Wind and ice conditions

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Linking Estonia and Latvia

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Wind data

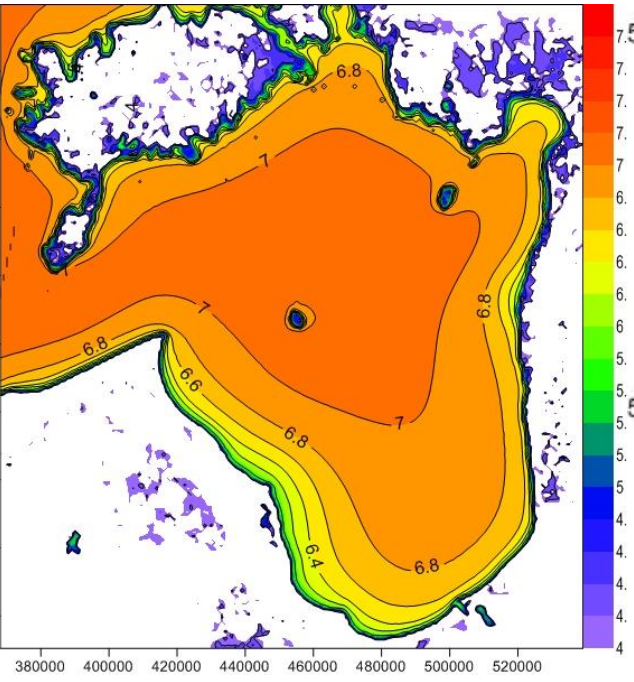
- In situ measurements
- WASP model (1981-2010)
- Hirlam model fields (2006-2010)
- BaltAn65+ wind fields (1965-2005)
- Satellite imagery (2007-2010)
- Future climate projections

Parameters

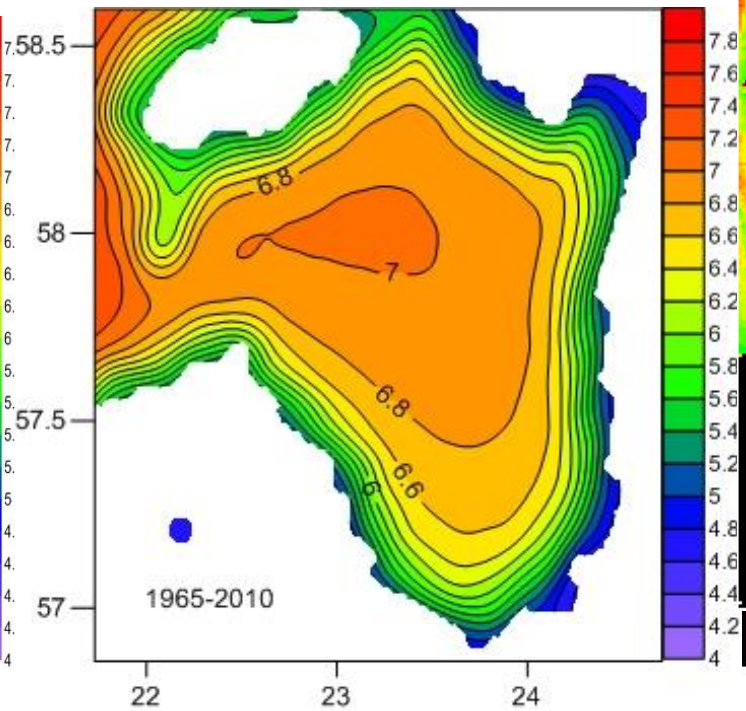
- Mean annual wind speed
- Mean monthly wind speed
- Mean annual energy density
- Weibull shape parameter k
- Weibull scale parameter A

Mean annual wind speed

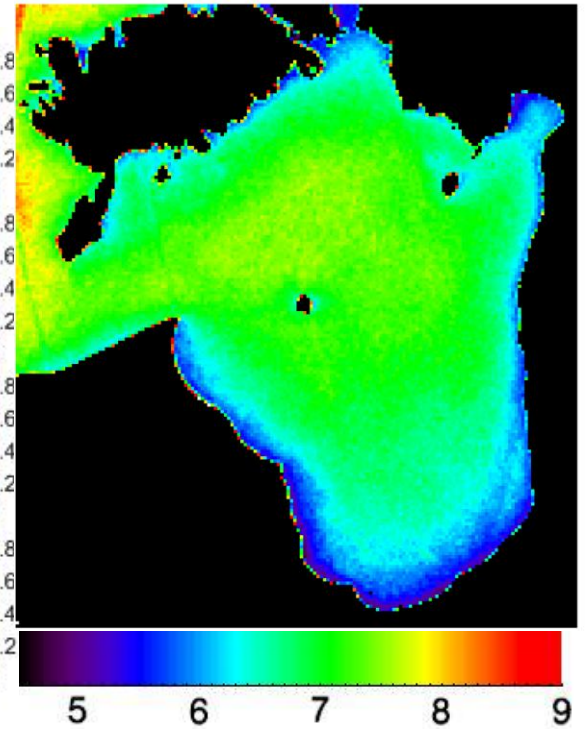
WASP 10m



Hirlam and BaltAn65+ 10m

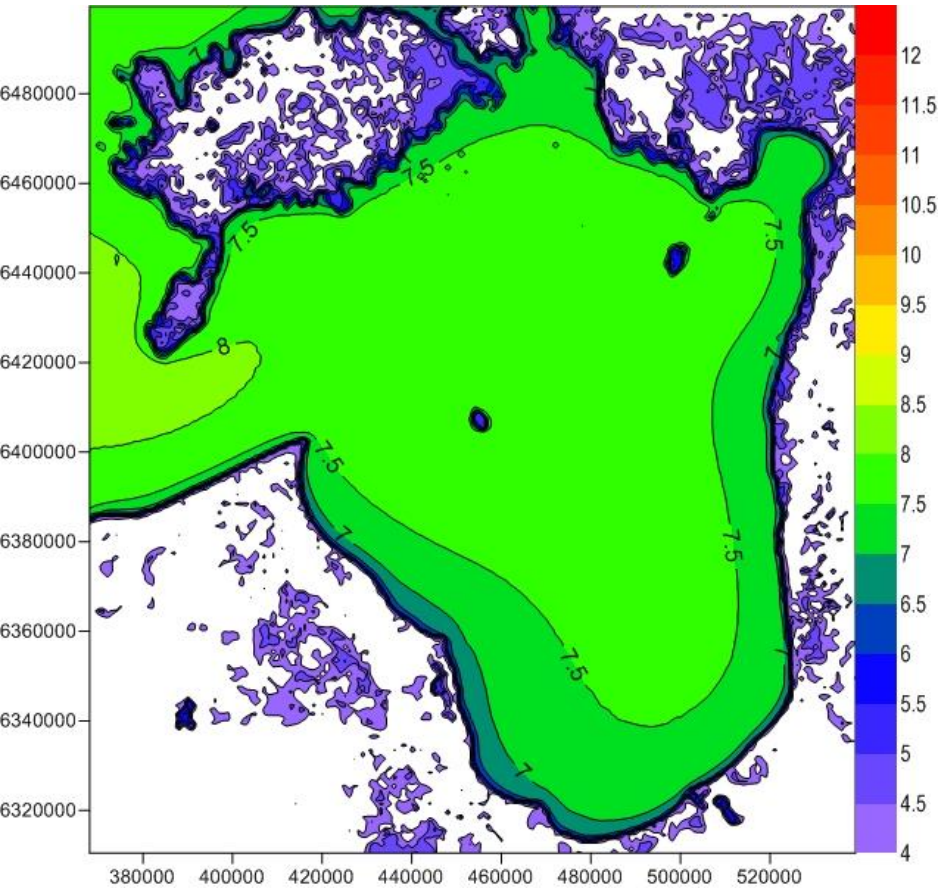


Satellite imagery 10m

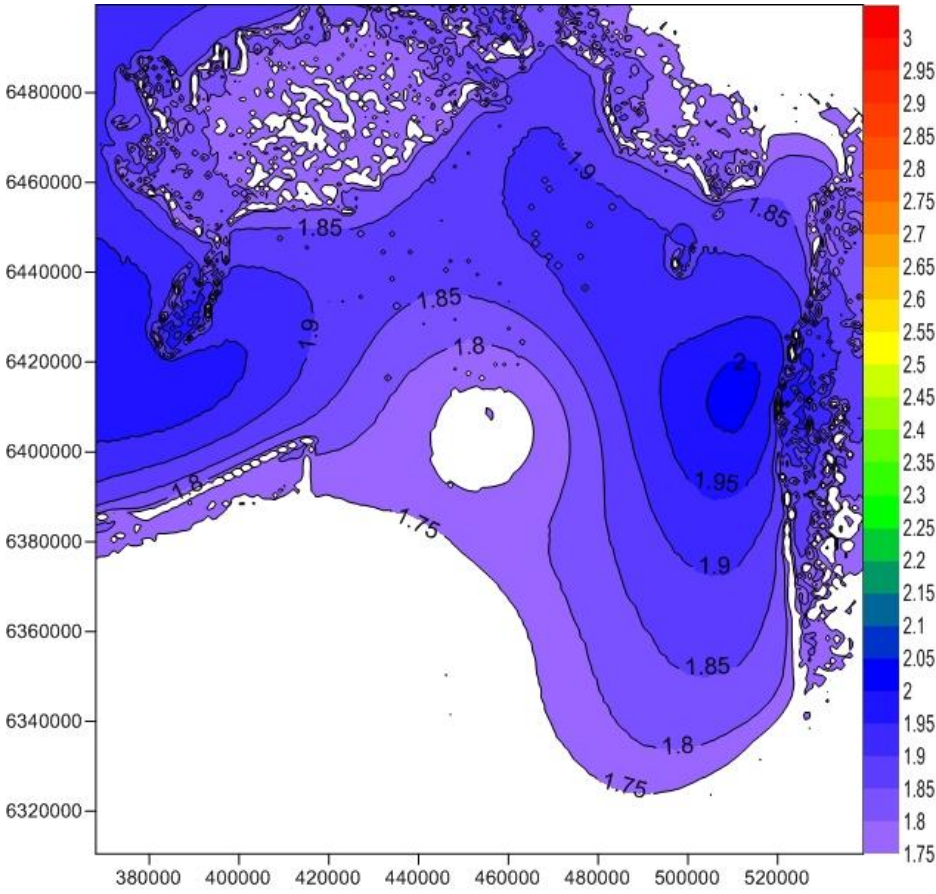


Weibull k and Weibull A parameters 10m

Weibul scale parameterl A (m/s)



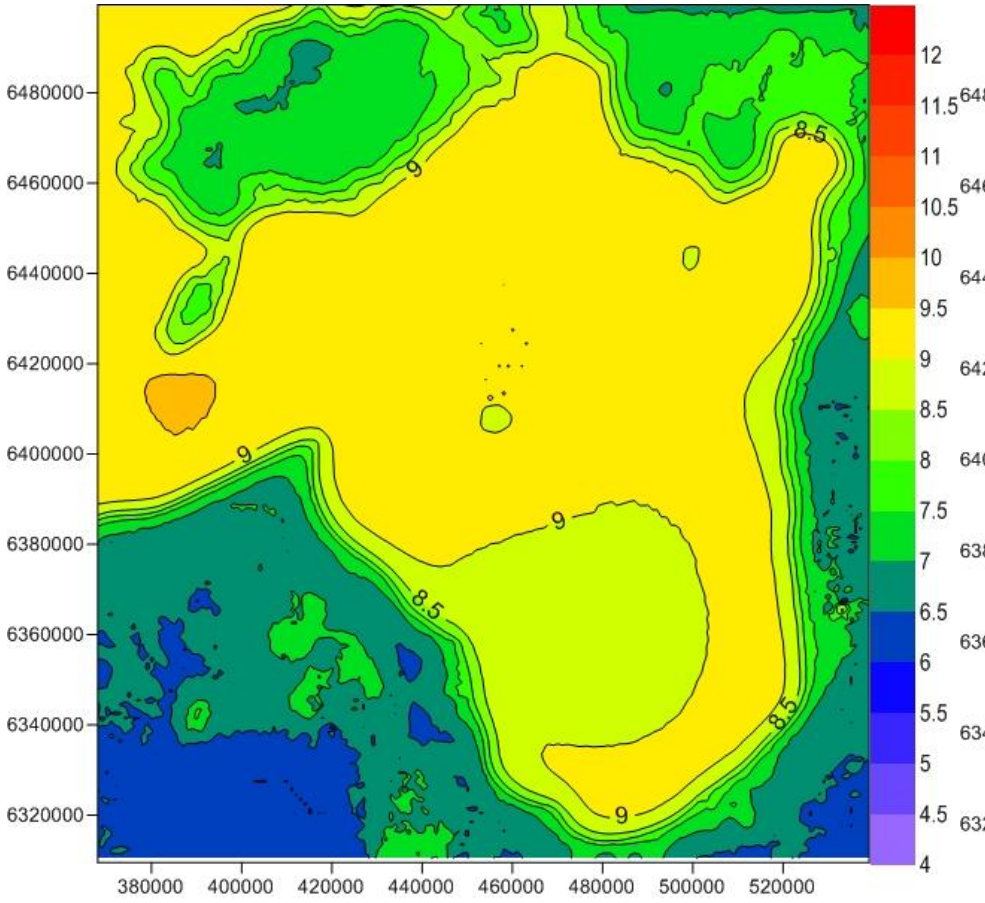
Weibull shape parameter k



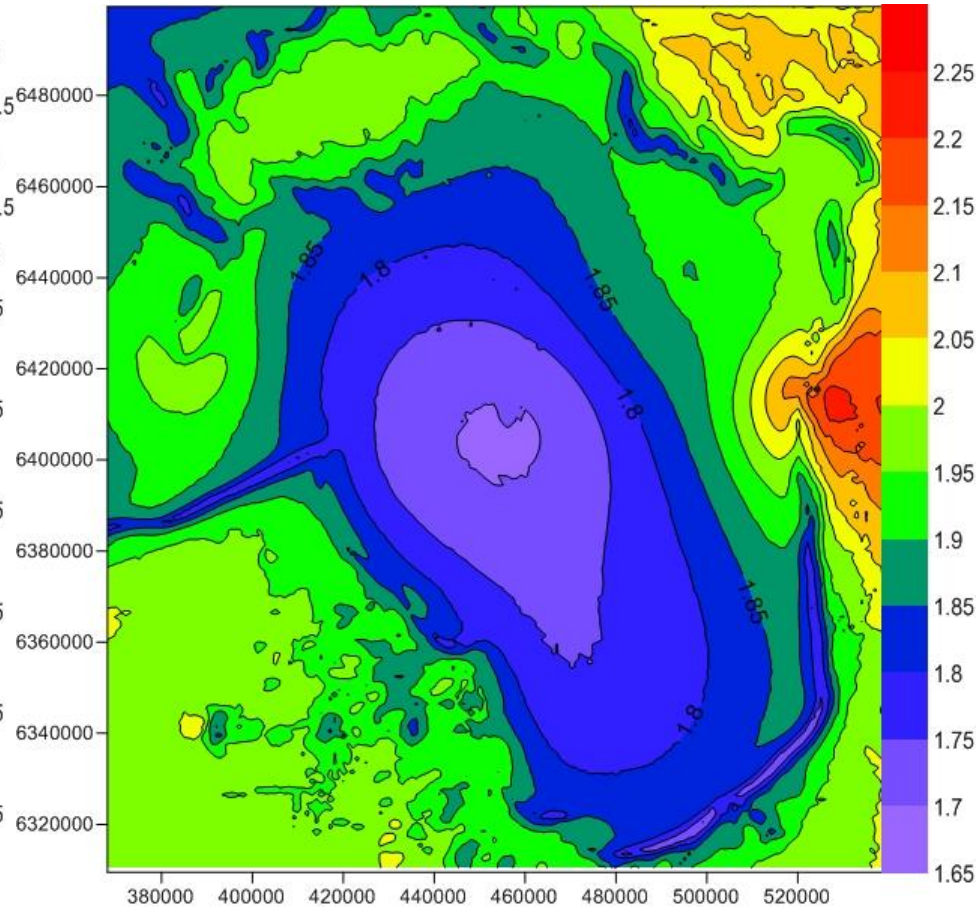
The higher the shape parameter k the median wind speed

Weibull parameters 100m

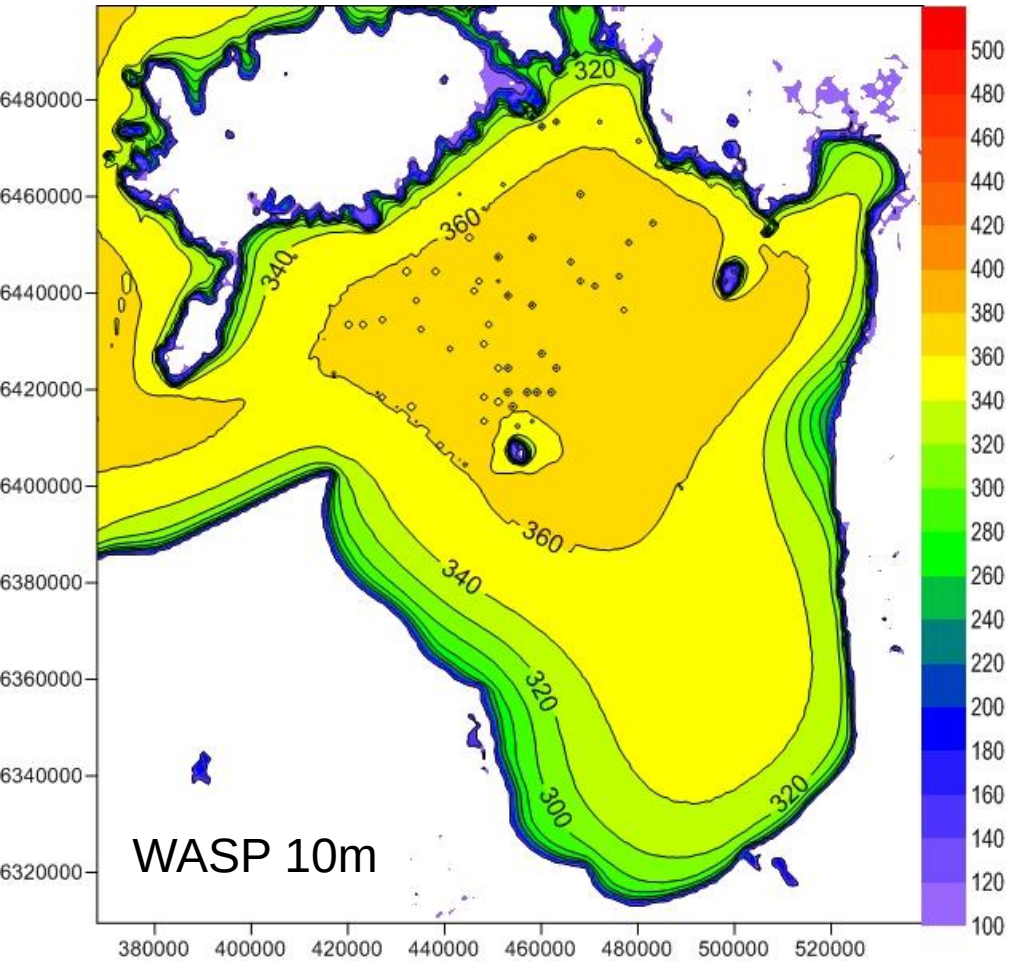
Weibul scale parameterl A (m/s)

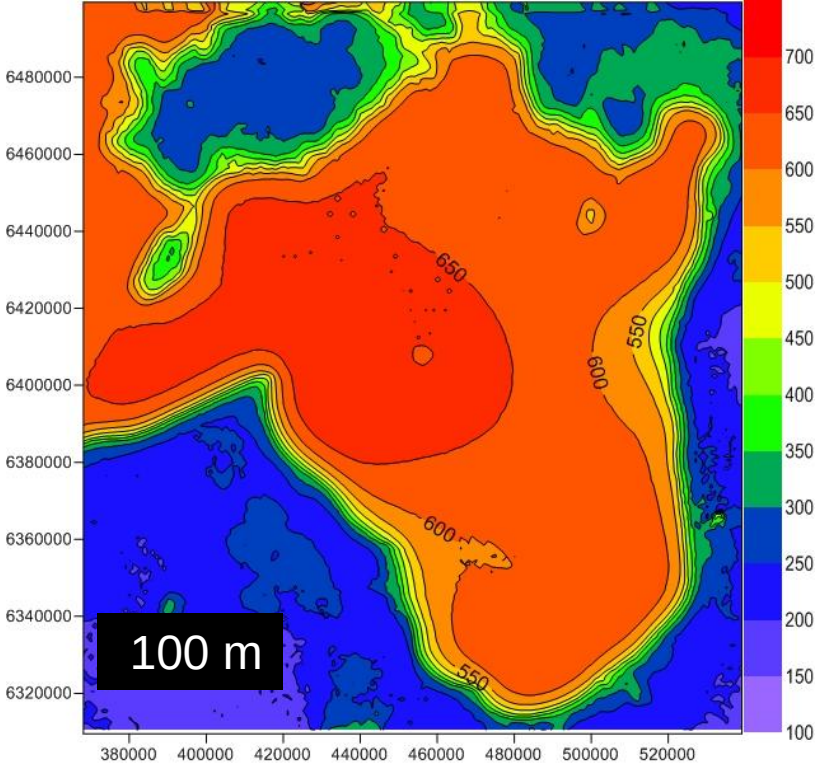


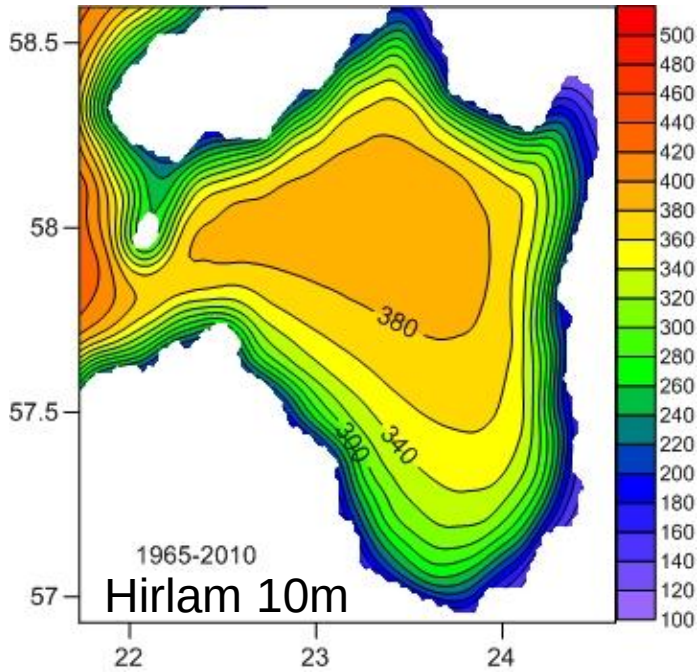
Weibull shape parameter k



Energy density



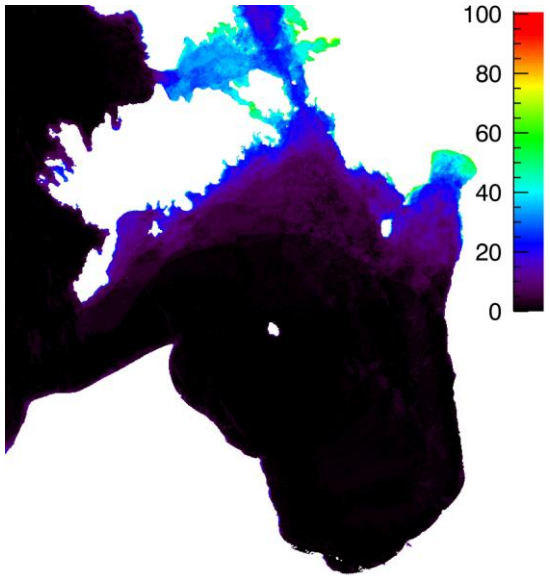




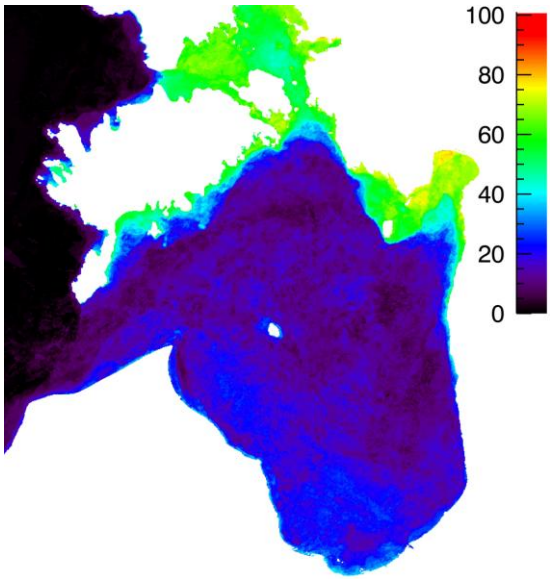
ICE CONDITIONS

- DATA
  - 366 satellite image
  - 2002/2003-2010/2011
- Parameters
  - Ice cover probability
  - Number of ice cover days
  - Average maps
  - Conditions for different winter scenarios
  - Extreme conditions

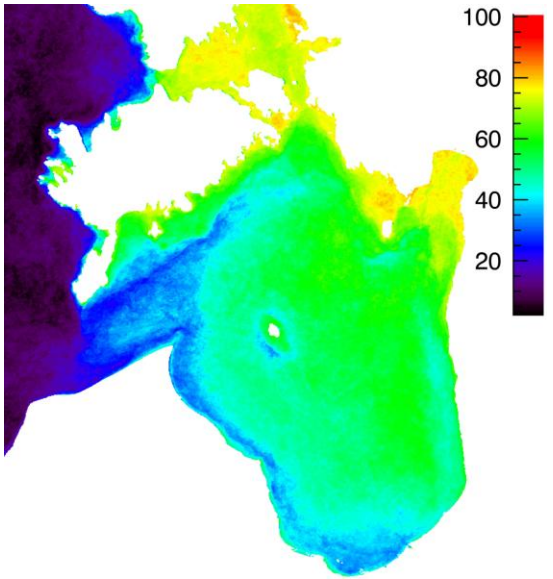
ICE cover scenarios



MILD

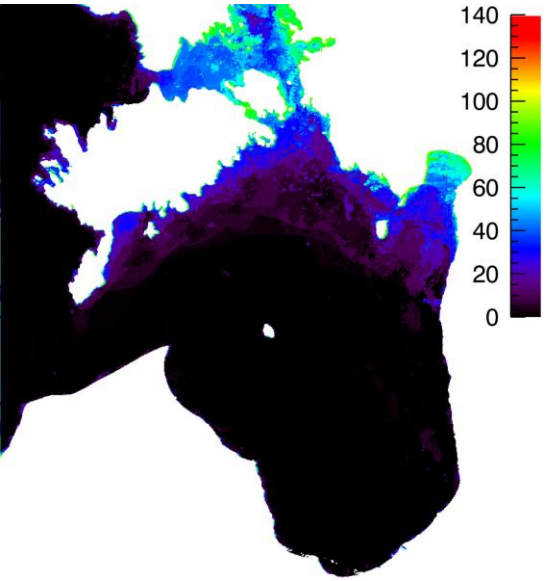


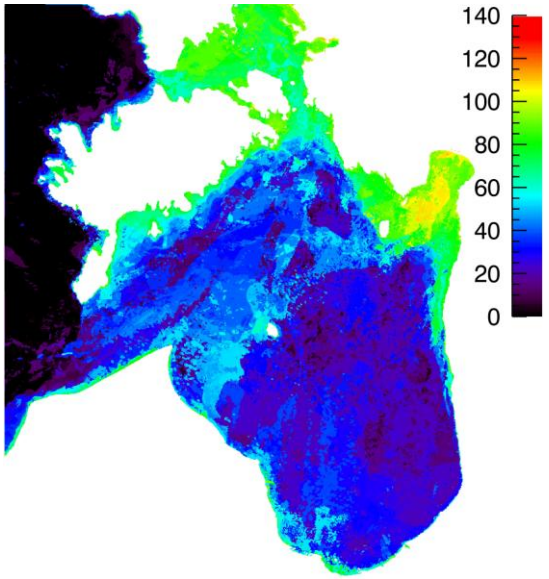
MEDIUM

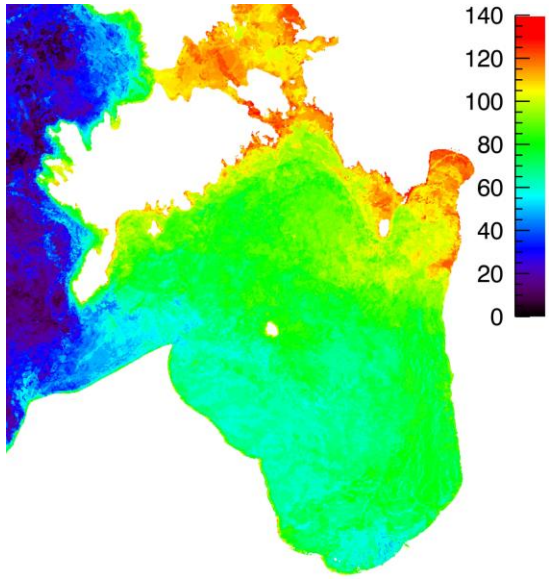


SEVER

Ice probability

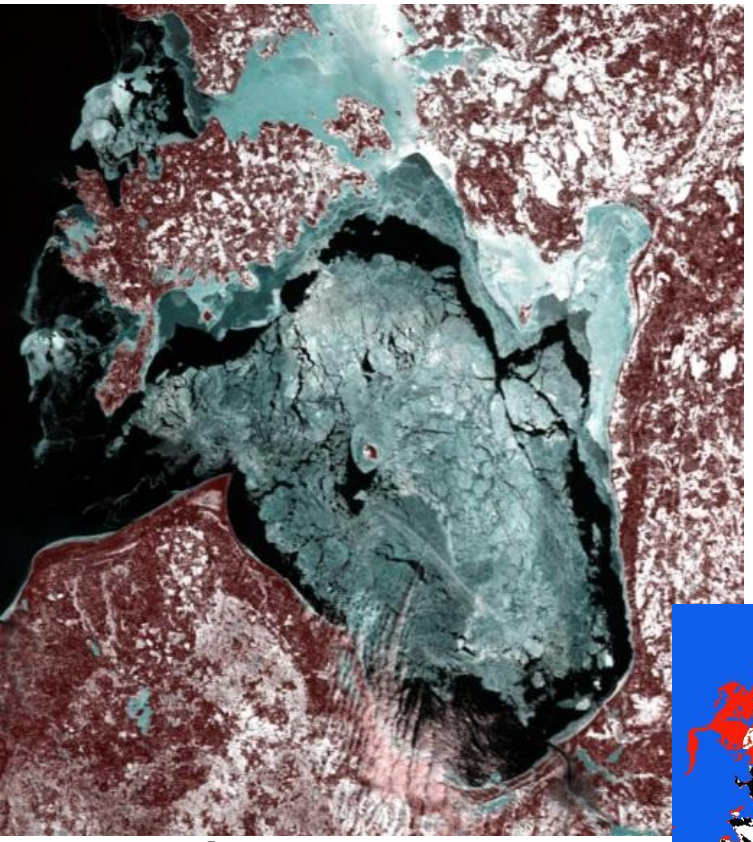




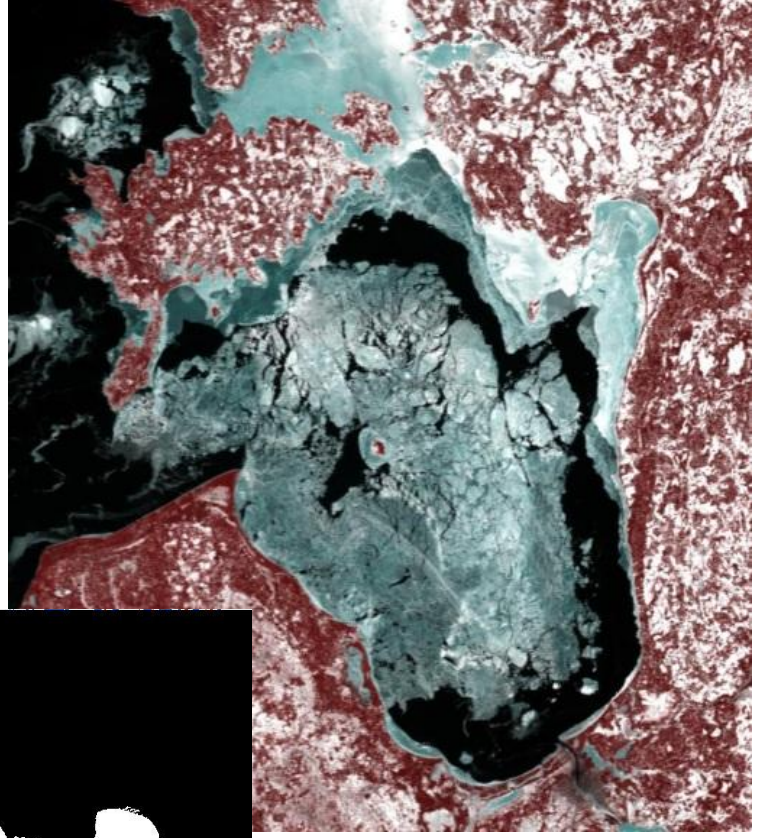


Nr. of ice days

Ice drift



15 March 2011



16 March 2011

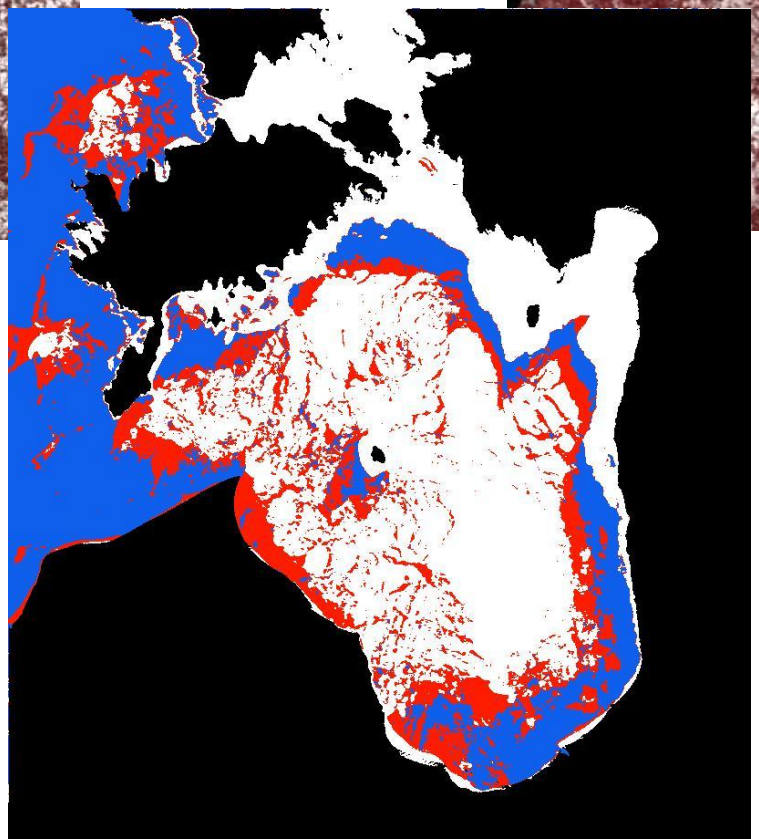


Image showing ice movements between15 March 2011 and 16 March 2011: red area shows regions of where cover hanged du to ice drift between those two days, blue area represents open water and white represents the area where ice was presented on both days.

Average ice conditions

Average maps showing the ice probability and number of ice cover days for seasons during 2002/2003-2010/2011.

Image showing the **ice probability** at each location.

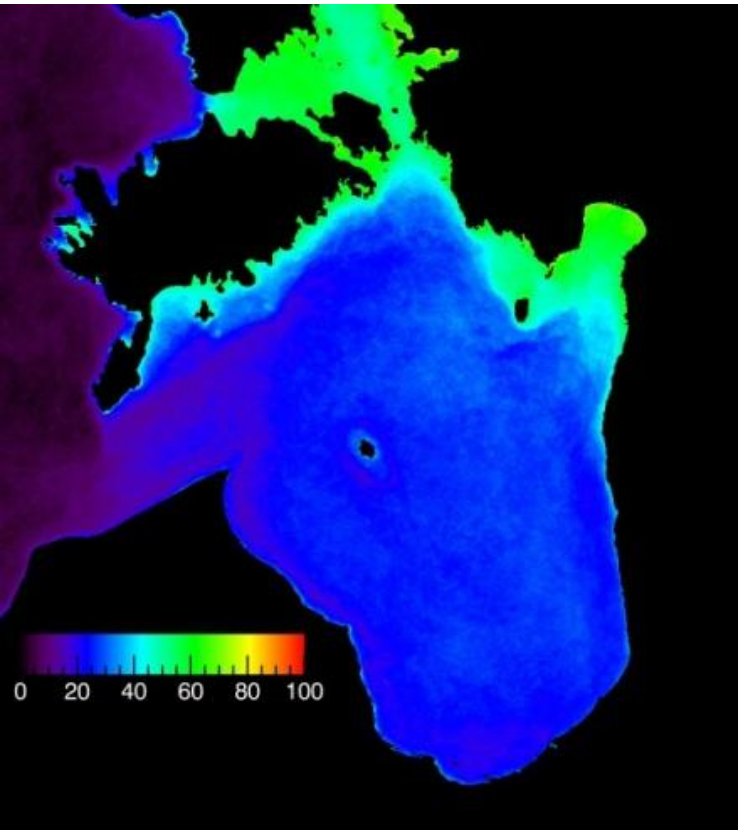
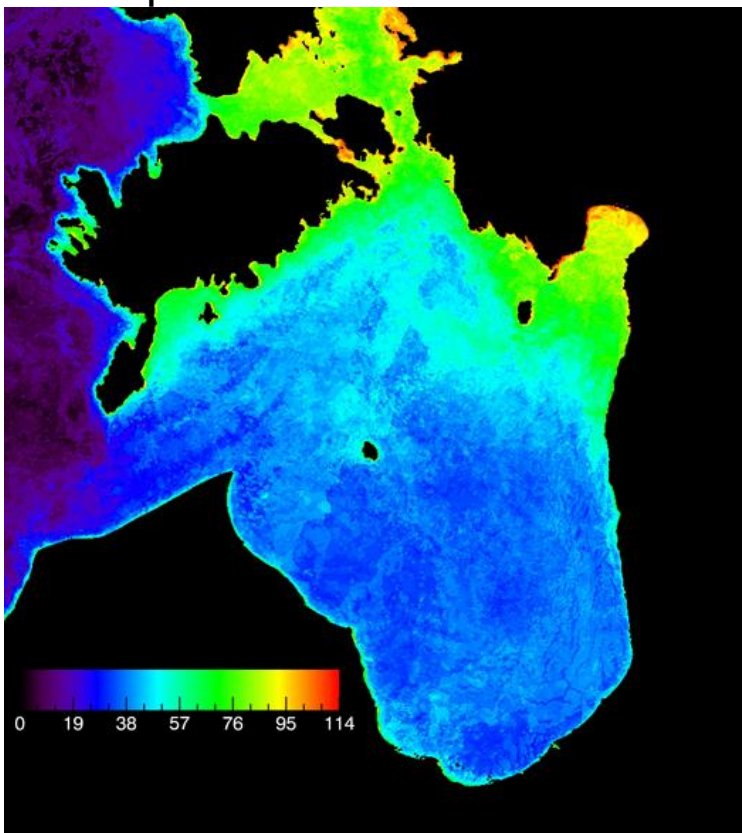
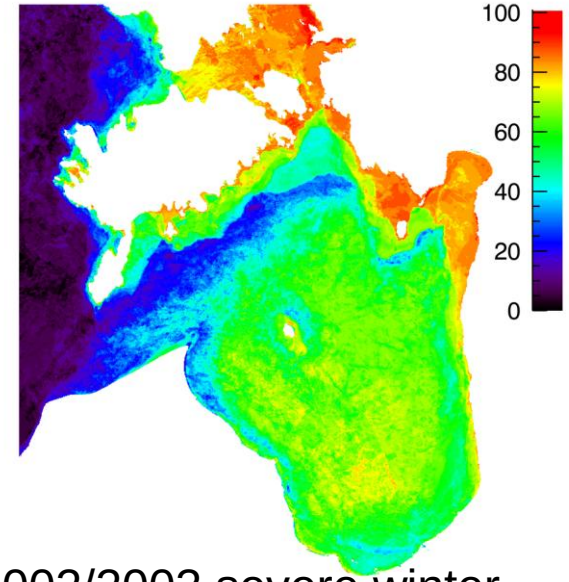
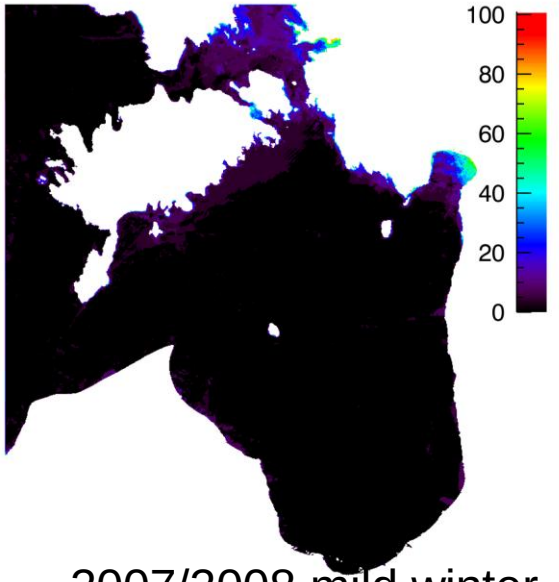


Image showing the average **number of ice** days at each location per season.



ICE: extreme conditions

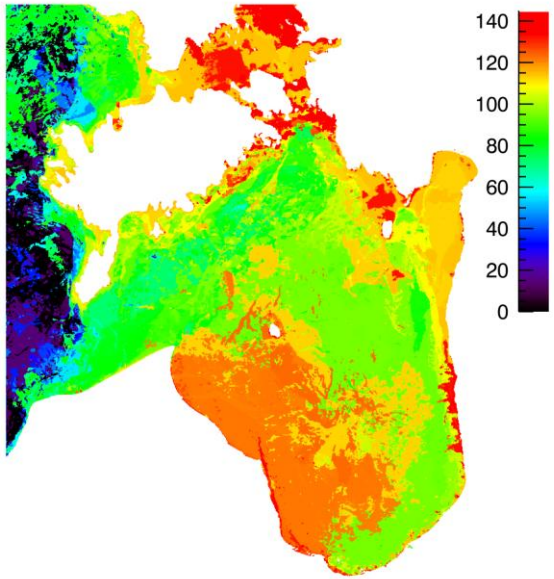


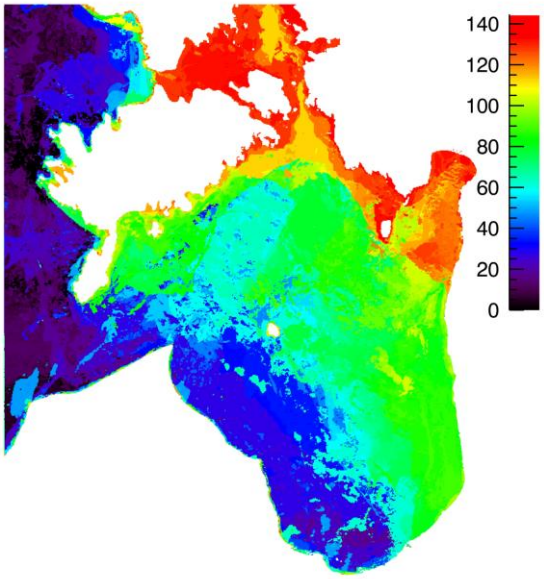


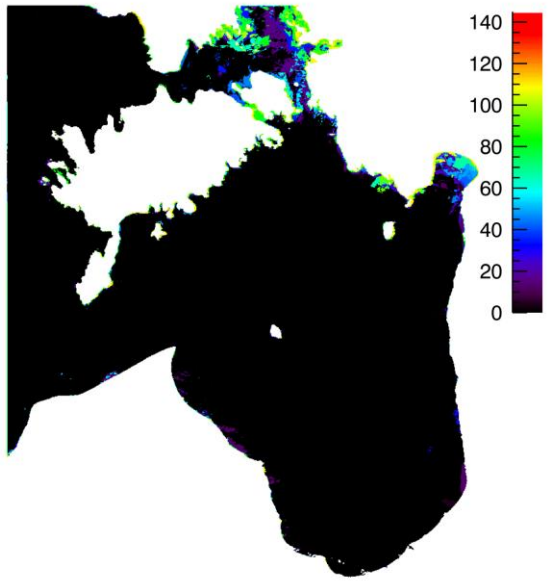
2002/2003 severe winter

2010/2011 severe winter

2007/2008 mild winter







Conclusions

- Areas with more suitable wind conditions are in thenorthern part of Gulf of Riga.
- Mean annual wind speed at 10m is ~7m/s
- Energy density at 100m is ~650W/m2

- Maximum length of ice season was 146 days
- Ice cover probability 94%
- Rougher ice conditions are in the northern part of the Gulf of Riga

Sufficient wind conditions are there…..

….but so are the rough ice conditions