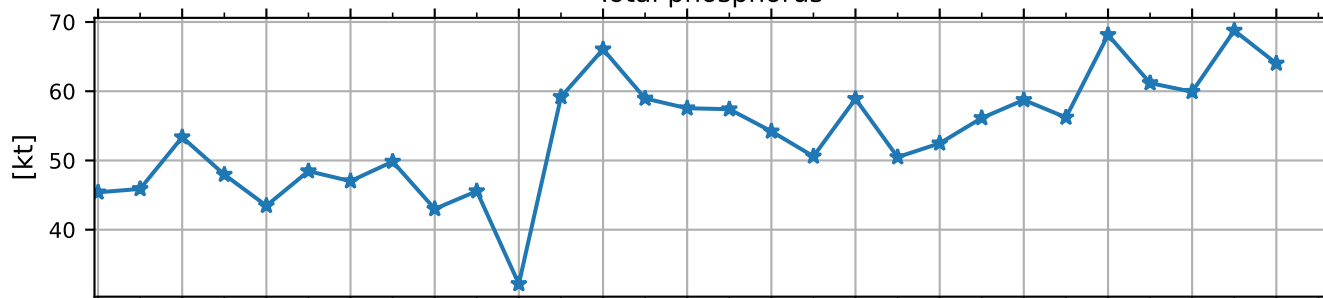
Offshore volume of basin: 1603 km³

—*— winter

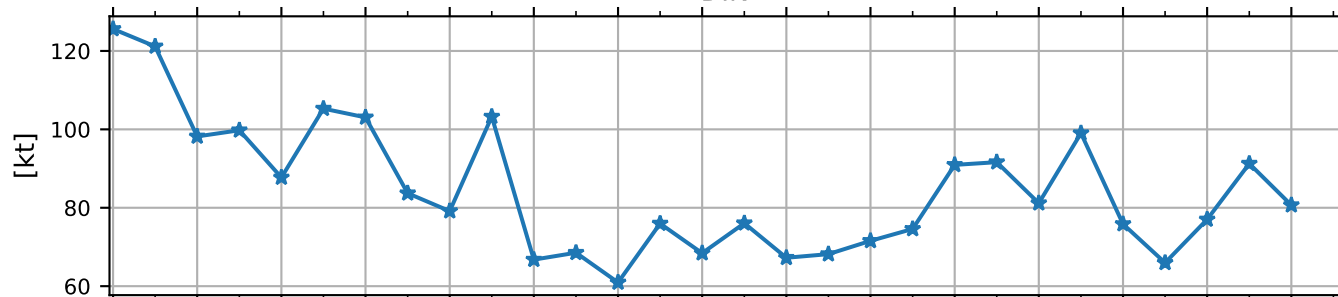
Phosphate



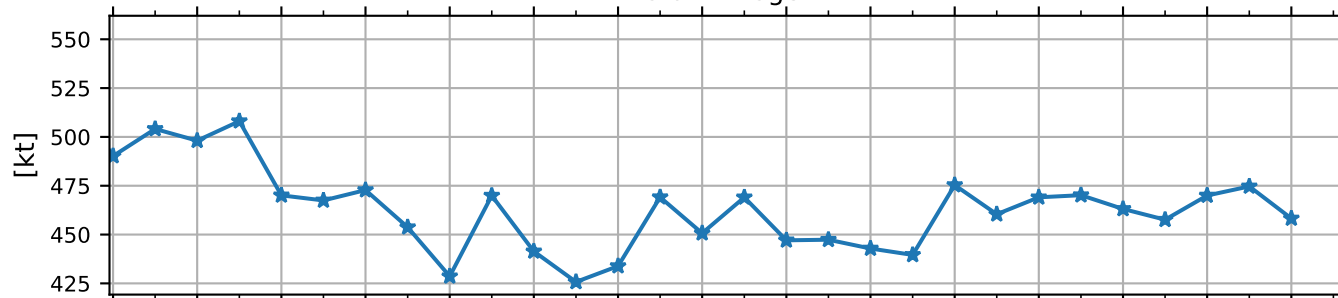
Total phosphorus



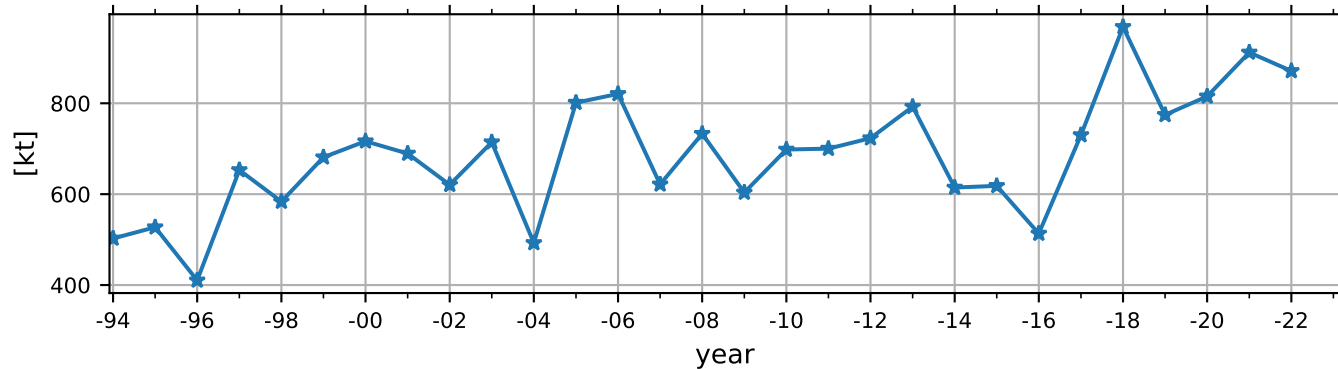
DIN



Total Nitrogen



Dissolved Silica

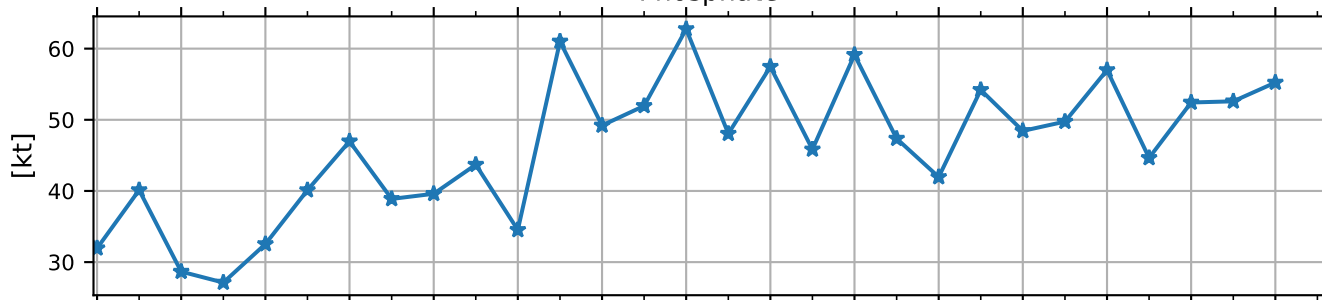


EASTERN GOTLAND BASIN BCS III-10

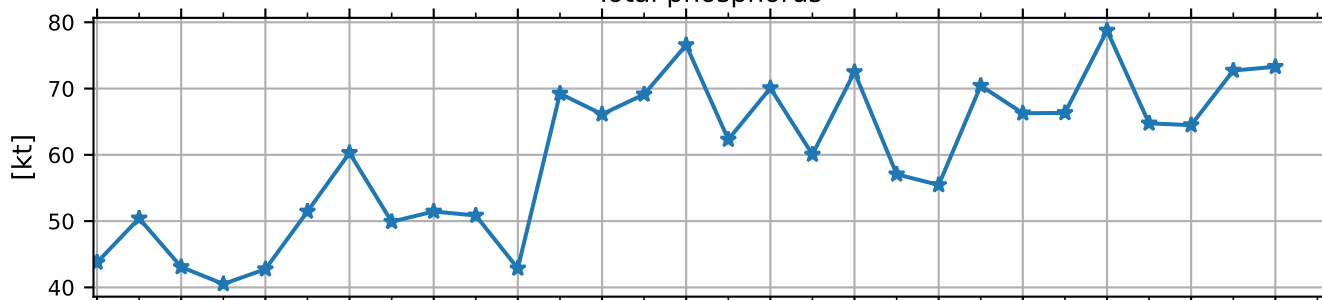
Offshore volume of basin: 1597 km³

—*— winter

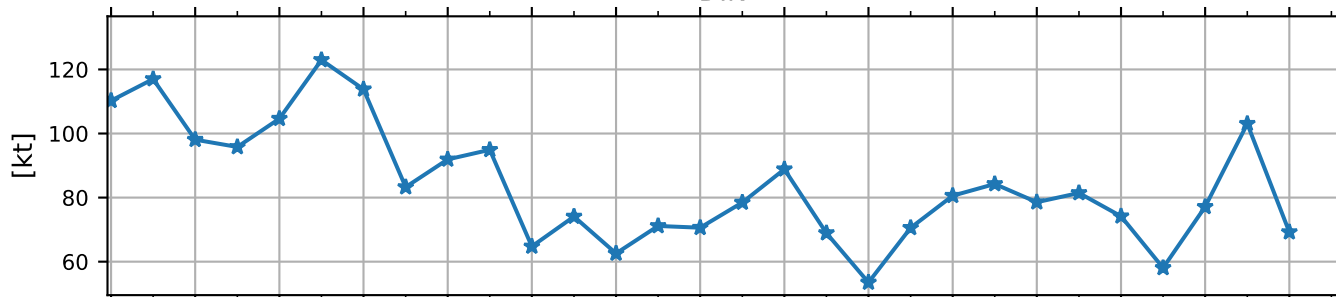
Phosphate



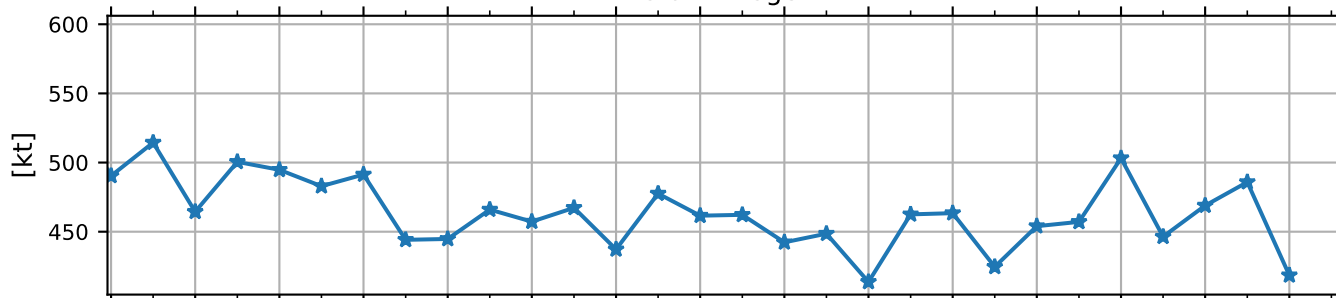
Total phosphorus



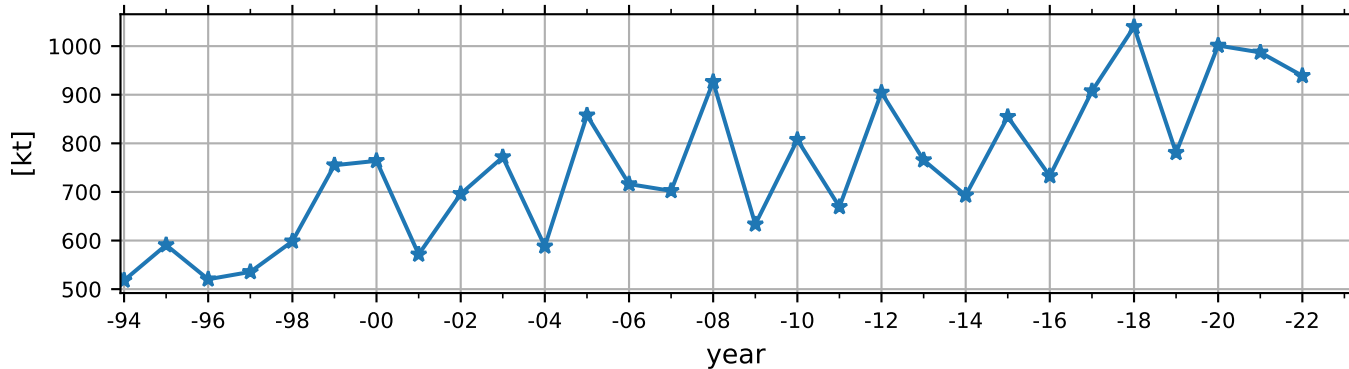
DIN



Total Nitrogen



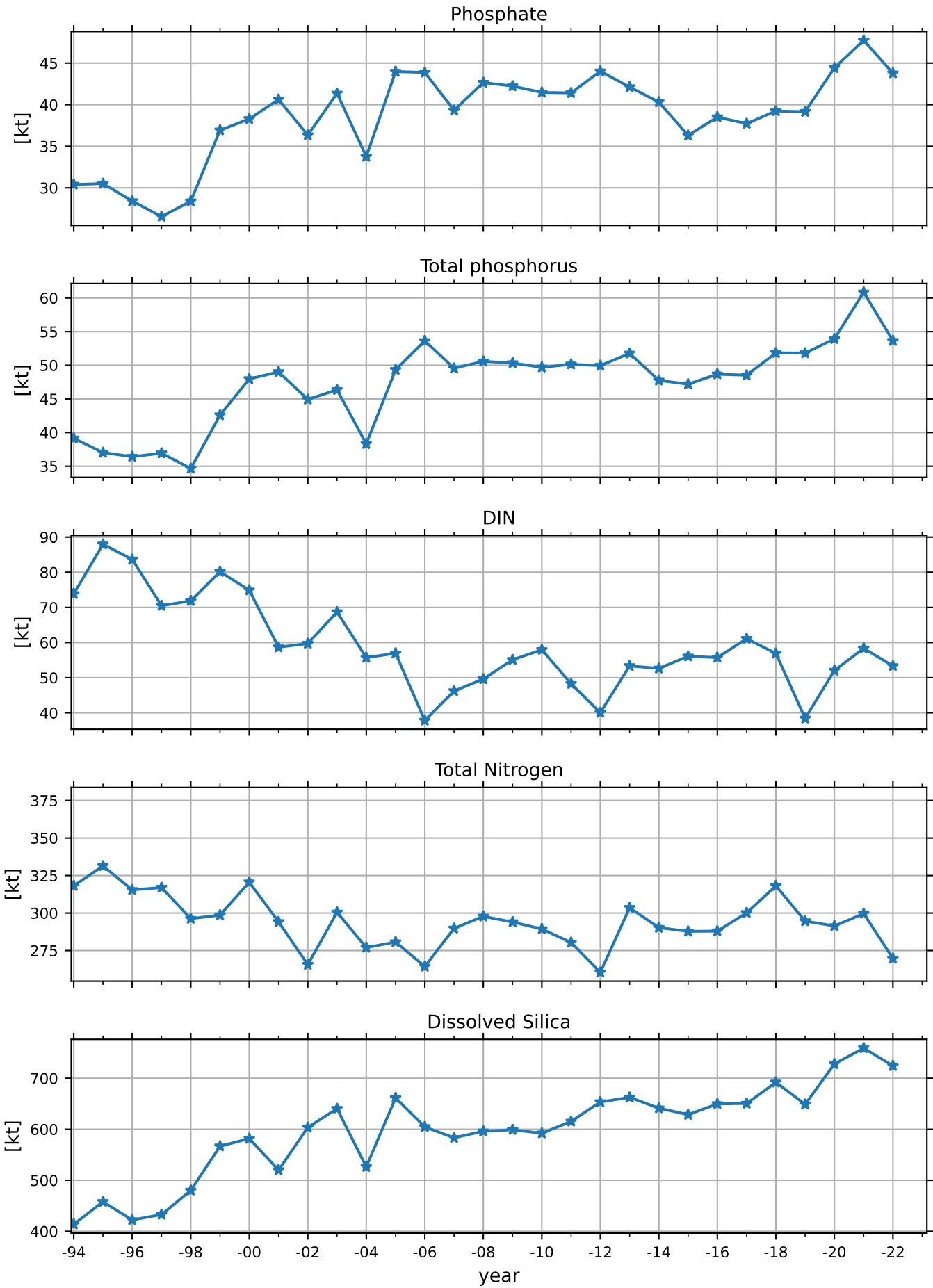
Dissolved Silica



EASTERN GOTLAND BASIN BY10

Offshore volume of basin: 1007 km³

—*— winter

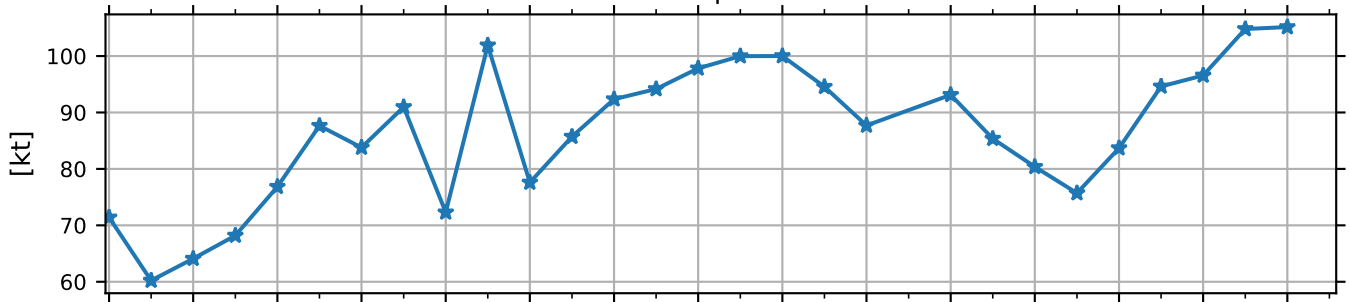


EASTERN GOTLAND BASIN BY15 GOTLANDSDJ

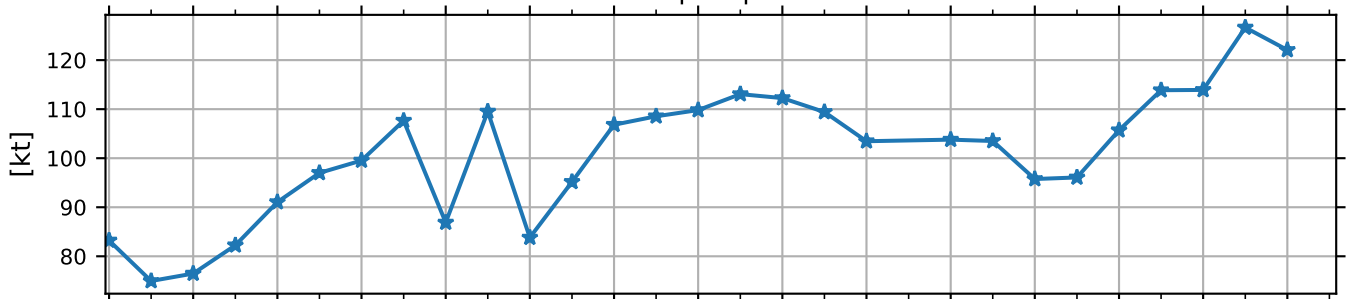
Offshore volume of basin: 1748 km³

—*— winter

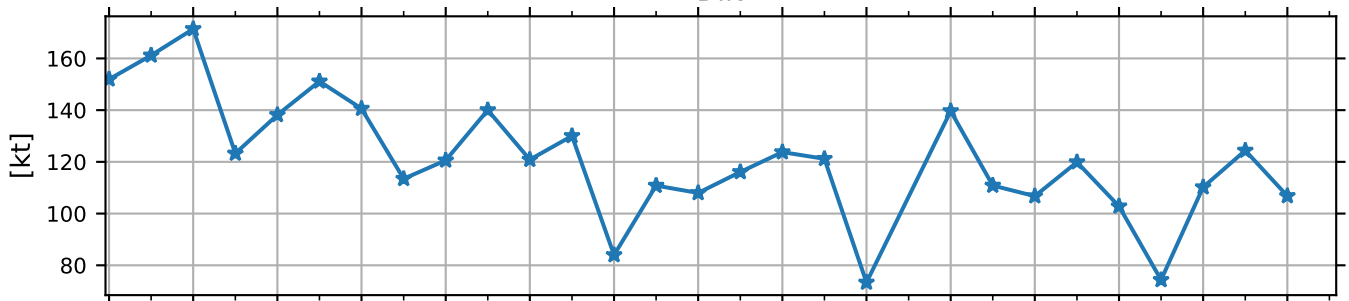
Phosphate



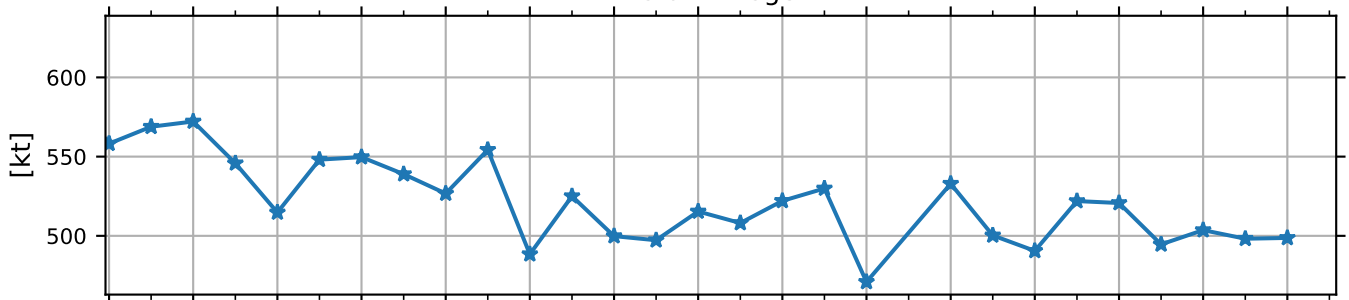
Total phosphorus



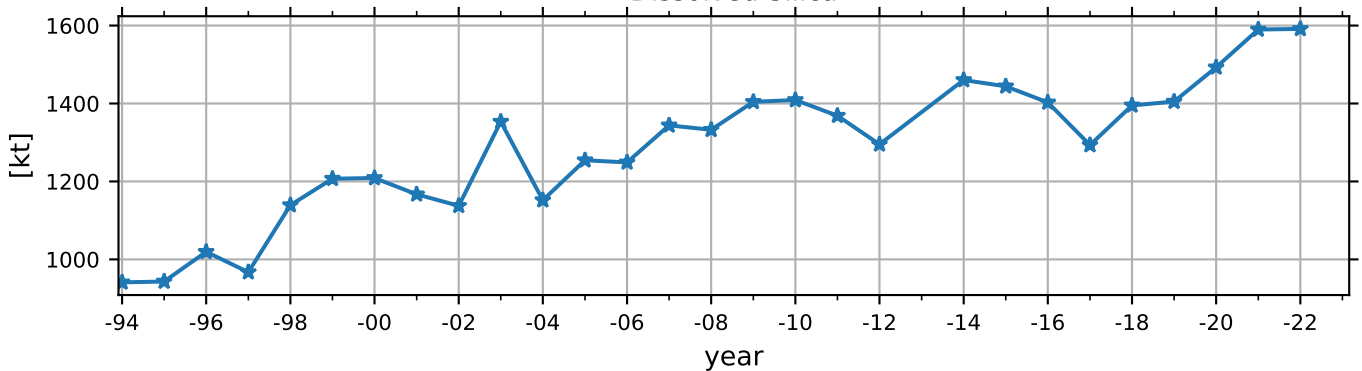
DIN



Total Nitrogen



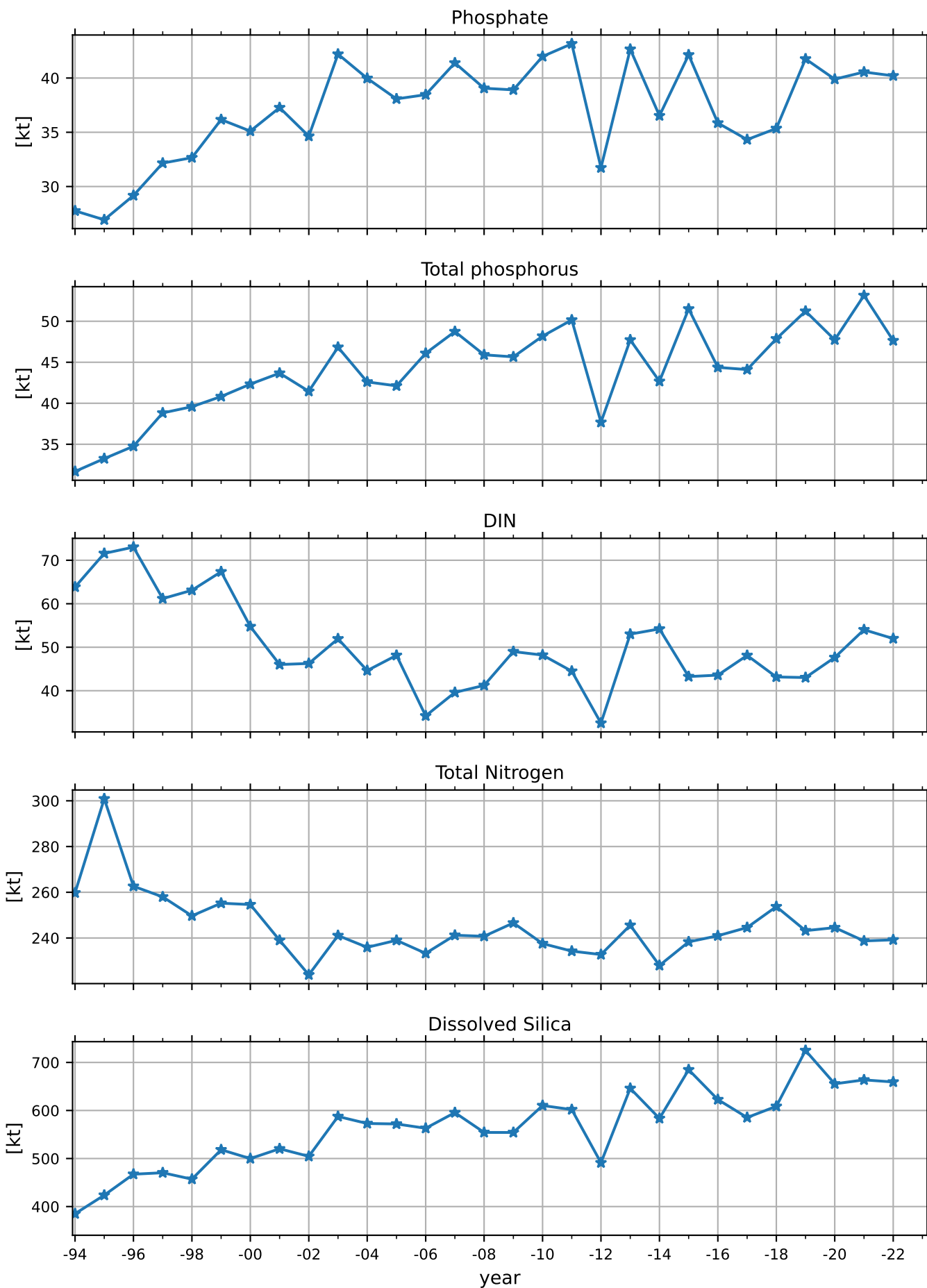
Dissolved Silica



EASTERN GOTLAND BASIN BY20

Offshore volume of basin: 841 km³

—*— winter

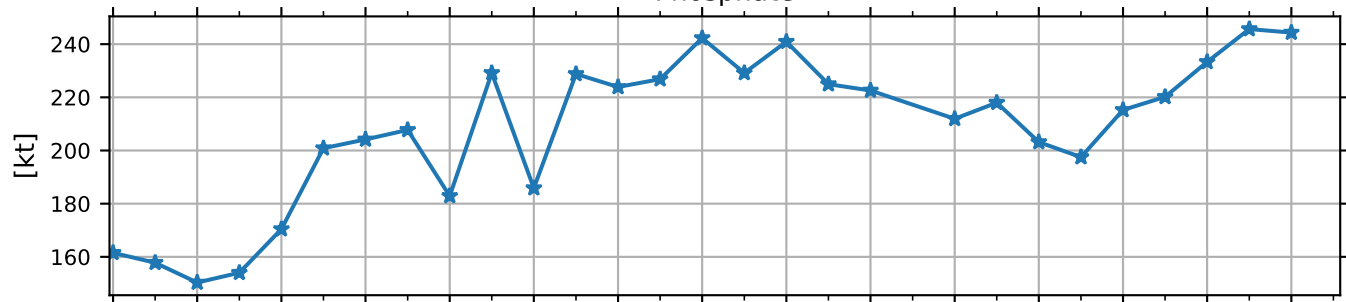


EASTERN GOTLAND BASIN

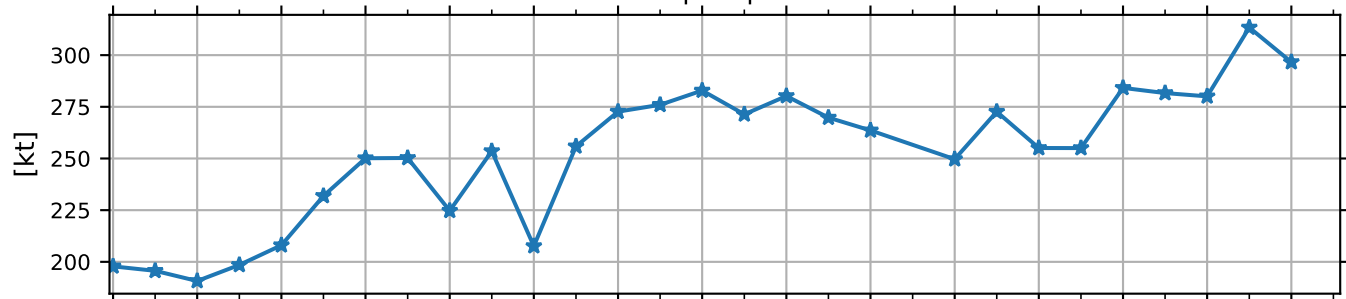
Offshore volume of basin: 5193 km³

—*— winter

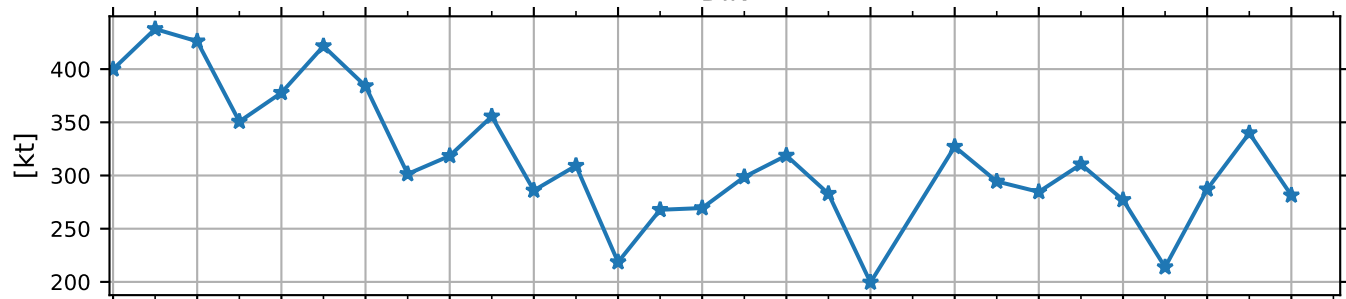
Phosphate



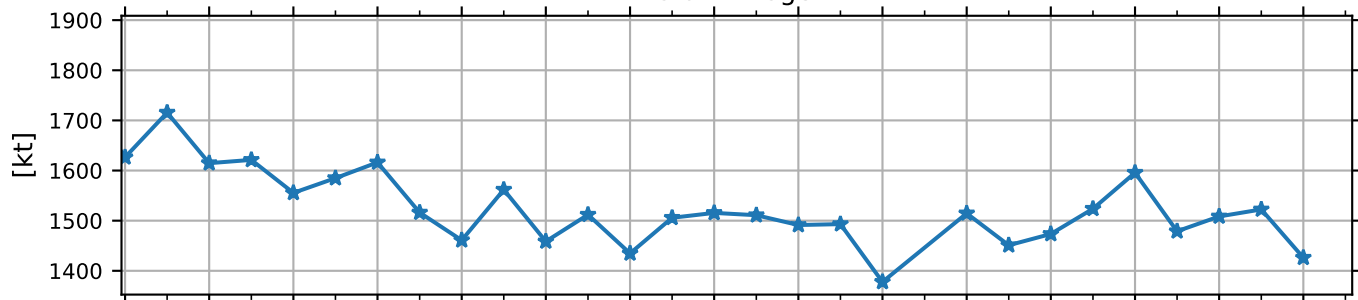
Total phosphorus



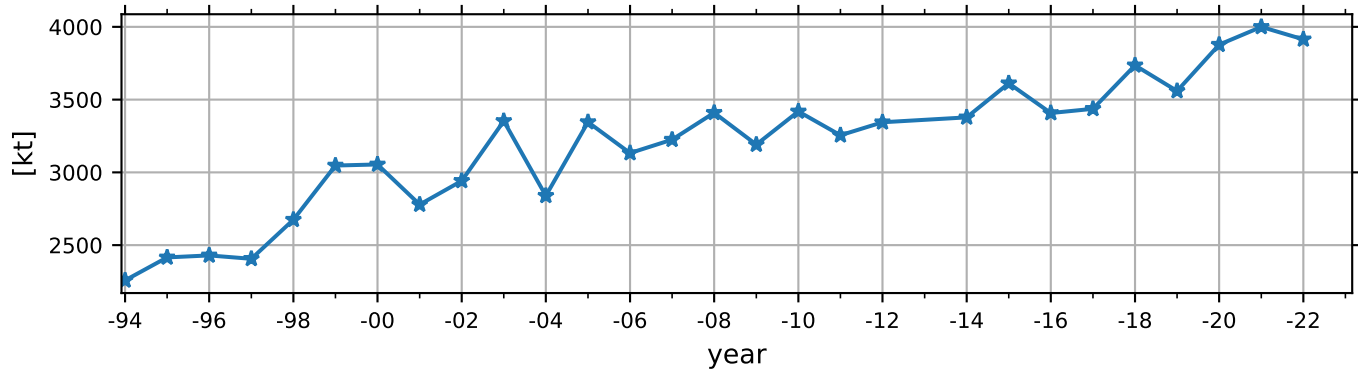
DIN



Total Nitrogen



Dissolved Silica

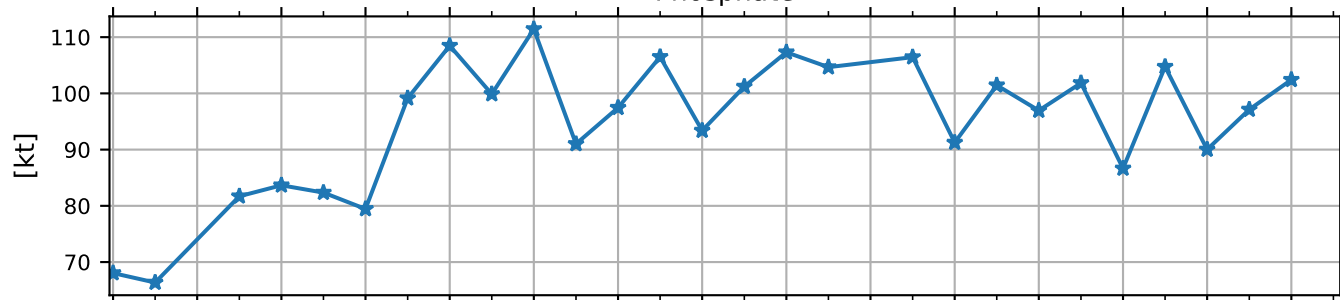


NORTHERN BALTIC PROPER

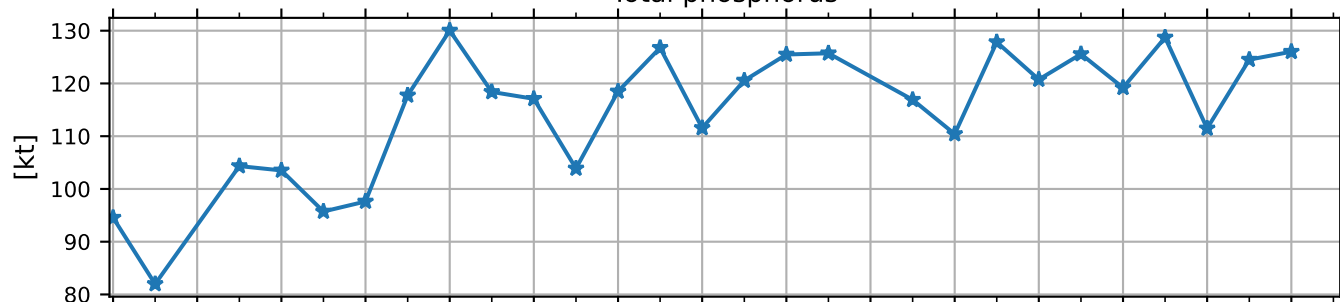
Offshore volume of basin: 2327 km³

—*— winter

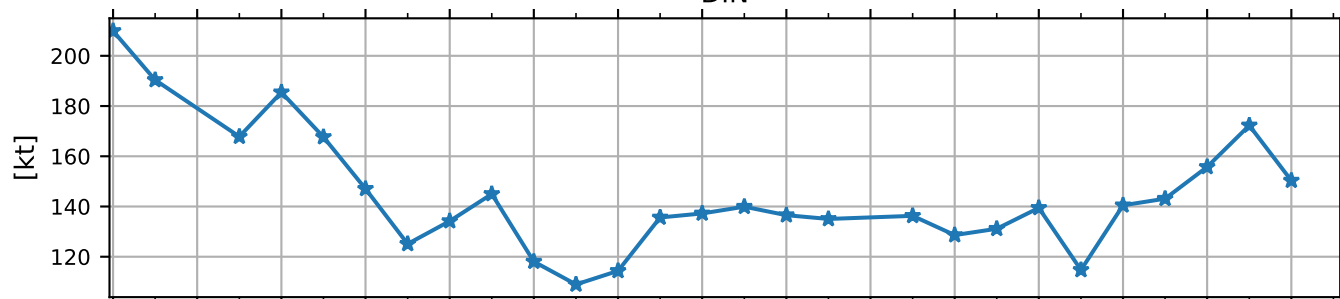
Phosphate



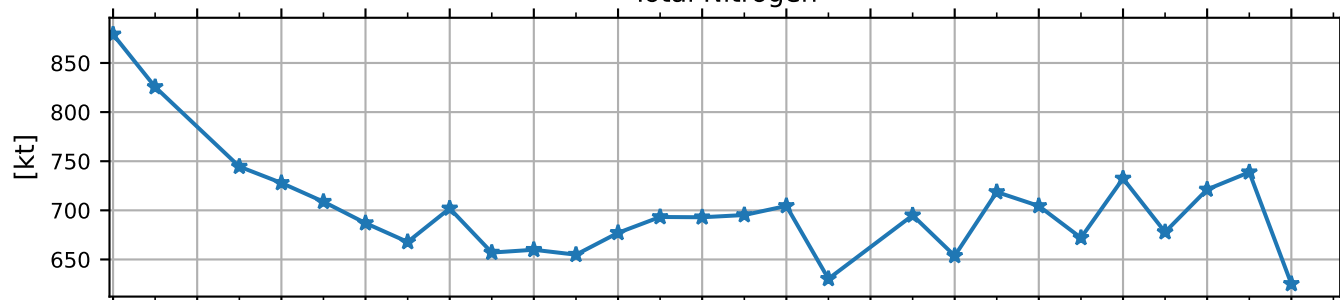
Total phosphorus



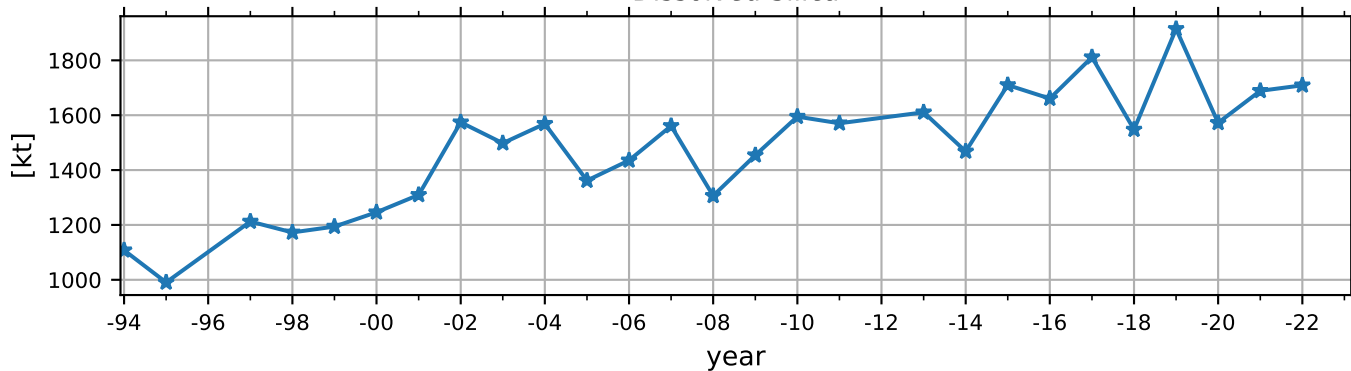
DIN



Total Nitrogen



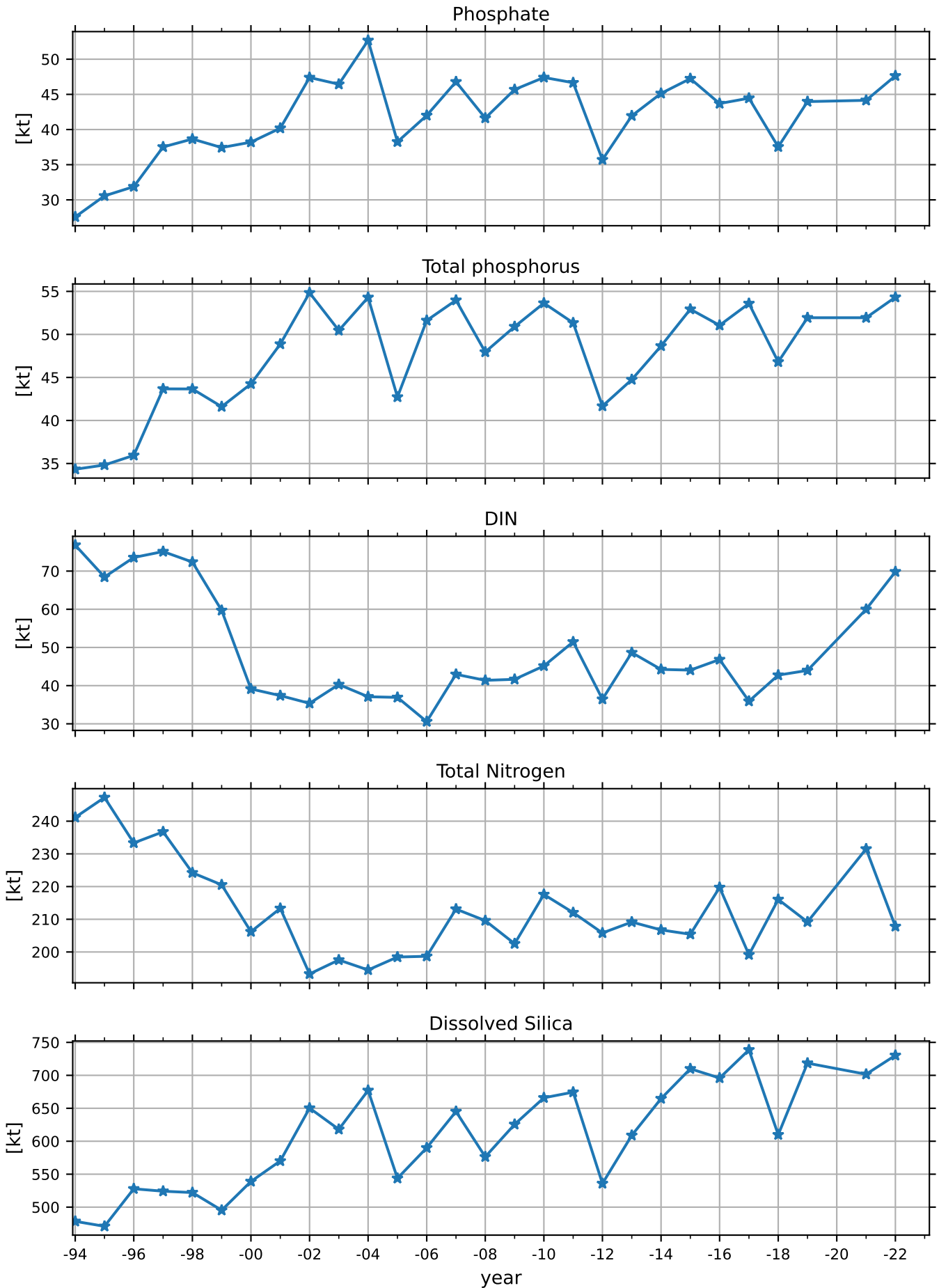
Dissolved Silica



WESTERN GOTLAND BASIN BY31 LANDSORTSDJ

Offshore volume of basin: 723 km³

—*— winter

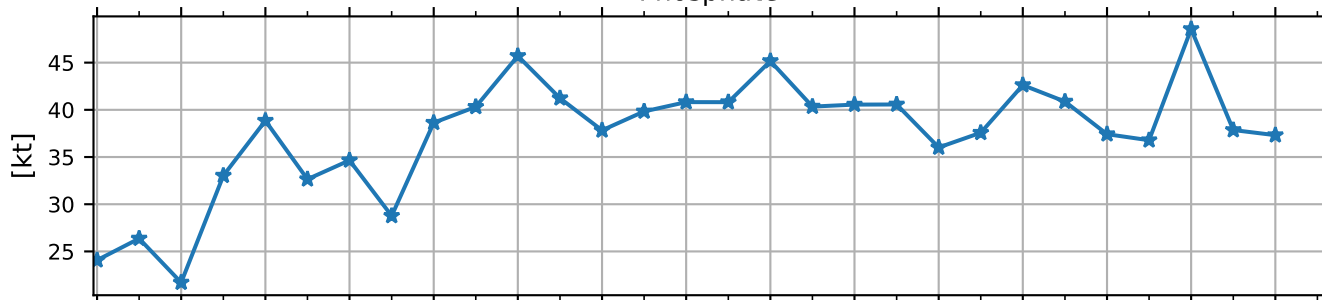


WESTERN GOTLAND BASIN BY32

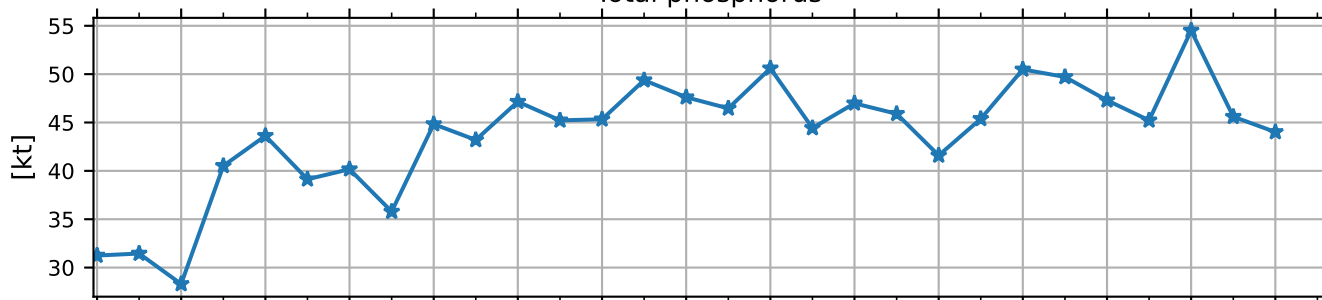
Offshore volume of basin: 767 km³

—*— winter

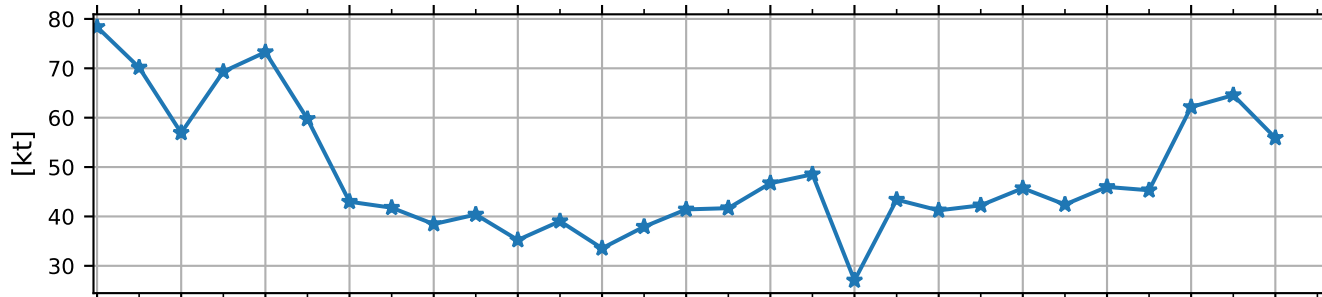
Phosphate



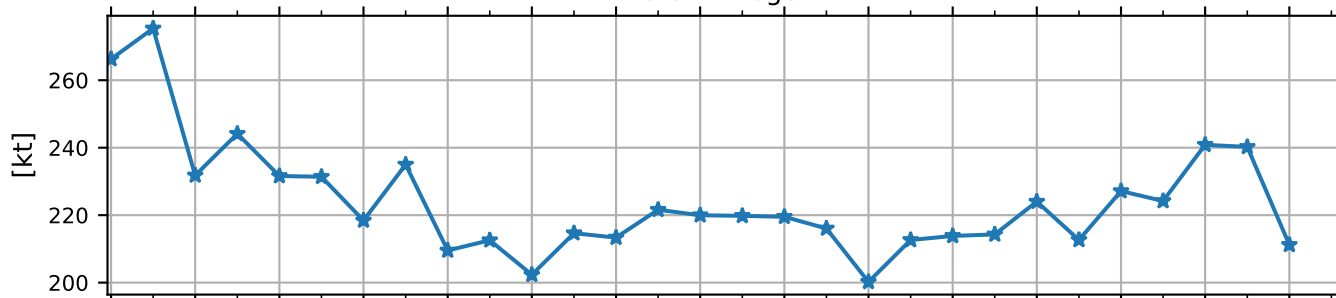
Total phosphorus



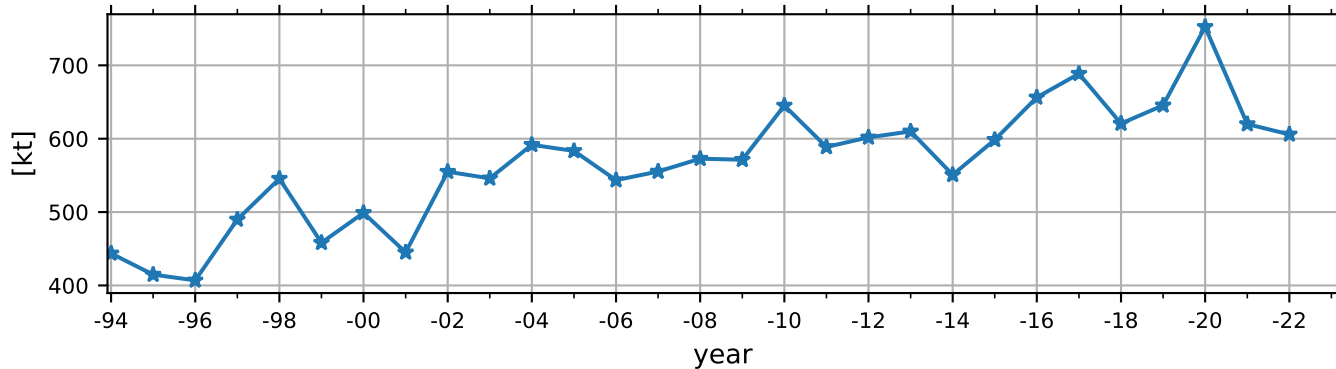
DIN



Total Nitrogen



Dissolved Silica



WESTERN GOTLAND BASIN BY38

Offshore volume of basin: 708 km³

—*— winter

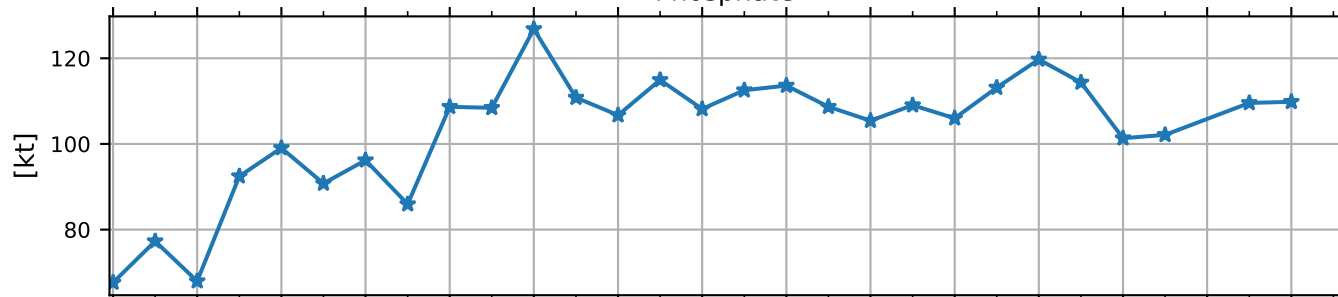


WESTERN GOTLAND BASIN

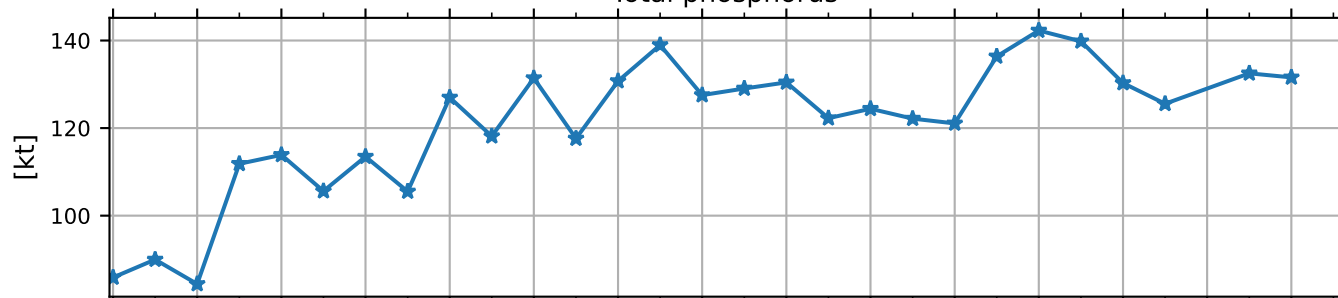
Offshore volume of basin: 2198 km³

—*— winter

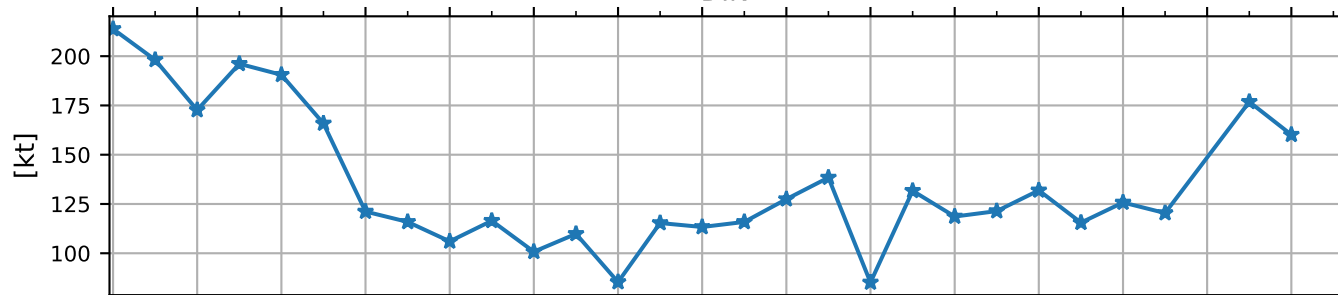
Phosphate



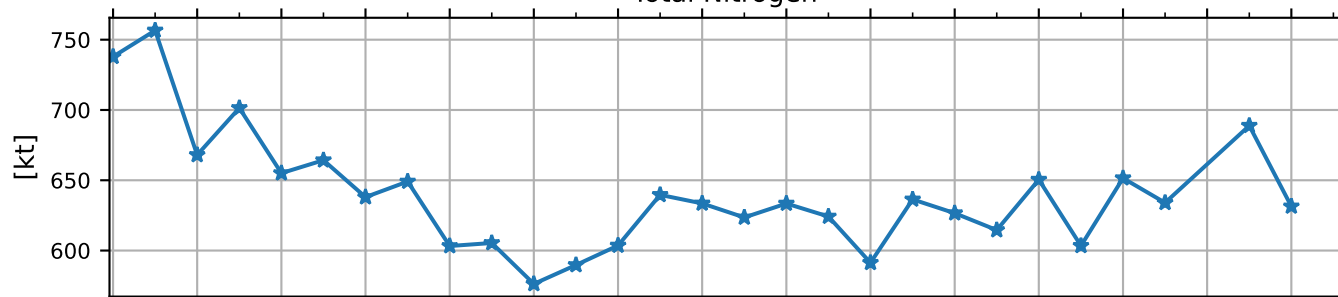
Total phosphorus



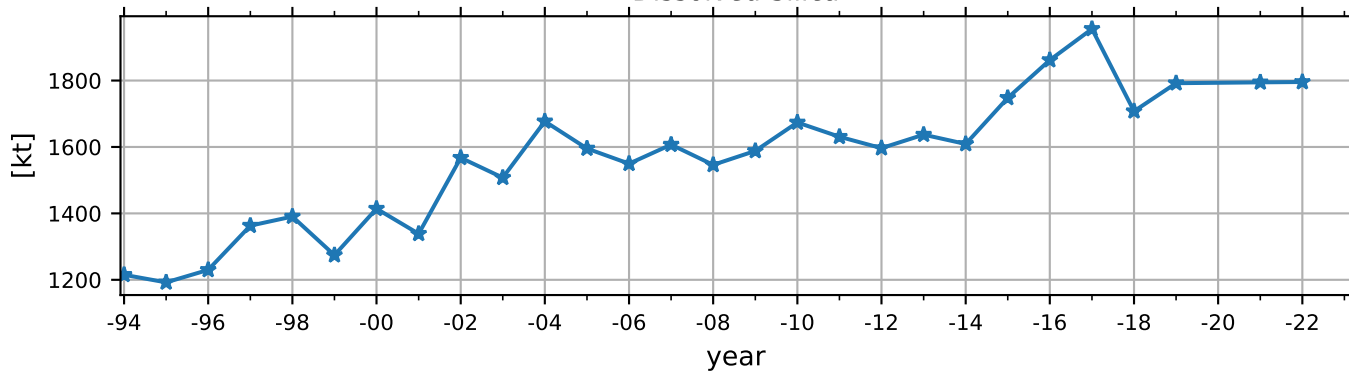
DIN



Total Nitrogen



Dissolved Silica

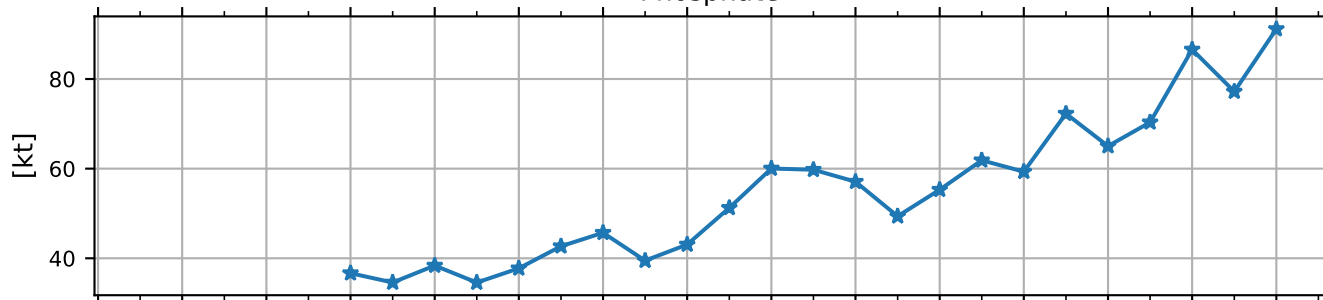


BOTHNIAN SEA

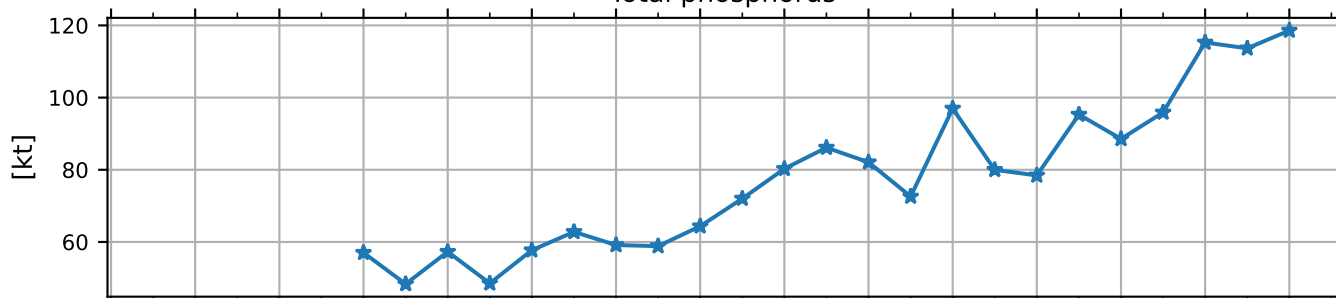
Offshore volume of basin: 4148 km³

—*— winter

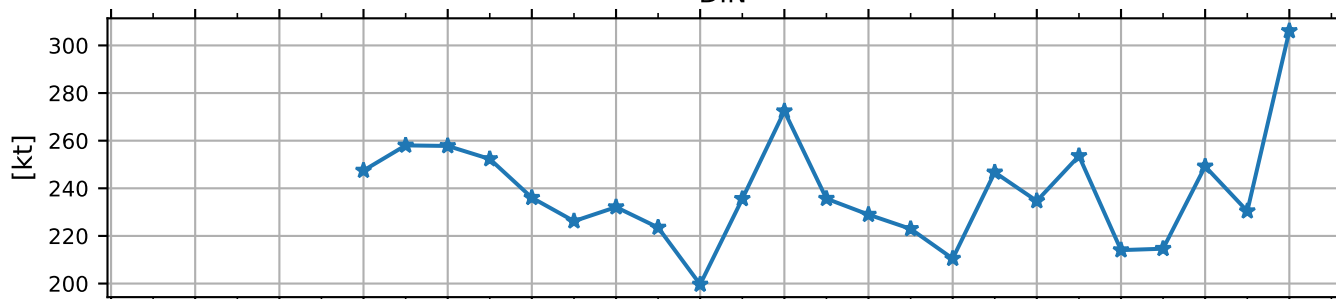
Phosphate



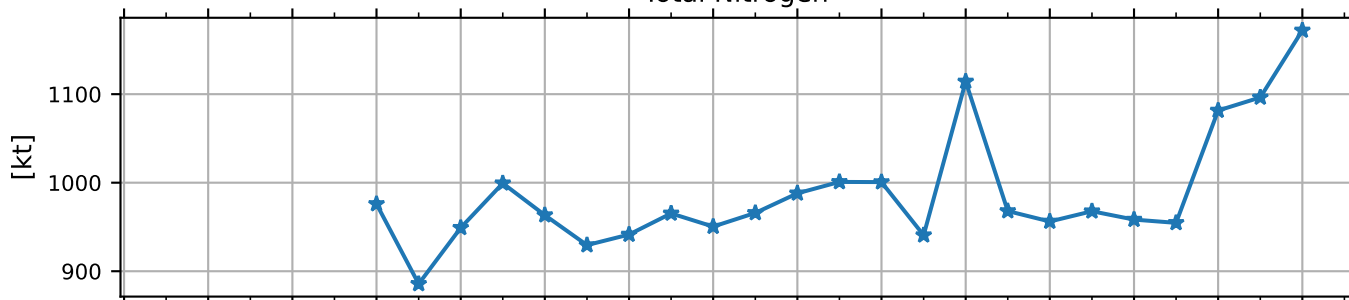
Total phosphorus



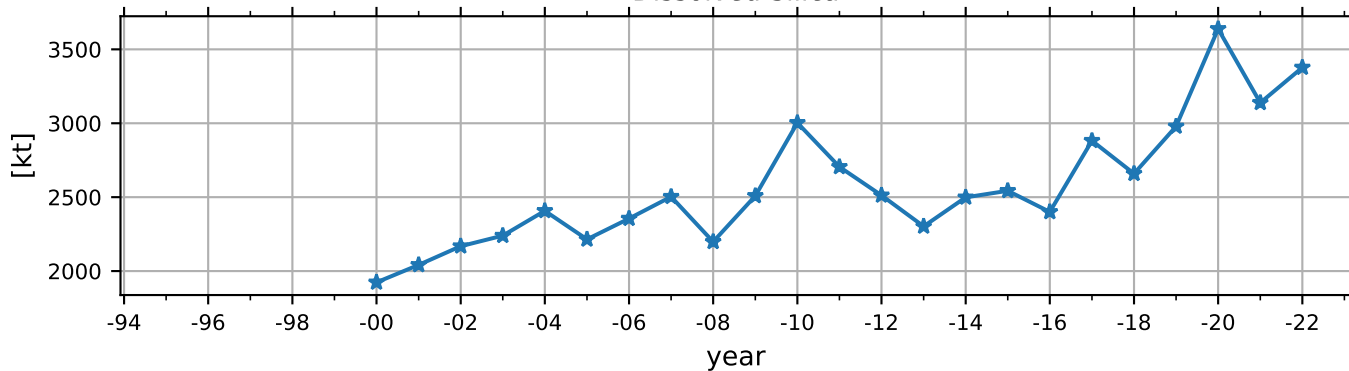
DIN



Total Nitrogen



Dissolved Silica

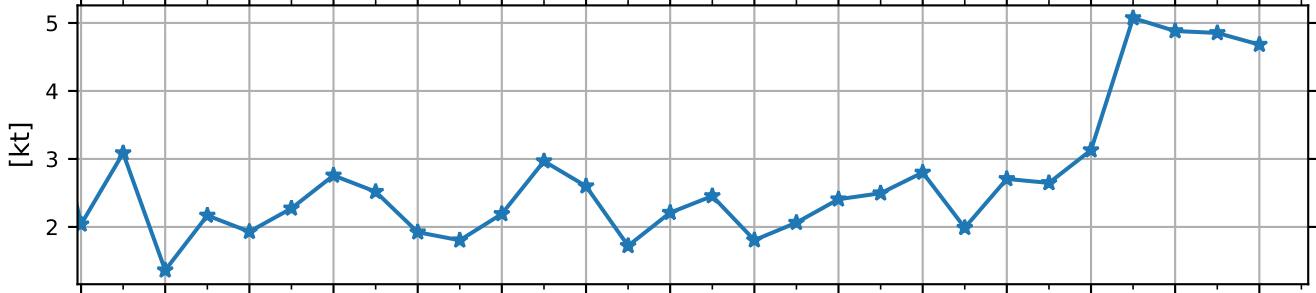


BOTHNIAN BAY

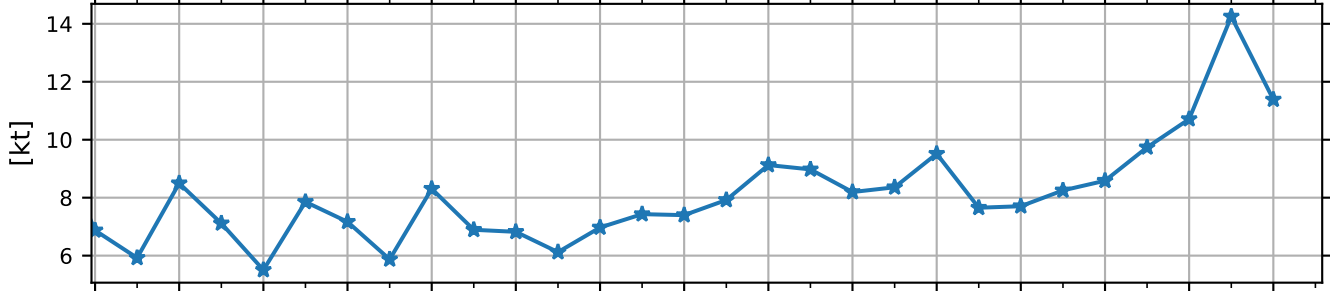
Offshore volume of basin: 1447 km³

—*— winter

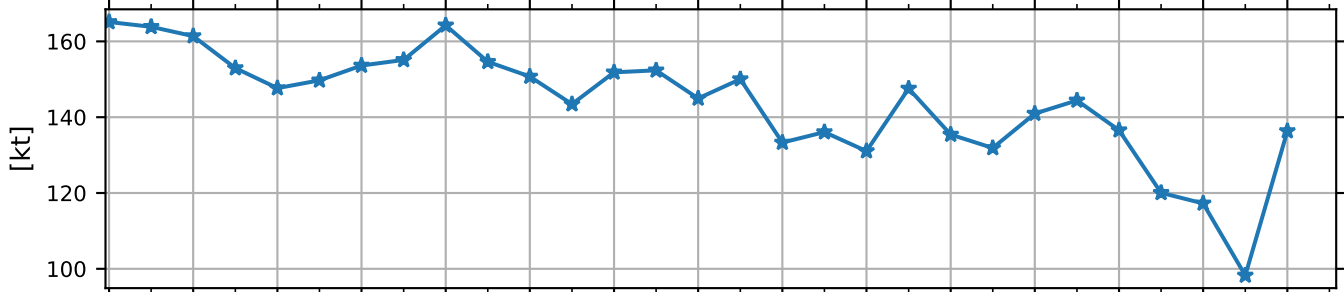
Phosphate



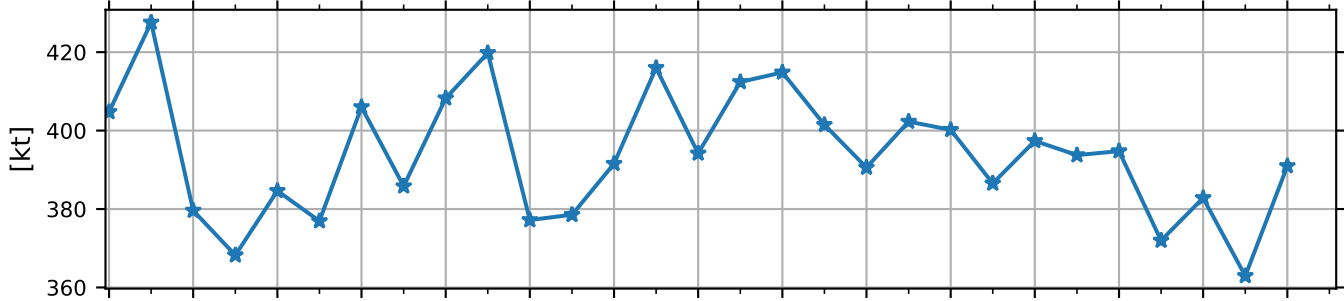
Total phosphorus



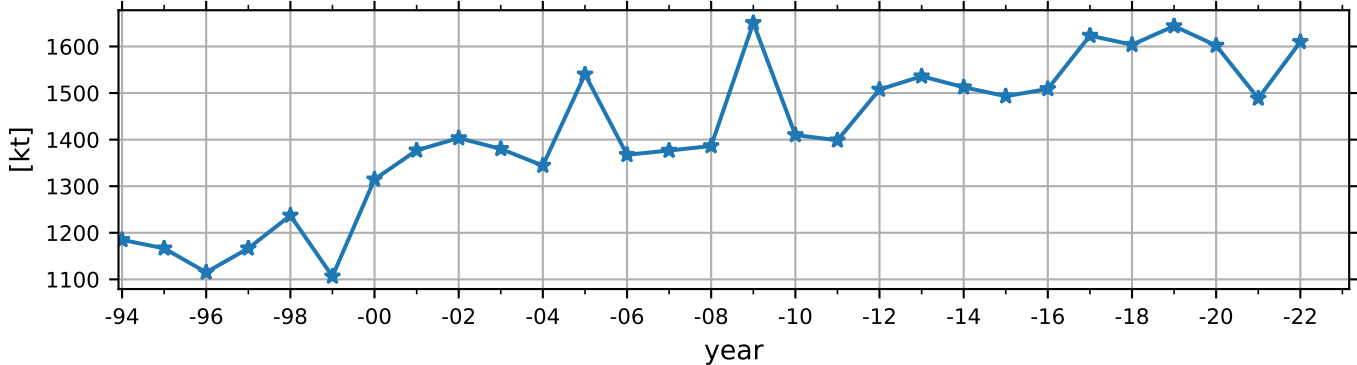
DIN



Total Nitrogen



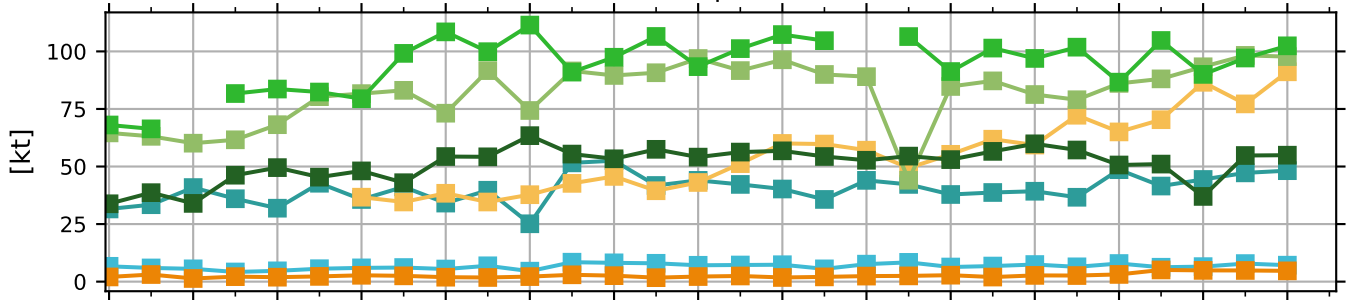
Dissolved Silica



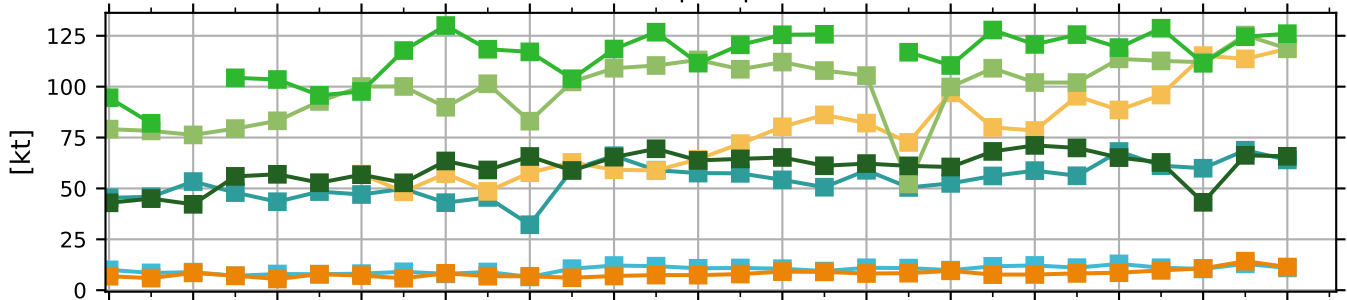
winter

- ARKONA BASIN
- BORNHOLM BASIN
- BOTHNIAN BAY
- BOTHNIAN SEA
- EASTERN GOTLAND BASIN
- NORTHERN BALTIC PROPER
- WESTERN GOTLAND BASIN

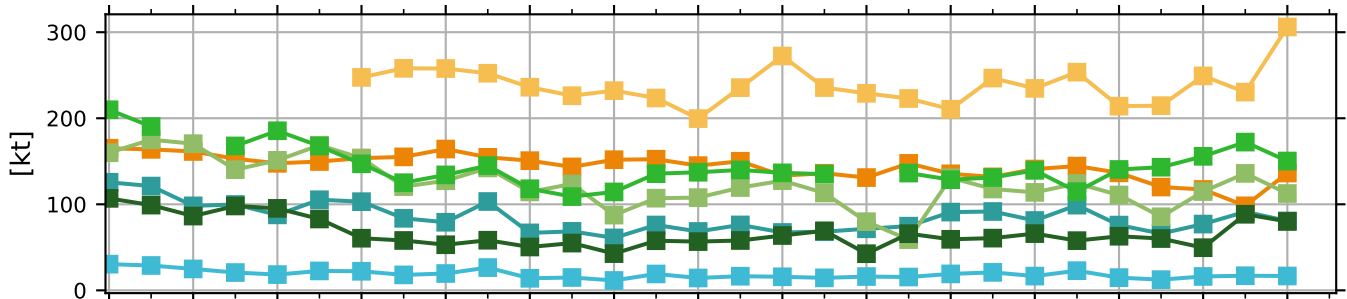
Phosphate



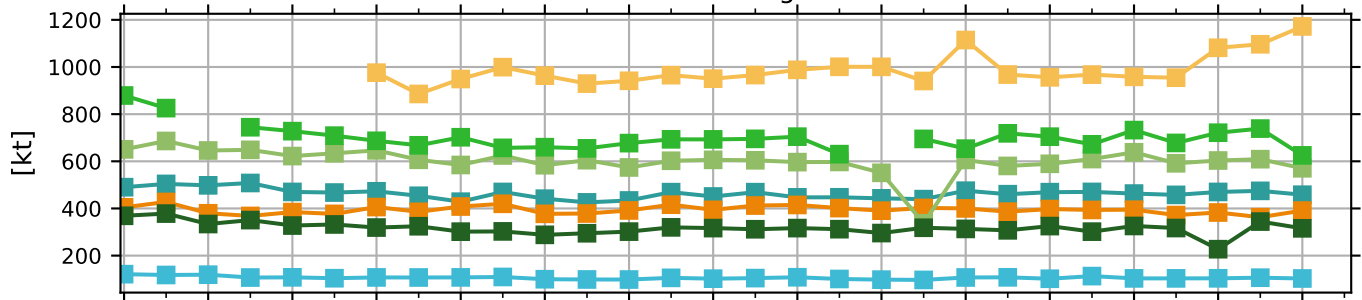
Total phosphorus



DIN



Total Nitrogen



Dissolved Silica

