Balt-HYPE
Baltic Sea Basin - Nutrient Transport Model

The Balt-HYPE model calculates water and nutrient concentration in groundwater, rivers and lakes for the whole Baltic drainage basin and inflow to the Baltic Sea.

The model can be used for:
- status characterisation of inland waterbodies
- source apportionment of nutrients
- predictions in ungauged basins
- filling time-gaps in monitoring programs
- flow normalisation of loads
- harmonising local or trans-national compilations
- estimating effects of remedial measures
- climate change impact assessments
- reconstructions of historical and pristine conditions
- forecasts and input to ecosystem models (e.g. of the Baltic Sea or the coastal zone).

Model set-up and products

The model uses global databases and GMES satellite products as input data. Forcing data is obtained from ECMWF and SMHI. The model produces high resolution information of:
- water variables (e.g. flow rates, soil moisture, snow)
- nutrients (organic & inorganic N, and soluble & particulate P) concentrations (mg/L) and loads (kg) in streams and rivers, in lakes and reservoirs, and in discharge to the sea
- gross and net load from polluting sources, including retention and nutrient transformation
- comparison between modelled and observed data, as regional statistics and for individual sites.

Model results will be shown at Eurogoos/seprise and at www.smhi.se for the oceanographic community.

The HYPE model is part of the decision support system ‘HOME Vatten’, which is used by Swedish water authorities to fulfil the EU Water Framework Directive.
The HYPE model
(HYdrological Predictions for the Environment)

- A new, daily time-stepping hydrological model for small and large-scale assessments of water resources and water quality.
- Landscape is divided into classes according to soil type, vegetation and altitude.
- Soils are divided into 1-3 layers.

- Parameters in the model may either be general, or related to soil type or land use.
- The model simulates e.g. snow melt, surface runoff, surface erosion, macropore flow, tile drainage, groundwater outflow.

Results from the Balt-HYPE model:
e.g. time-series of water flow
The model results are compared to observed runoff. Results can be down-loaded for every 100 - 1000 km² of land surface (sub-basins) and for coastal segments for discharge to the sea.

Temporal and spatial characteristics of the Balt-HYPE model.

<table>
<thead>
<tr>
<th>Time-step</th>
<th>Time periods</th>
<th>Domain (Baltic Sea Basin)</th>
<th>Resolution (subbasins)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily</td>
<td>1960-2008</td>
<td>1 700 000 km²</td>
<td>100-1000 km²</td>
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<tr>
<td></td>
<td>2008-2100</td>
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</tbody>
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The E-HYPE model is maintained and operated at the SMHI, which is a governmental body under the Ministry of the Environment. SMHI offers products and services in the fields of meteorology, hydrology and oceanography for general and customised forecasts, analyses, surveys, statistics, expert judgments, climate studies and research. The institute represents Sweden in the World Meteorological Organisation (WMO) and is involved in many European projects. SMHI has around 600 employees and its management system is certified under the quality standards ISO 9001 and ISO 14001. SMHI has a 100 years tradition of working with hydrological issues.