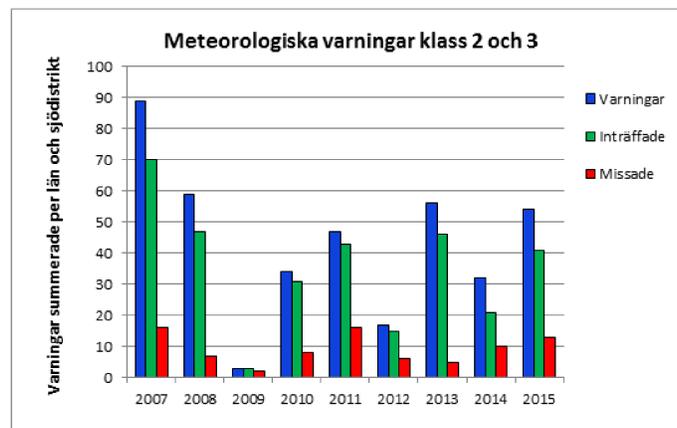


Severe weather warnings and working process at SMHI

- Prewarnings, called risk, could be issued up to 72 hours ahead of a high impact weather event in Sweden. When a risk is issued, contact is always taken with the Swedish civil contingencies agency, MSB. National and/or regional teleconferences are initiated by MSB with all relevant and important actors invited.
- Warnings are issued up to 24 hours ahead of the event. During the event teleconferences are held on request from the authorities.
- After the event a national teleconference is usually held to sum up the event, the forecast outcome and the social impacts.
- Every orange or red warning is also followed by a written report, evaluating the outcome of the warning, the social impacts, model performance and the communication during the event.
- The results of the report forms the basis for future improvements in the working process and methods during high impact weather events. The reports are also important to better understand characteristics of the models and biases. For example, one known model issue is that ECMWF has positively biased wind gusts over forest areas in Sweden, see example from storm Gorm below.



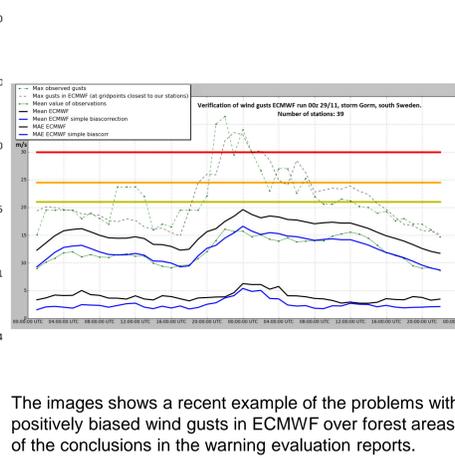
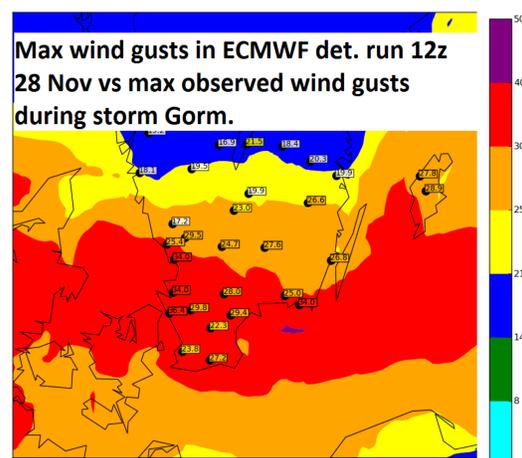
The diagram shows an annual summary of issued and missed orange or red met warnings in the period 2007-2015. Blue bars are the number of issued red or orange warnings. Red bars shows the number of missed events.

High impact weather in the medium to extended range and forecasts to the ice breaking management

- When predicting high impact weather the focus is mainly in the short range since the benefit drops with the forecast skill in longer ranges.
- Sustained large scale weather pattern can however lead to high impacts on some particularly economically or socially important function. In such cases the medium to extended range forecast may be of special interest.
- Wintertime the navigation in Swedish waters could be limited by the ice conditions and therefore forecasts of changes and tendencies in the large scale circulation and temperature pattern could be crucial for the ice breaking management.
- The allocation of the ice breaker resources are of great importance for both economically and safety reasons and is strongly dependent on the weather conditions. As support to the ice breaker management SMHI are providing forecasts of ice formation and ice drift.

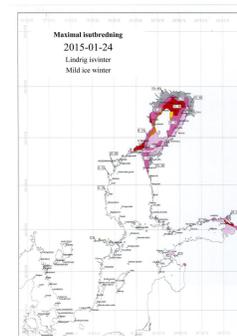
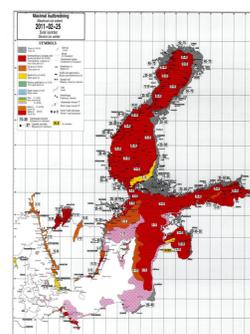


To better understand the coupling between a certain weather condition and the ice conditions, ice forecasters and ice analysts at SMHI are spending about one week every winter onboard one of the Swedish ice breakers.



The images shows a recent example of the problems with positively biased wind gusts in ECMWF over forest areas. One of the conclusions in the warning evaluation reports.

- To the right is an example from beginning of January this winter when the forecasts were very late to pick up a big change in the weather pattern that drastically changed the conditions for new ice formation.
- An extensive high pressure block formed from northern Russia to Barents Sea and Greenland which brought an air mass with temperatures well below average to Sweden.
- First half of January became much colder than expected from the early forecasts which lead to rapid new ice formation and ice growth in some parts of the Baltic Sea.



The ice charts shows the ice maximum extent during the severe ice winter 2010/11 to the left and the mild ice winter 2014/15 to the right. For the Maritime administration the medium to extended range forecasts are crucial to get early information about possible changes in the large scale weather pattern and thus the conditions for new ice formation.

