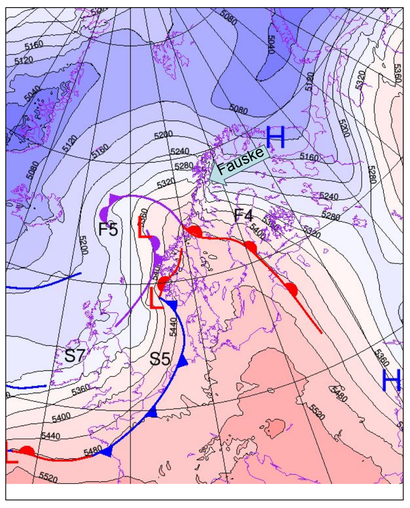
ECMWF products at MET Norway

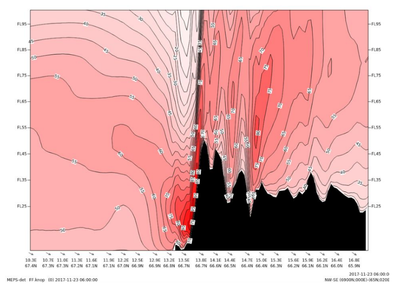
Forecasting severe weather



Surface analysis of the stationary low/high pressure systems causing the severe wind event 'Ylva', 22-24 November 2017.

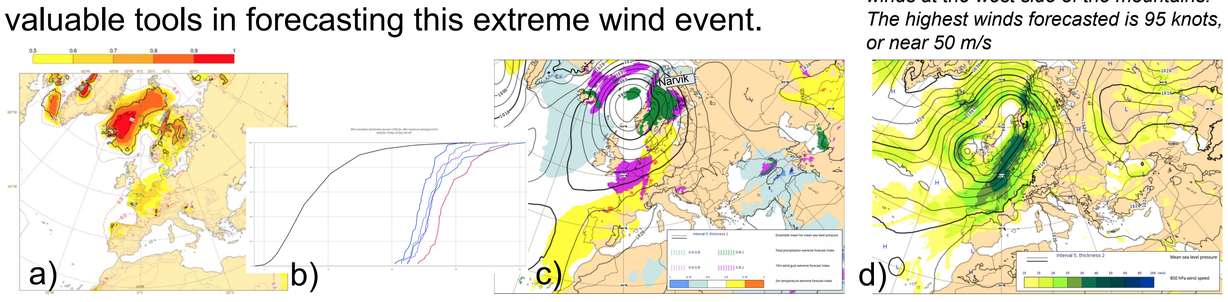
Treefall in Fauske, caused by strong winds during 'Ylva'

22-24 November 2017 a deep North-Atlantic Low stopped against a blocking High over the Kola peninsula. This induced mountain waves with persistent storm force lee winds north of the stationary front, resulting in extensive power outages, disruptions of traffic and damage on properties and infrastructure.



Vertical cross section from the 2,5km local model Arome,showing the strong lee winds at the west side of the mountains. The highest winds forecasted is 95 knots, or near 50 m/s

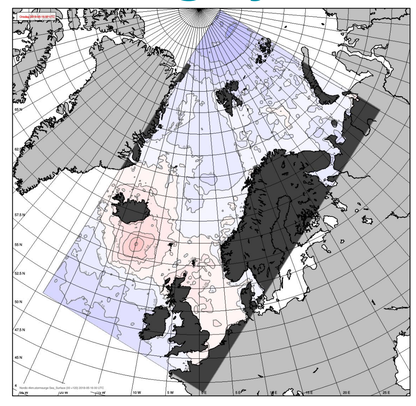
ECMWF HRES, EFI and SOT forecasts gave consistent signals of extreme winds 3-4 days ahead and were valuable tools in forecasting this extreme wind event.



a) EFI/SOT for 10 m winds b) CDF for wind gust at Narvik c) Multi-parameter EFI-product d) EC HRES mslp and 850 hPa wind valid for the period 22-24 November 2017

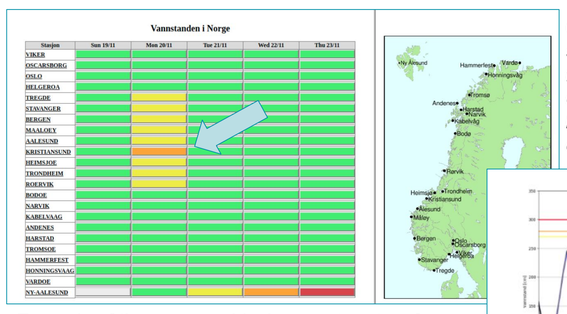
New Ensemble Storm Surge Warning system

Sea water flooding the piers in Central Bergen during a Storm Surge event in January 2007. Events like this, often combined with high waves and strong winds, causes extensive damage to infrastructure along the coastline. Early warning may reduce the impact of such events.



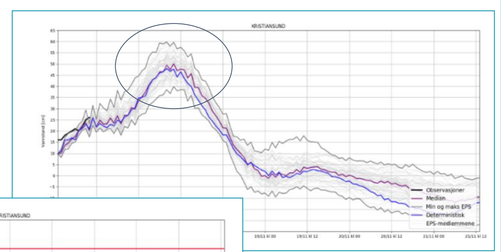
The 2D regional ocean model ROMS (Regional Ocean Modeling System), covering the Norwegian sea and North-Atlantic. Lateral forcing from EC-ENS, with a sponge layer to reduce wave reflection.

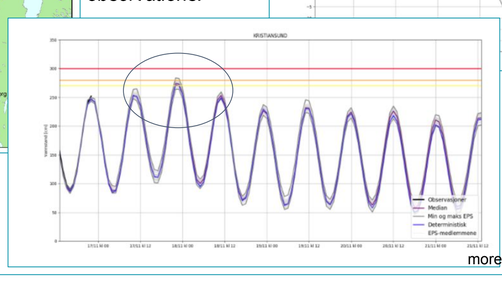
From winter 2017/2018, the Norwegian regional Storm Surge forecast model is running in ensemble mode, with 51 members driven by surface pressure and wind stress from EC-ENS. Based on this new ensemble, MET has developed a new decision making tool to help the forecasters pick out possible severe storm surge events.



Example of the new graphical support system for issuing warnings for high water-levels. The system will give a signal if one or more ensemble member reaches a warning threshold.

On the coastal stations the forecast is corrected using the latest water-level observations.





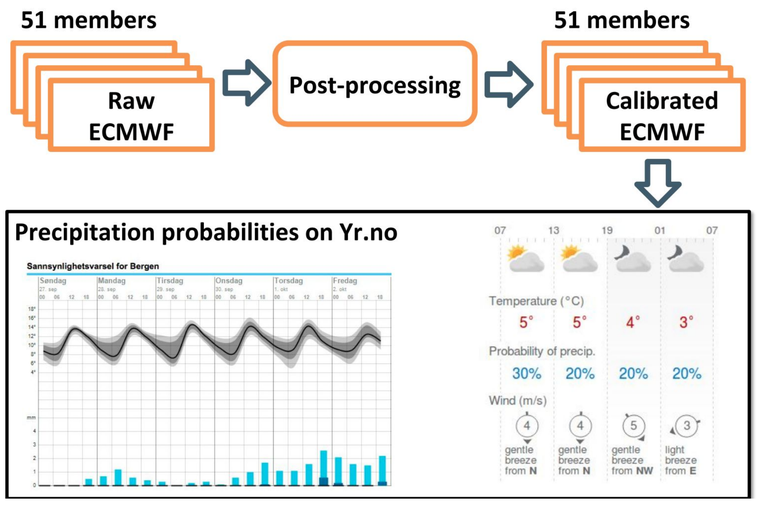
The warning thresholds vary from location to location, mainly because of varying climatology, but also based on input from local authorities.

more info: Haldis Berge, haldisb@met.no

www.yr.no: ECMWF forecasts to the public

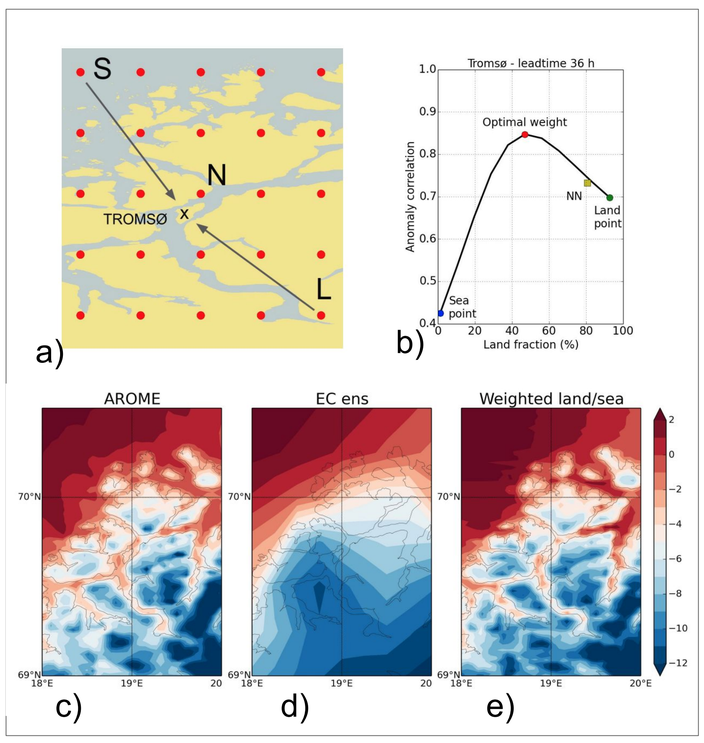
Public weather forecasts from met are issued via the website www.yr.no.
Short range forecasts are based on the local 2,5 km AROME/MEPS covering Scandinavia, forced by EC-HRES.

In the medium range the forecasts are based directly on ECMWF. For Norwegian areas the public forecast is a post-processed EC-ENS forecast, and for areas outside Norway the forecast is based on EC-HRES.



There are many challenges in forecasting 2 m temperature along a complex coastline. MET is experimenting with various downscaling techniques to find the optimal mix of bias correction and the influence of land and sea properties.

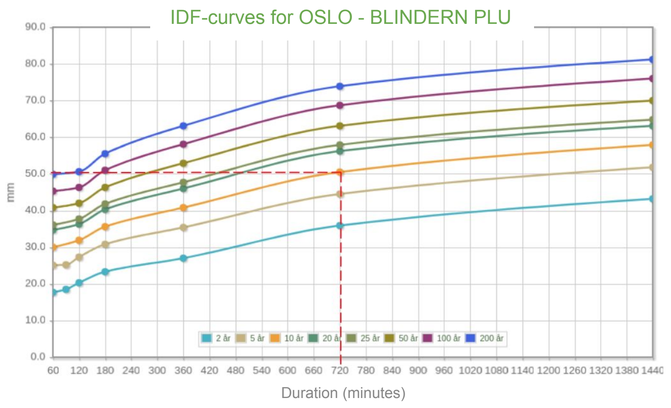
Example of downscaling 2m temperature from EC-ENS, for a case with a large cold bias in Tromsø:
Each point in the grid (a) is assigned an optimal weight of influence from its surrounding land and sea points (b).
The 2m temperature field from the MEPS 2.5 km model (c) compared with the corresponding EC-ENS control run (d), and the final downscaled field using the optimal land/sea weighting method (e).



more info: Ivar A. Seierstad, ivaras@met.no

Extreme rainfall? The YRP index ; combining MEPS with local climate

The local high-resolution model MEPS is relatively new and under constant development, and does not have a known model climate. To get an idea of how the model's rainfall predictions compare with climate, MET has developed a method called YRP (Yearly Return Period), which is the "sister" of EFI, using real climate instead of model climate for reference.

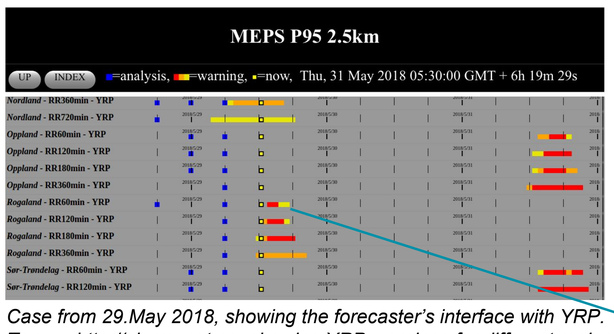


Left: *Example of IDF (Intensity-Duration-Frequency) curves for the observation site Blindern in Oslo. IDF-numbers have been computed for the entire country in a 1x1km gridded database, KliNoGrid.*

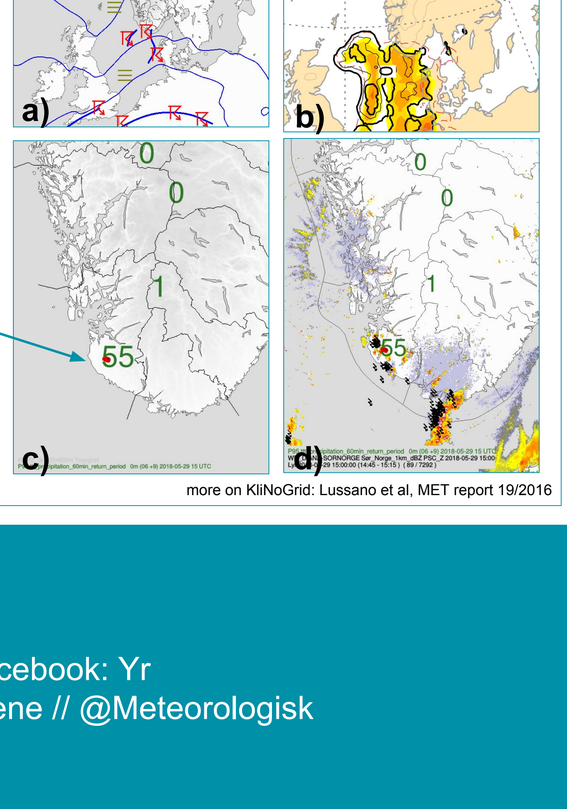
To find the YRP the database is converted into grids of 2.5x2.5 km to get the same resolution as MEPS. Precipitation from MESP is then compared to the corresponding IDF value in each model grid square. YRP values are computed for each of the 10 MEPS members, and for different accumulation periods from 1 hour up to 24 hours.

For example, a forecast of 50 mm / 12 hours at Blindern give YRP = 10 years.

The YRP is presented in a graphical interface, and as fields on the forecaster's weather maps.



Case from 29.May 2018, showing the forecaster's interface with YRP.
Top: *http://alarm.met.no, showing YRP-warnings for different regions and accumulation periods.*
Right: *a) Synoptic situation 29.May b) EC Cape EFI/SOT c) the YRP index on the forecaster's map, showing 60 minutes precipitation forecasts exceeding 50 years return period d) Radar echoes confirm heavy showers in the area.*



more info: Tor Skaslien, torhs@met.no / Anita Dyrrdal, anitavd@met.no

more on KliNoGrid: Lussana et al, MET report 19/2016

Vibeke W. Thyness
Senior Meteorologist
vibekewt@met.no
@METhyness

Norwegian Meteorological Institute

met.no // Yr.no
Instagram: yrno // Facebook: Yr
Twitter: @Meteorologene // @Meteorologisk