Estimation of the wave climate for the Baltic Sea 1980-2004.

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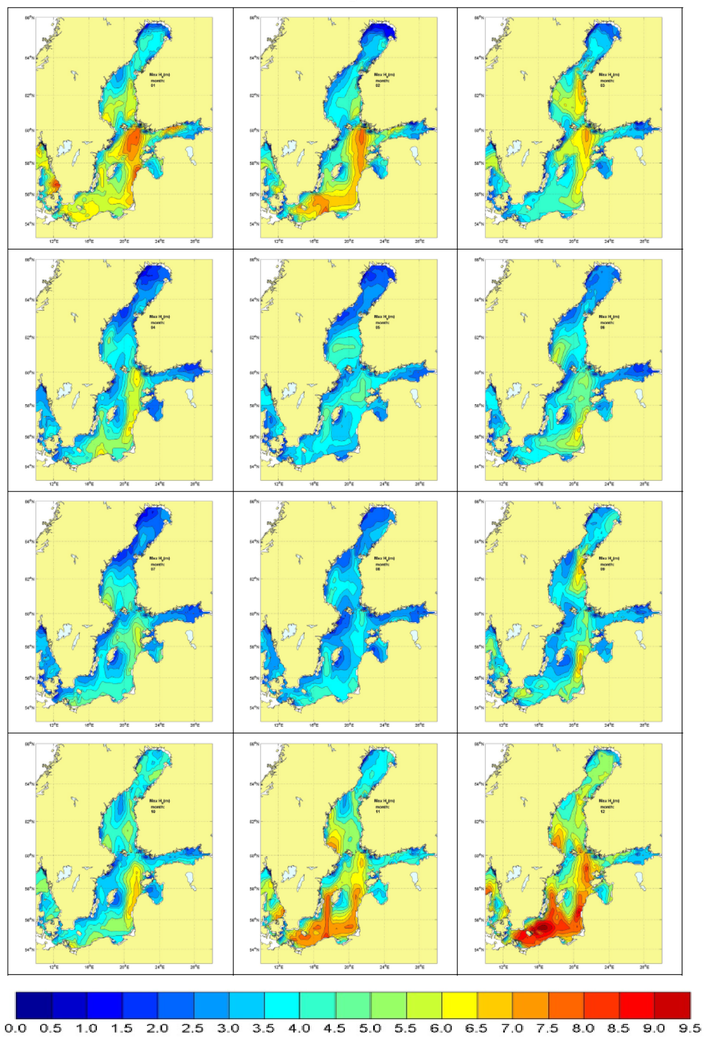
From wind to waves:

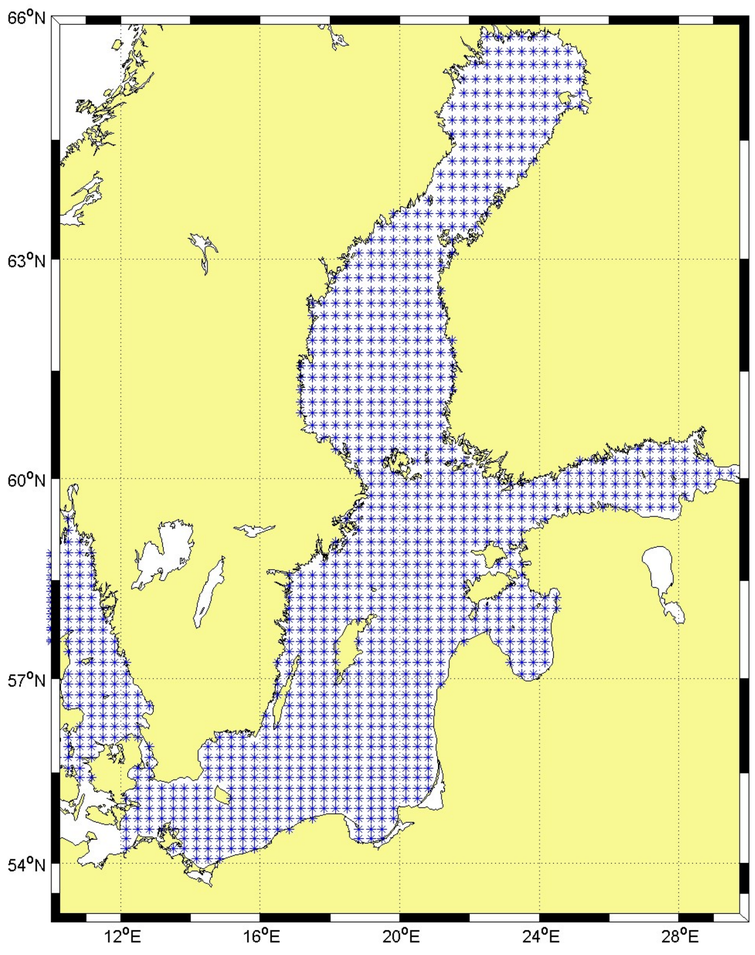
The Baltic wave climate has been estimated by a simple model based on a nomogram in: Guide to Wave Analysis And Forecasting (WMO-No. 702,1998).
The waves are computed through a function like *SWH = F(wind,fetch,duration*).
Wind is taken from a gridded database with 3-hourly values for the period 1980-2004, (25 years). For a resolution of 10'*20' in the Baltic distances to the shore in 8 directions are stored in fetch database for 1223 points.

Waves are calculated for each point at a time where the wind speed is used and the direction gives the fetch from the database. By experience 7 hours of duration gives fairly good results and is used in this work. The result is 25 yearly matrixes with SWH for 1223 points and 3 hour resolution. For the same period gridded ice data twice a week has been used to correct wave result by using ice concentration >=50% to set wave height to zero.

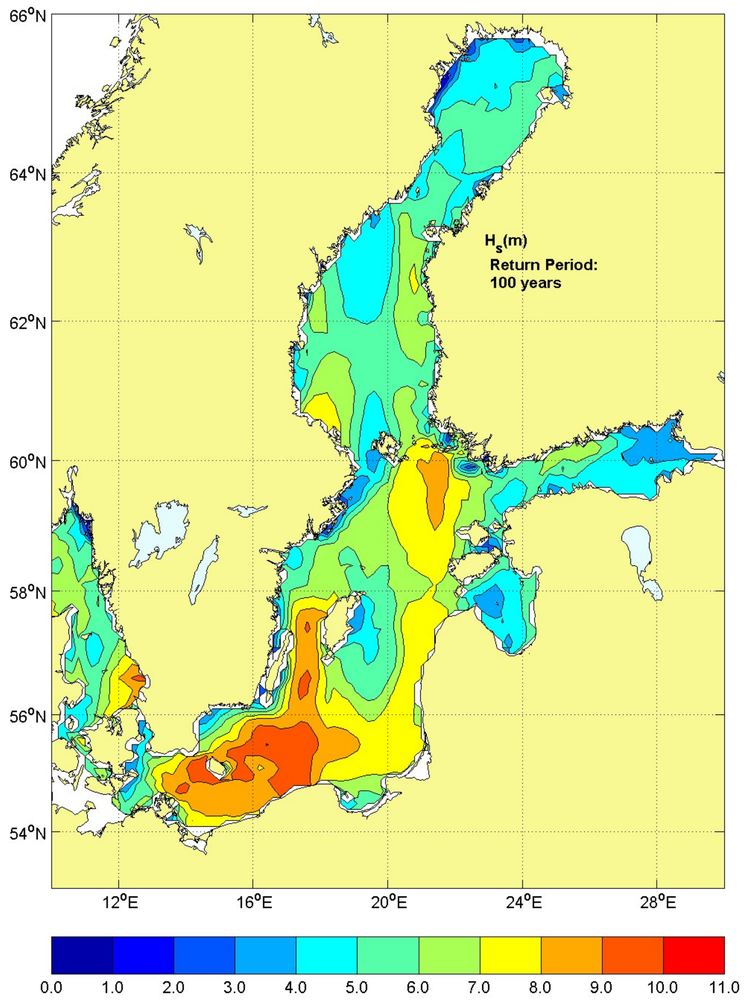
Monthly maximum wave heights (SWH) 1980-2004.



The calculation points.



100 year return time for SWH from 25 yearly maxima.



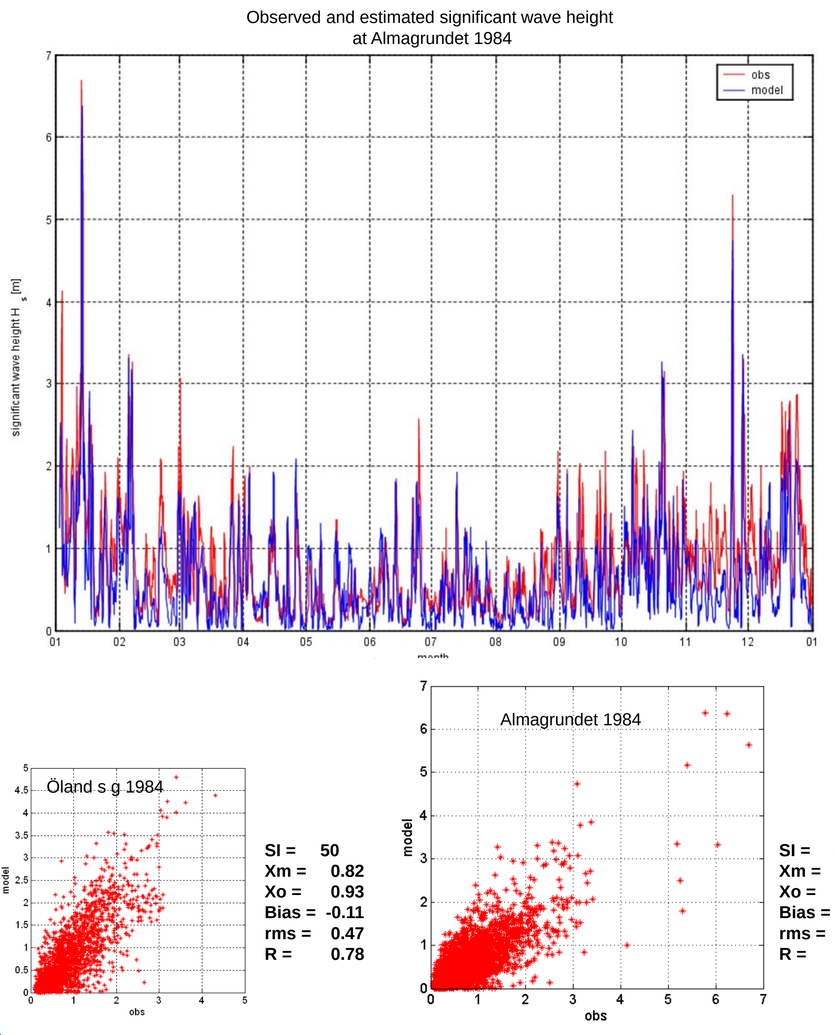
Datasets

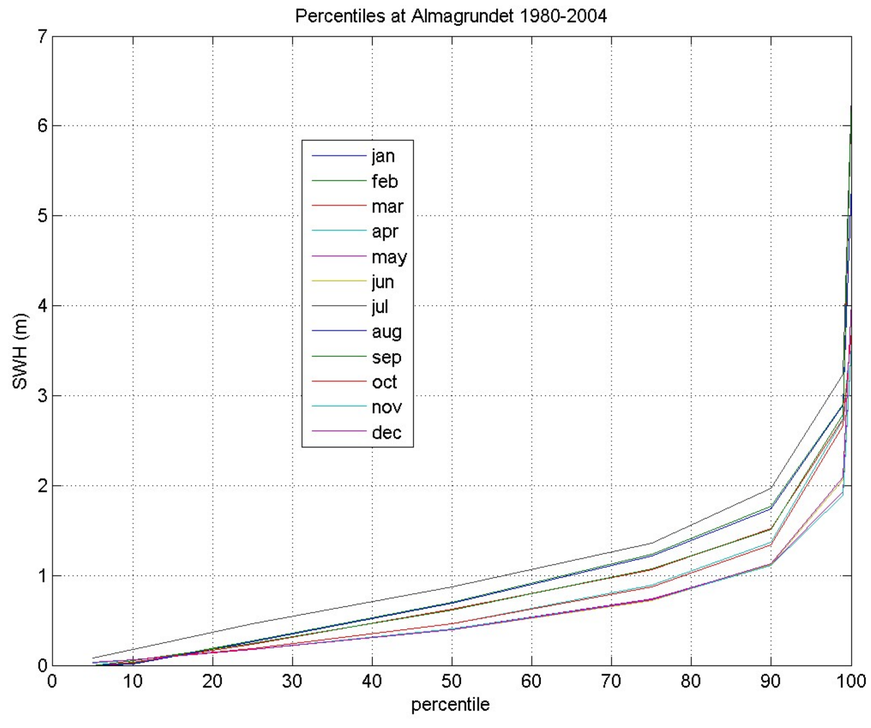
Type	*Nr of points*	*Nr of timesteps*	*Timestep*	*Nr of years*
Wind	1223	2928/2920	3 hours	25*1
Ice	1223	Ca 104	Mo/Th	25*1
Yearly waves	1223	2928/2920	3 hours	25*1
Monthly waves	1223	6200/6000/ 5856	3 hours	12*25

Type	*Nr of points*	*Nr of fetches*	*directions*
Fetch	1223 Resolution (10'*20')	8	N NE E SE S SW W NW

By combining these datasets the outcome will be estimated significant wave heights (SWH) 3-hourly values for the period 1980 – 2004.

Comparison: model - observations





The extreme values are very rare as shown above. The 90th percentile seems more realistic as a representative. From the stored results it is rather easy to produce maps and statistics of different kinds. One example is maps of percentiles for different months