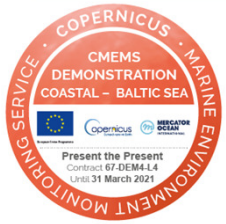
An insight in the developement of the geospatial WEB service demonstration – Present the present



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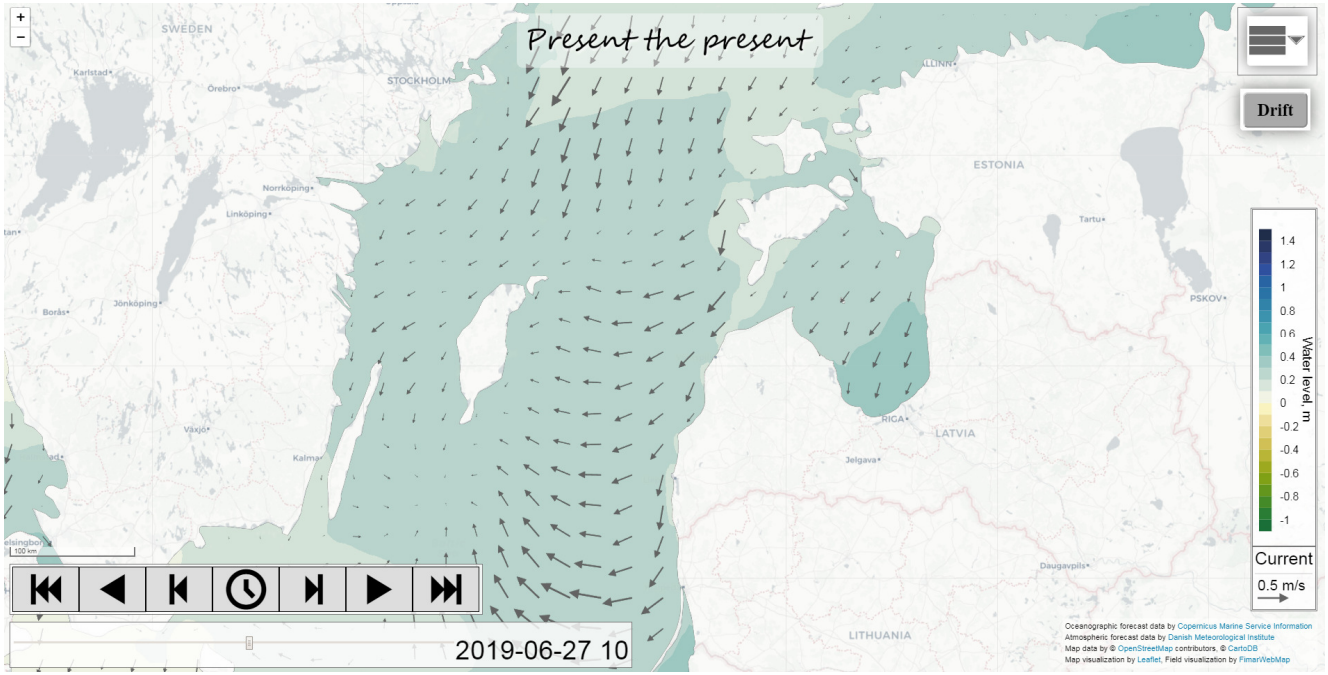
Aims

- Provide an insight of the duties of WEB developer working with the geospatial information
- Provide an overview – where the knowledge of math/physics/geography is involved
- Widen the understanding of data visualisation techniques

WEB service «building blocks»

- The view of the professional uncovers the details not seen by ordinary user…

- **What do you recognize in this screenshot of Present the present Web service?**



WEB service «building blocks»

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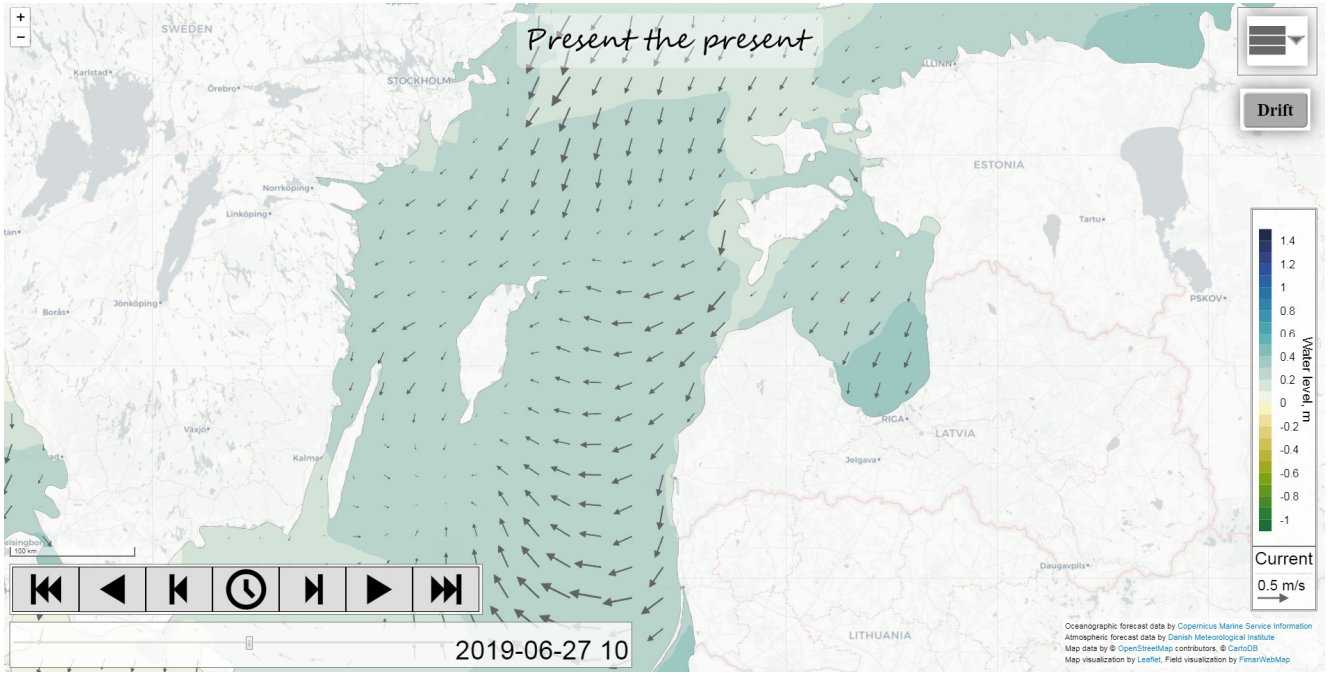
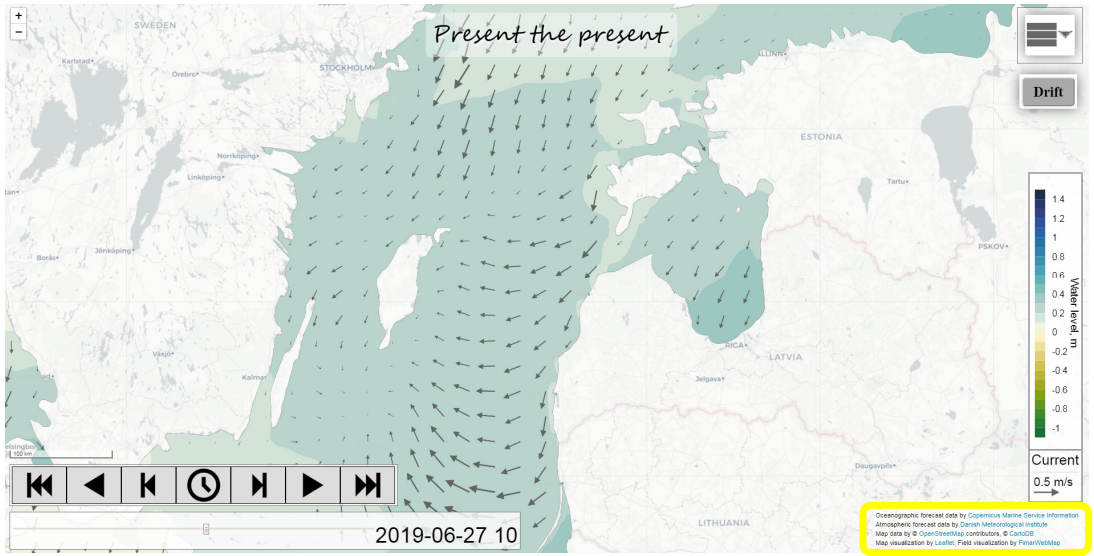


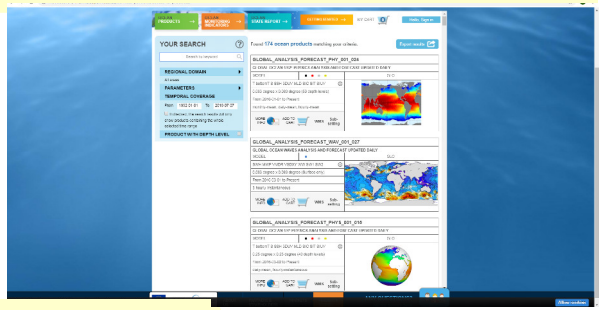
The map
The Baltic Sea
The scale of the water level
The legend (current)
Contourplot
Vectorplot
Info about the date&time
Animation & zoom controls
……

Ingredients?

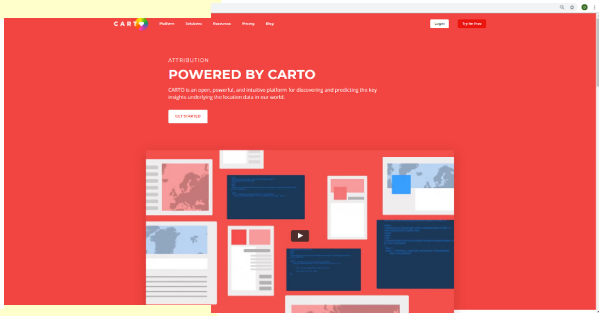


Oceanographic forecast data by Copernicus Marine Service Information
Atmospheric forecast data by Danish Meteorological Institute
Map data by © OpenStreetMap contributors, © CartoDB
Map visualization by Leaflet, Field visualization by FimarWebMap

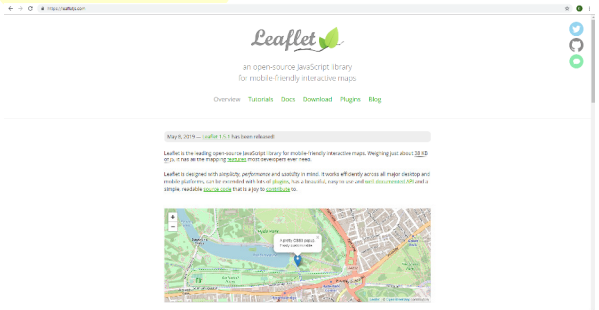
CMEMS (Copernicus Marine Services data)



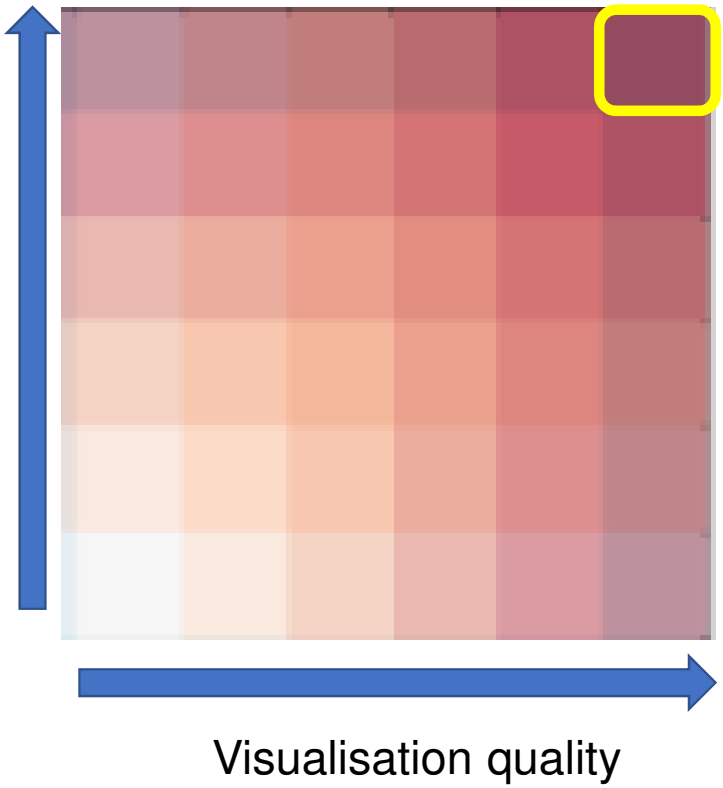
CartoDB



Leaflet



Quality (visualisation & data…)



The top quality of data &visualisation

«Not everything is gold that shines» …. There exist – perfect visualisations of «poor» data & poor visualisations of «bright» data

Data origins

- Do you trust the source?
- Any limitations in further reproduction and usage?
- Data formats?
- File size?
- Refresh rate?
- Sustainability of the used data format (are changes possible)?
- Sustainability of the source of data?

Visualisation

Image by: https://4cs.gia.edu/en-us/blog/gemologist-jeff-mason-pawn-star-in-the-making/

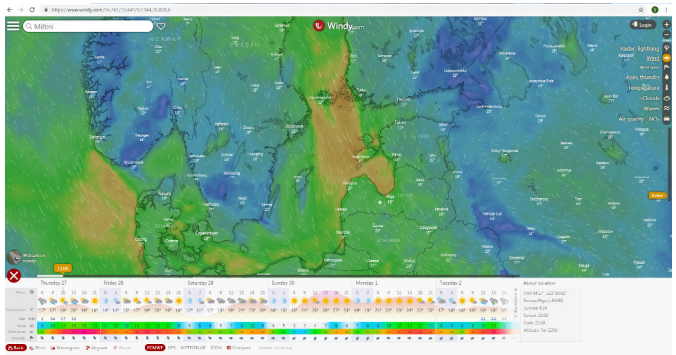
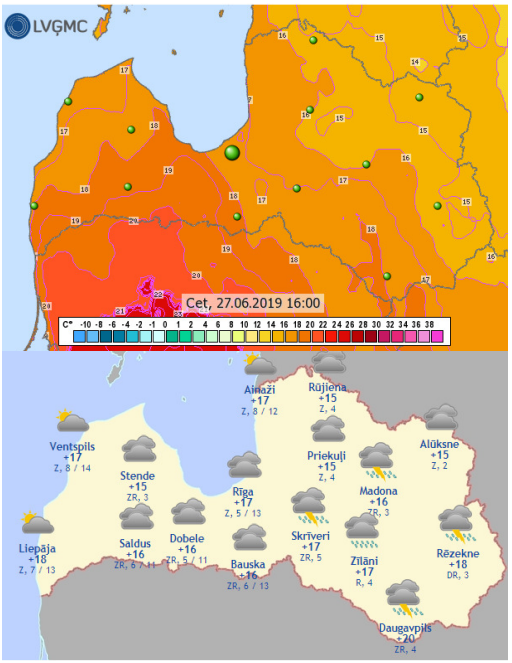
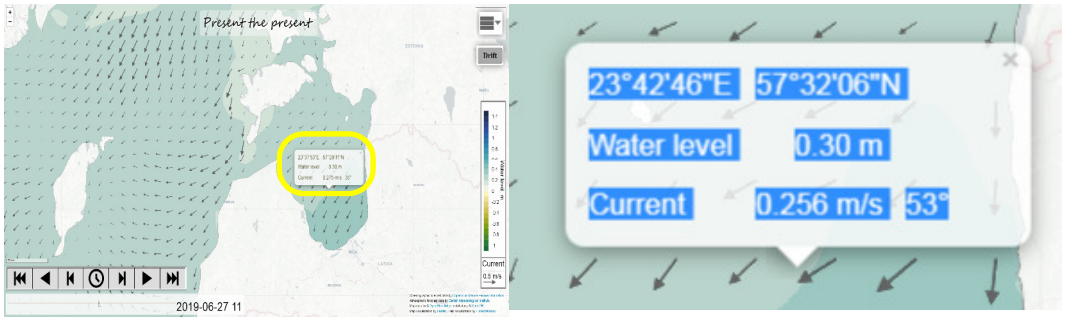


Image: http://www.windy.com



Images by: http://www.meteo.lv

Interactivity?
Pop-up info?
Information suitable for transfer (data or image?)



Images by: http://www.water.lv/fimarweb

Training task

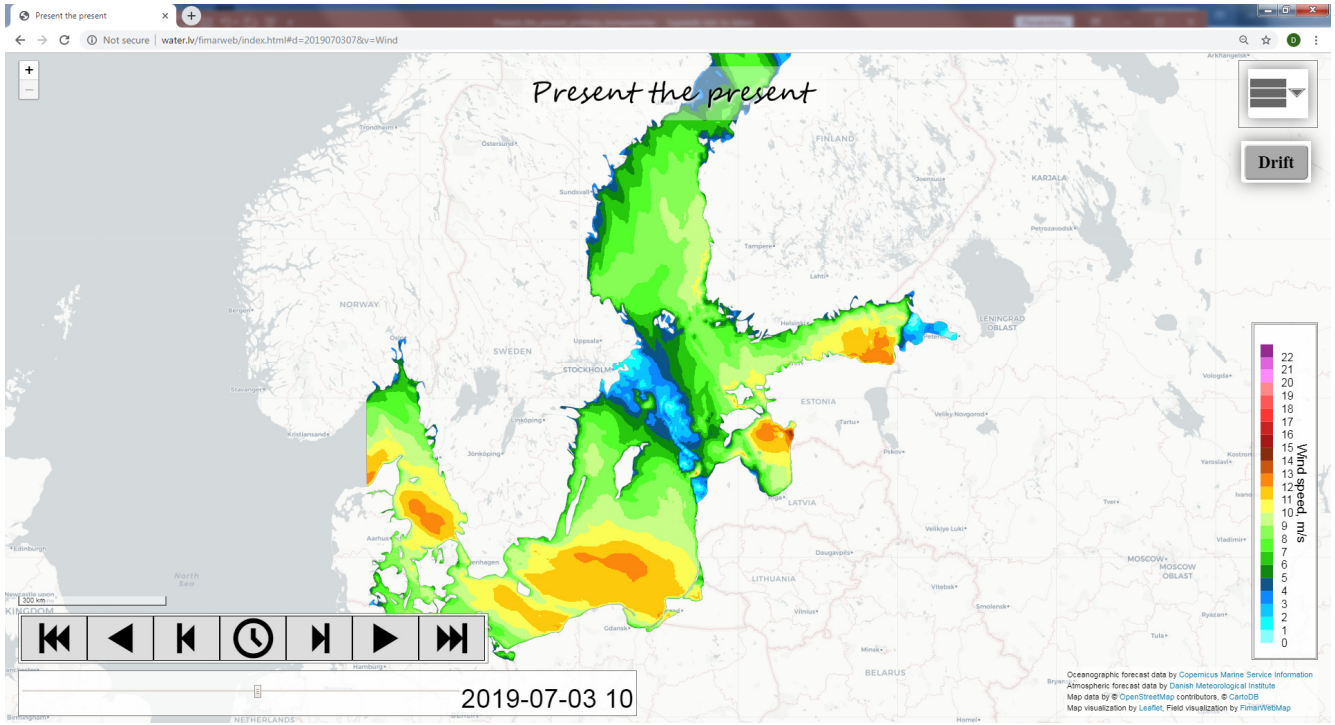
- Determine (and fill the table) the current velocity and the wave height in Irbe Strait during the previous 5 days by implementing the Present the present service.

- Is there a difference among the values in different times of the day?

- Is there a difference among the values in different locations of Irbe Strait?

Present the present service demonstration

- Available: www.water.lv/fimarweb
- Dedicated web page: www.water.lv/present
- Development: 2018- 2019
- Aim: Building the virtual model of the Baltic Sea surface in order to visualise the drift of the floating object and characteristic current directions and speeds

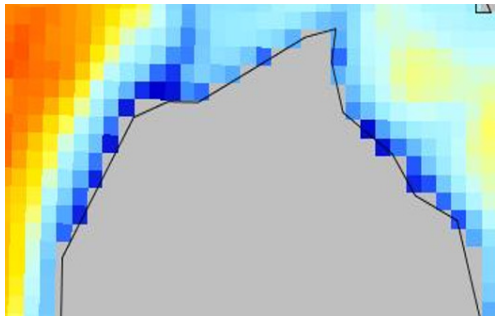


Location: Surface of the Baltic Sea
Refresh frequency: once per 6 hours;
Temporal scale: data for each hour (2 days ahead and 7 days in the past)
Contents: 11 scalar (numerical) parameters and 4 vectors (direction) parameters;

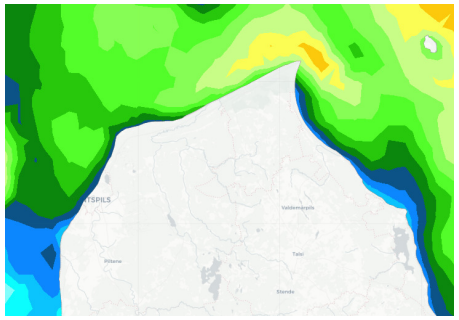
Mathematics?

Data on the server of Copernicus Marine Services

Data locally



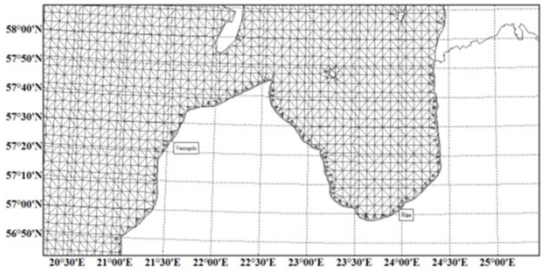
Visualisation on the structured grid



Visualisation on unstructured grid

Characteristic duties:

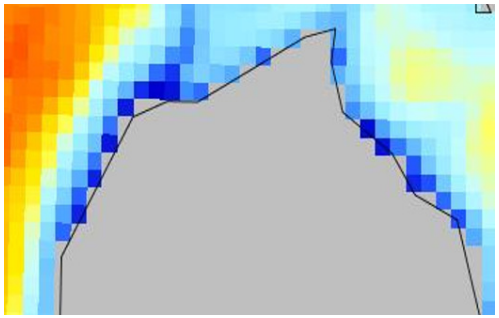
- Data interpolation
- Contourline & grid intersections
- Contourline plots



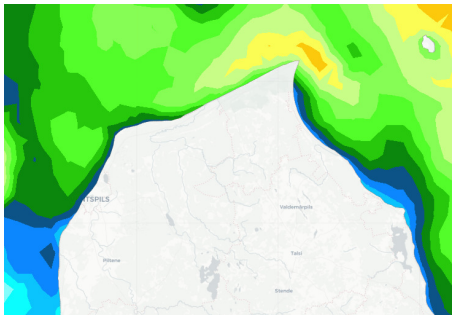
An example of unstructured grid

Mathematics?

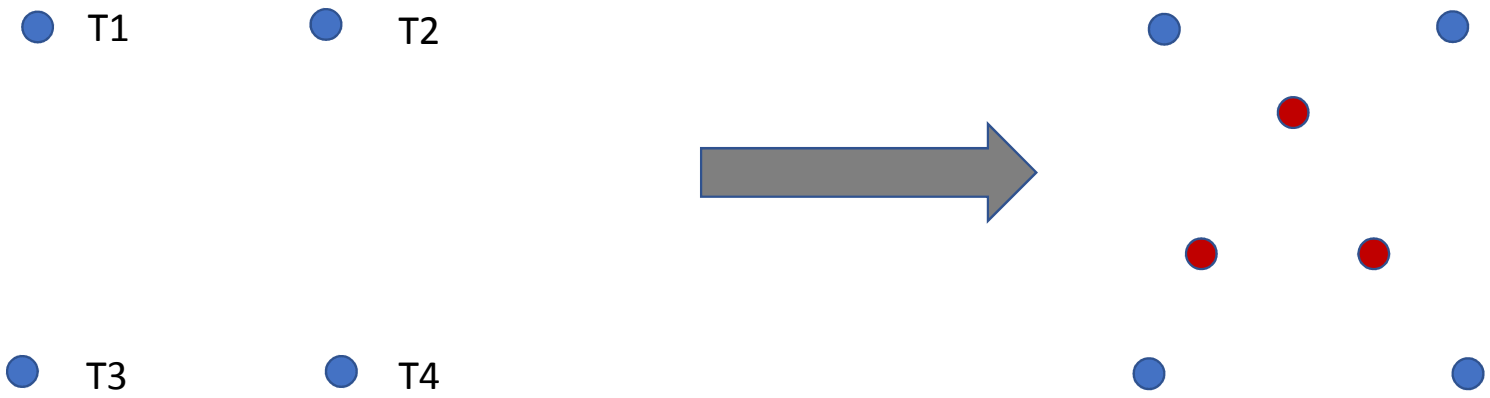
Situation: there are given temperatures on the vertices of the structured grid.
Task: how the temperature in the middle of the grid element could be determined?



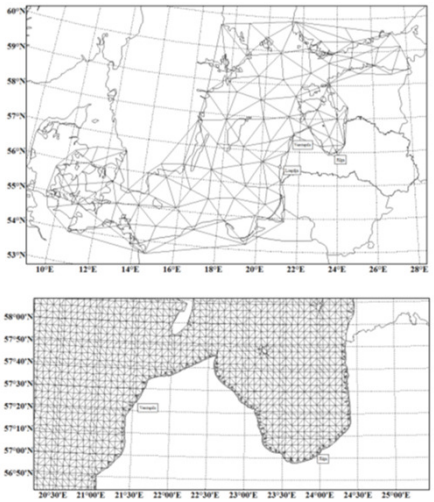
Visualisation on the structured grid



Visualisation on the unstructured grid



Mathematics?

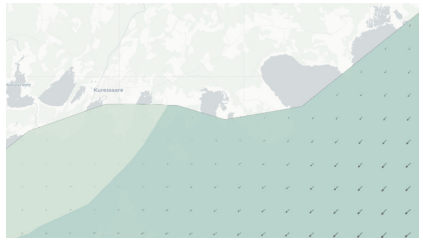


Examples of unstructured grids

Common situations:

- Original data are given on the different grid (wind & surface current);
- Different requirements on data amount (the coarser the grid – the smaller the file sizes…);

Skills: how to transfer data between different grids – interpolation of the data?



Difference in shoreline location between different data sources

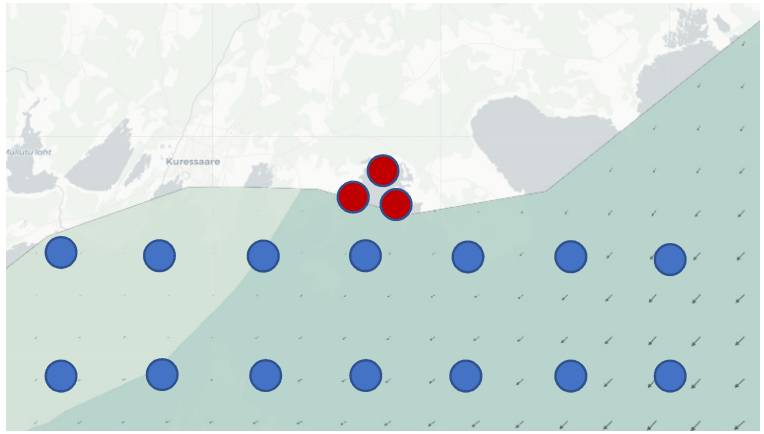
Common situation:

- Update/change of shoreline necessary;

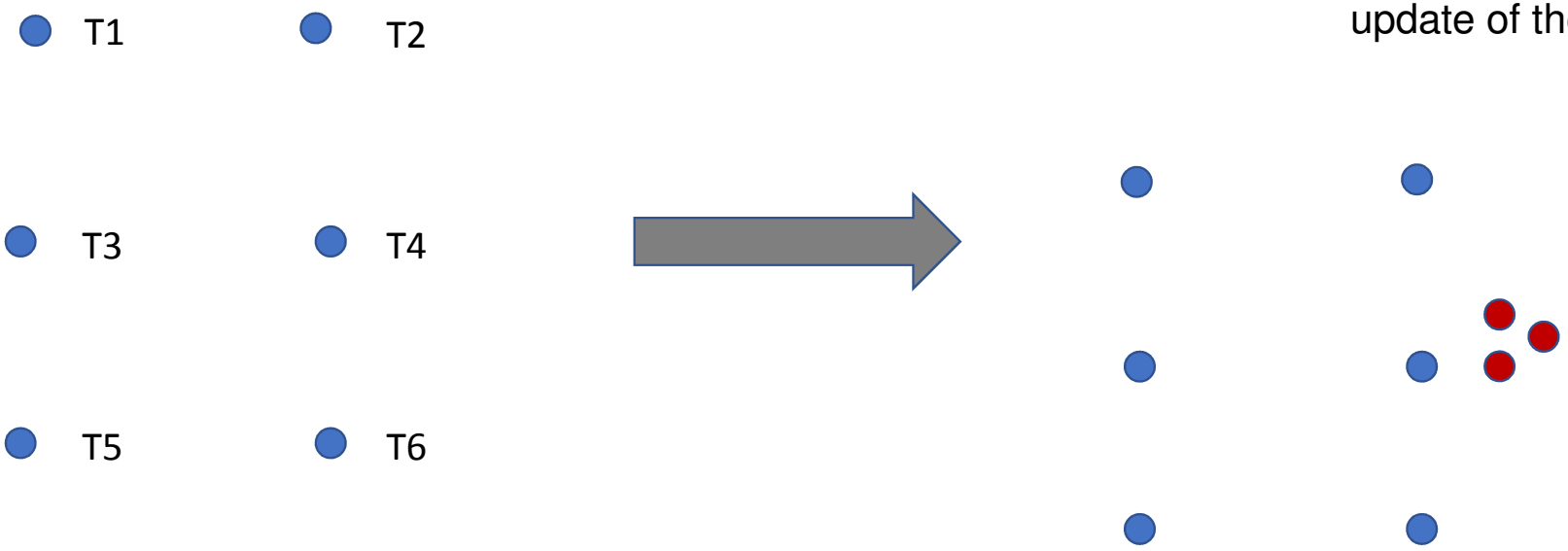
Skills: extrapolation of the data?

Mathematics?

Situation: there are given temperatures on the vertices of the structured grid.
Task: how the temperature outside the grid element could be determined?



Extrapolation of the data in case of the update of the shoreline



Geography?

- Virtual model of the Baltic Sea;
- Map (main cities, bays, islands etc.);
- Are there the main inlets of rivers included in the service?
- Is there coordinate system mentioned (can I georeference the location I am interested in)?

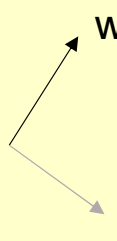
Physics?

Rotation of the surface current caused by Earth rotation (is it possible to recognize it in the service?)

Task

Determine – are there the regions where current rotation around the wind vector could be seen (in the given time period)?

It is possible to observe the rotation of the current direction (in case of permanent wind direction)



Rotation period: 13 hours (in the Gulf of Riga)

Physics?

Storms in the Baltic Sea

Wave height can exceed 6 m in the storms in the Baltic Sea.

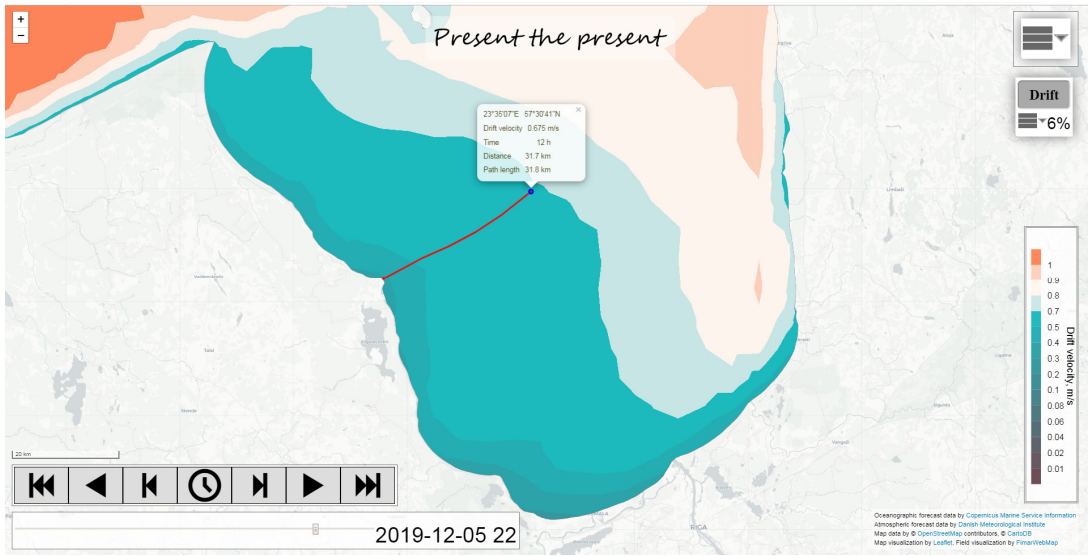
Task

Observe – are there the regions in the Baltic Sea with the wave height above 3 m?

Describe your observations concerning the wave height in the sea.

Physics?

Funcionality that provides modelling the drift motion of the floating object



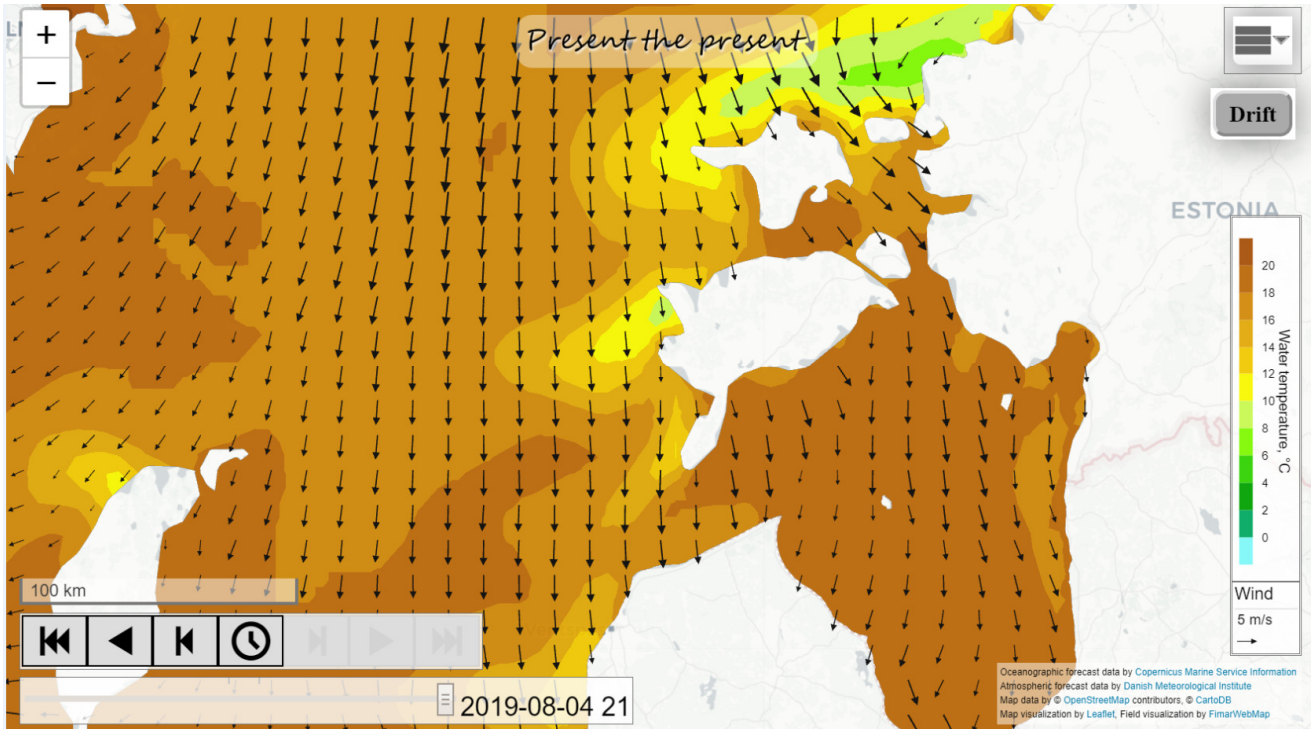
Direction of the drift motion and its speed is determined by wind speed, surface current and waves.
Wind impact is related to the open part above the water of the floating object.

The motion of the boat can be simulated:
0.94 * current velocity + **0.06** * wind velocity
(*wind factor* – 6%).

Characteristic speeds of the drift of the boat in the Baltic Sea 0.1-1 m/s.

Physics?

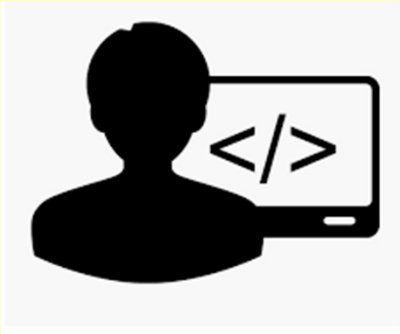
Upwelling



Wind from the coast causes upwelling of the deeper/cooler water layers.

Fulfillment in the job of geospatial data web developer

- «I gained the skills – how data from one mesh to another can be transfered…»
- «I updated the shoreline location in the Sarema island in my visualisation»
- «I am glad that I received the response that users like the color scales I implemented»
- «I find the design of my service excellent…»
- «I am glad that kitesurfers told me that the wind direction has been exactly the same as forecasted»
- «Our demonstration service is used by XXX»
- «Our demonstration service is used by YYYYYY users»



Thank you for your attention!

Contacts & feedback: present.the.present.UL@gmail.com