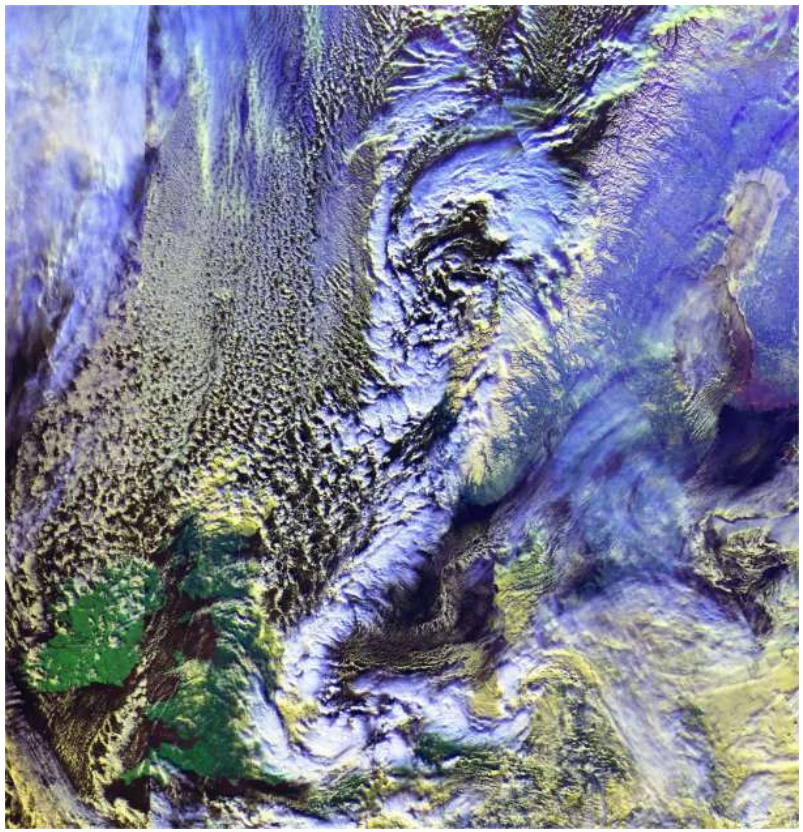
NOOS
North West European Shelf Operational Oceanographic System
EuroGOOS

Rijkswaterstaat
*Ministerie van Infrastructuur en Waterstaat*



# Developments in the NWP systems

## Some questions from a user perspective

Annette Zijderveld, RWS/ WMCN

9 december 2021

# Outline

- Storm Surge Forecasting process at RWS
- Switch HiRlam – Harmonie
- Further developments Harmonie - UWC West
- Uncertainty and probabilities : ensemble forecasting and poor man’s ensemble

Two main questions:

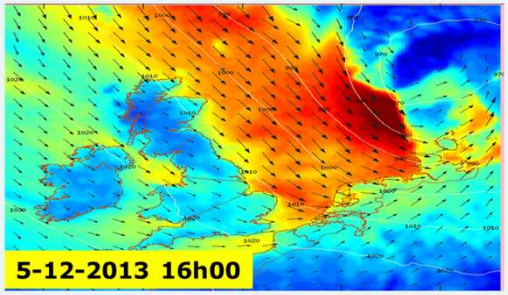
***How to keep track of the impact of new weather model versions on our storm surge forecasting?***

***How to gain more information on uncertainties for short lead times?***

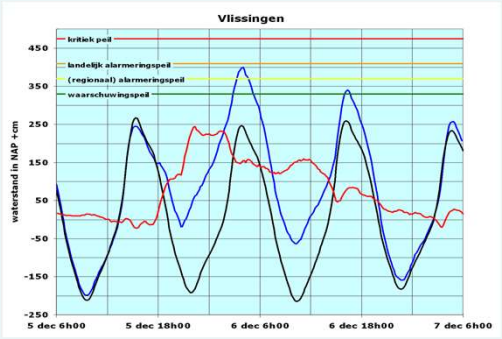
# Storm surge warning process at RWS:

Meteo Data

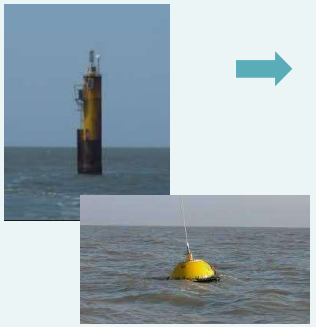
NWP model



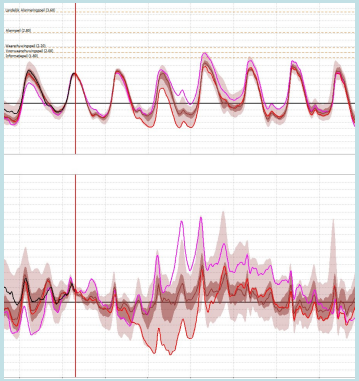

Hydrodynamic model




Data



Model + probability information



Expert judgment + manual corrections

Storm surge forecasts + warnings

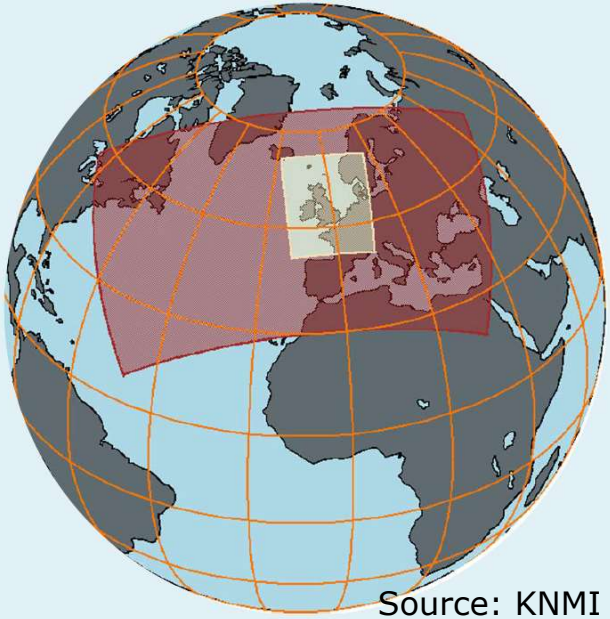
# Changing meteo forcing HiRLAM -> Harmonie

- Validation and verification process,

also on major storm surge events

- Took about 2-3 year to make the switch,

new model has significantly different behaviour

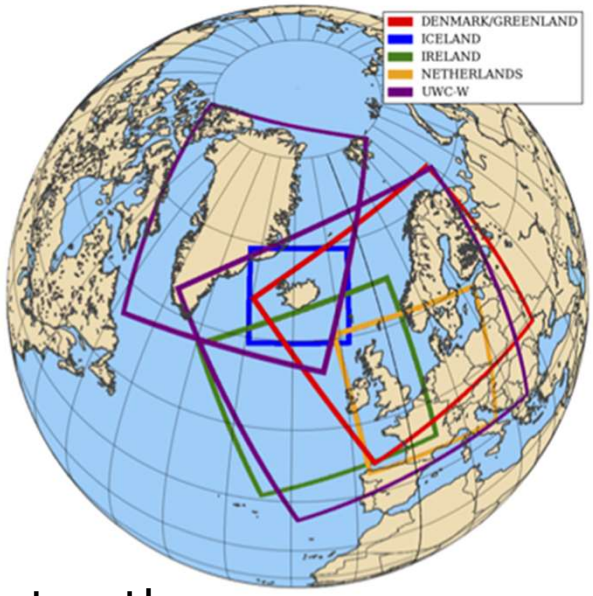

Source: KNMI

Issues:

1) Current domain of Harmonie too small for our North sea model, is combined with ECMWF.
This has consequences for ensemble forecasting.

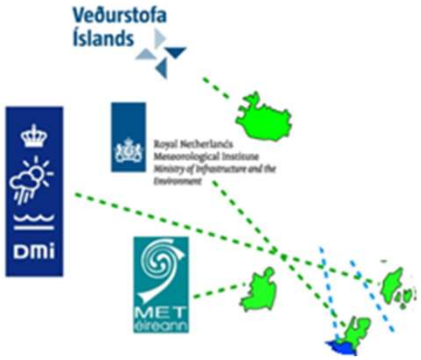
2) Higher resolution of Harmonie can result in difficulties to capture small low-pressure systems at the right spot at the right time (and with SLR these smaller events become more important for us)

# UWC west




- Cooperation between Denmark, Ireland, Iceland and the Netherlands
- One Numerical Weather Prediction system (located in Iceland)
- Goal: better weather forecasts while costs stay the same
- Faster developments expected in future, which is good of course, but influence might be less for us as users

Model domain of Harmonie will increase again!




**UWC West**

- 2014 Denmark and Iceland start cooperation
- 2019 Ireland and the Netherlands join in and form UWC-West
- 2023 UWC West operational @ joint supercomputer facilities in Iceland

Source: KNMI

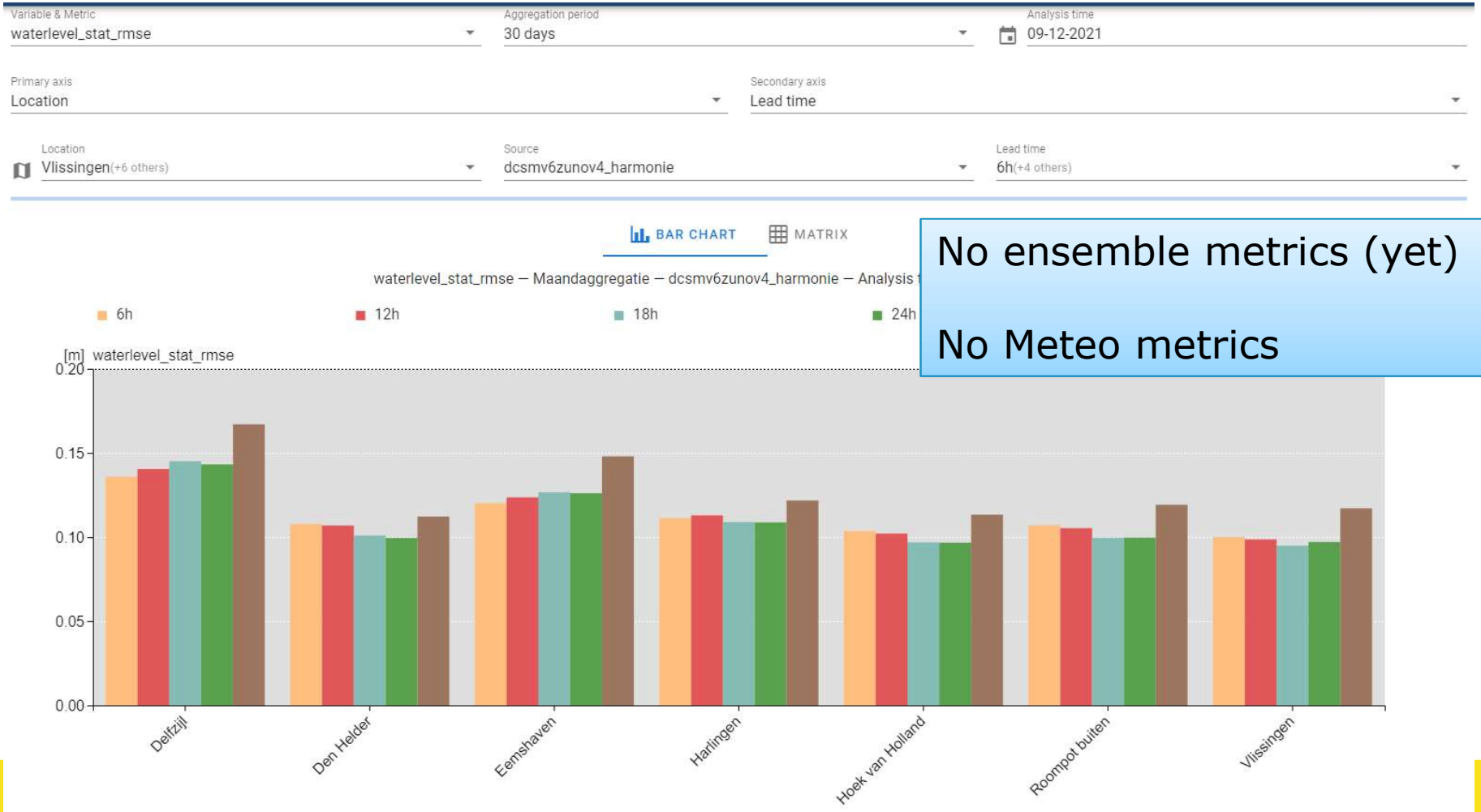
# New HARMONIE version's planned

- Release of new model versions with higher pace in future
- We are only 1 client for the NWP system
- How to check impact on forecast quality of storm surge events?
- In 2022 even 2 releases of Harmonie are planned
  - first new version at KNMI
  - end of 2022 new version operational at UWC-West

# Model verification

- Development of a verification dashboard, not yet operational (work in progress)
- Will enable us (hopefully) to keep track, but no alternative of storm surge event verification
- Focus now on waterlevel and surge (10 min time steps) and waterlevel and skew surge at HW/ LW
- Statistics per month or week, also generating automated reports in furture

# Verification dashboard (web-based)




No ensemble metrics (yet)

No Meteo metrics

# Research Cooperation in Europa

From 2021 onwards 26 Meteo institutes cooperate in research projects in **ACCORD**

Within ACCORD research is carried out for further HARMONIE developments for short-term weather forecasts

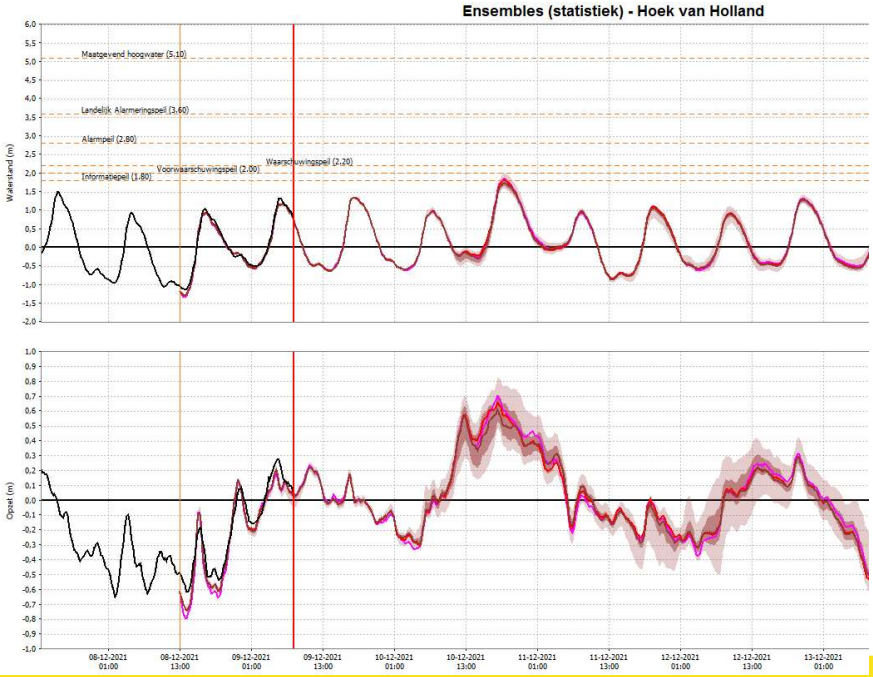
HARMONIE = Hirlam Aladin Research On Meso-scale Operational NWP in Euromed

Before ACCORD there was between 2005-2020 the European cooperation on the **ALADIN – HIRLAM**


ACCORD: consortium of the National Met Services of Algeria, Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, , Estonia, Finland, France, Hungary, Iceland, Ireland, Lithuania, Morocco, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Tunisia and Turkey

# Talking about uncertainties in forecasts

- NWP ensemble products: EMCWF –EPS and ~~Harmonie-EPS~~
- No other EPS products  (yet) used for storm surge forecasting in NL, mainly due to restricted computational recources

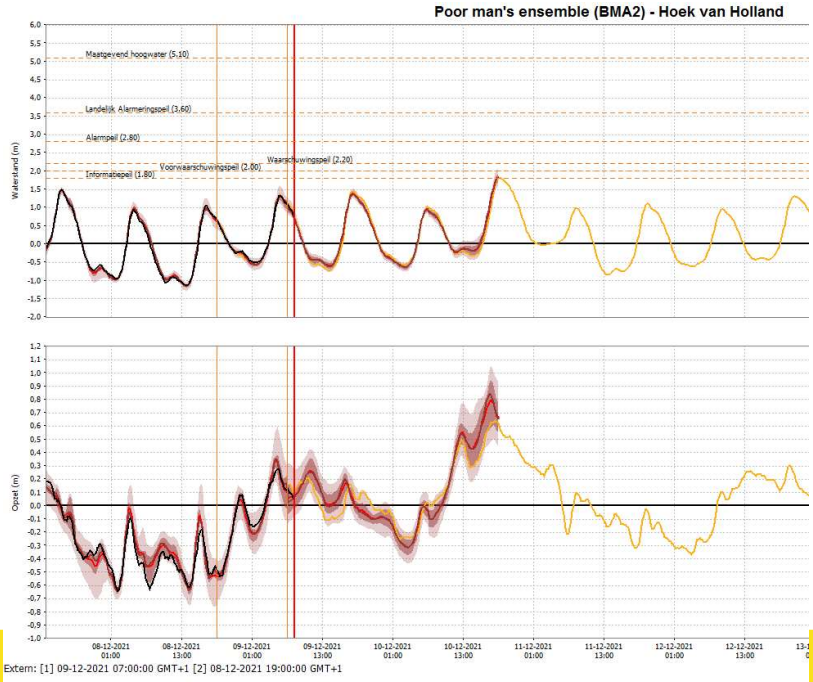



Spread in first 24 hours lead time limited

Again also smaller events can lead in future to missing or false alarms

# Talking about uncertainties in forecasts

- NWP ensemble products: EMCWF –EPS and ~~Harmonie-EPS~~
- ICON-EPS and COSMO-LEPS not (yet) used for storm surge forecasting in NL
- BMA2 – poor man's ensemble




Increasingly used at RWS

Verification should not depend on Marc's weekend hours

Step to calibrate this ensemble to get probabilities ?

# Questions …

Two main questions:

***How to keep track of the impact of new weather model versions on our storm surge forecasting?***

How do you deal with it? Can we join forces on Harmonie verifications on water level/ storm surge forecasting in any way?

***How to gain more information on uncertainties for short lead times?***

What do you use, NWP –EPS products? What is your experience? Do you have insight in meteo uncertainties in other ways? Do you have experience with calibrating a poor man's ensemble?