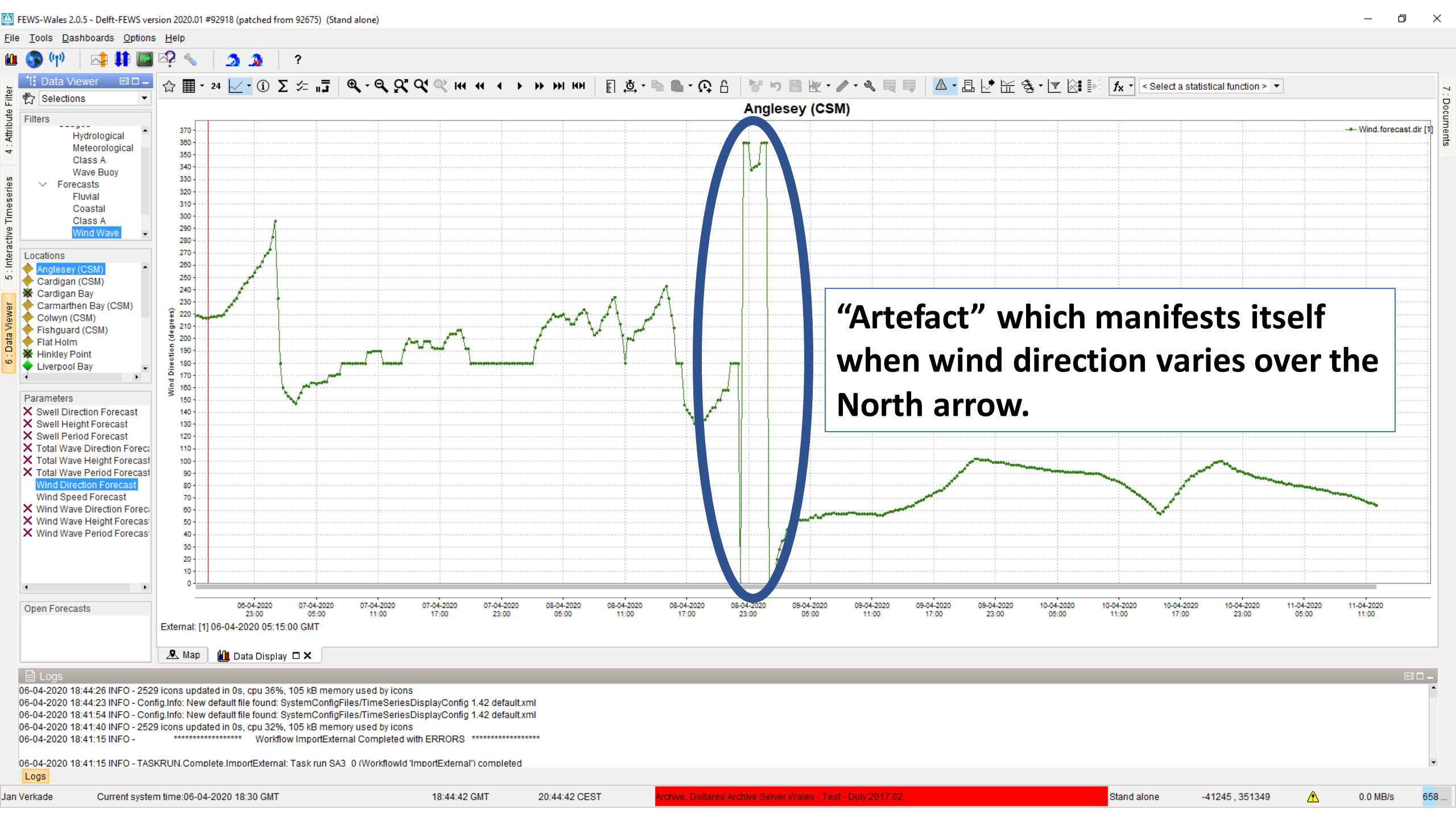
Polar wind plots

Request for funding

Dr Jan Verkade, June 2020

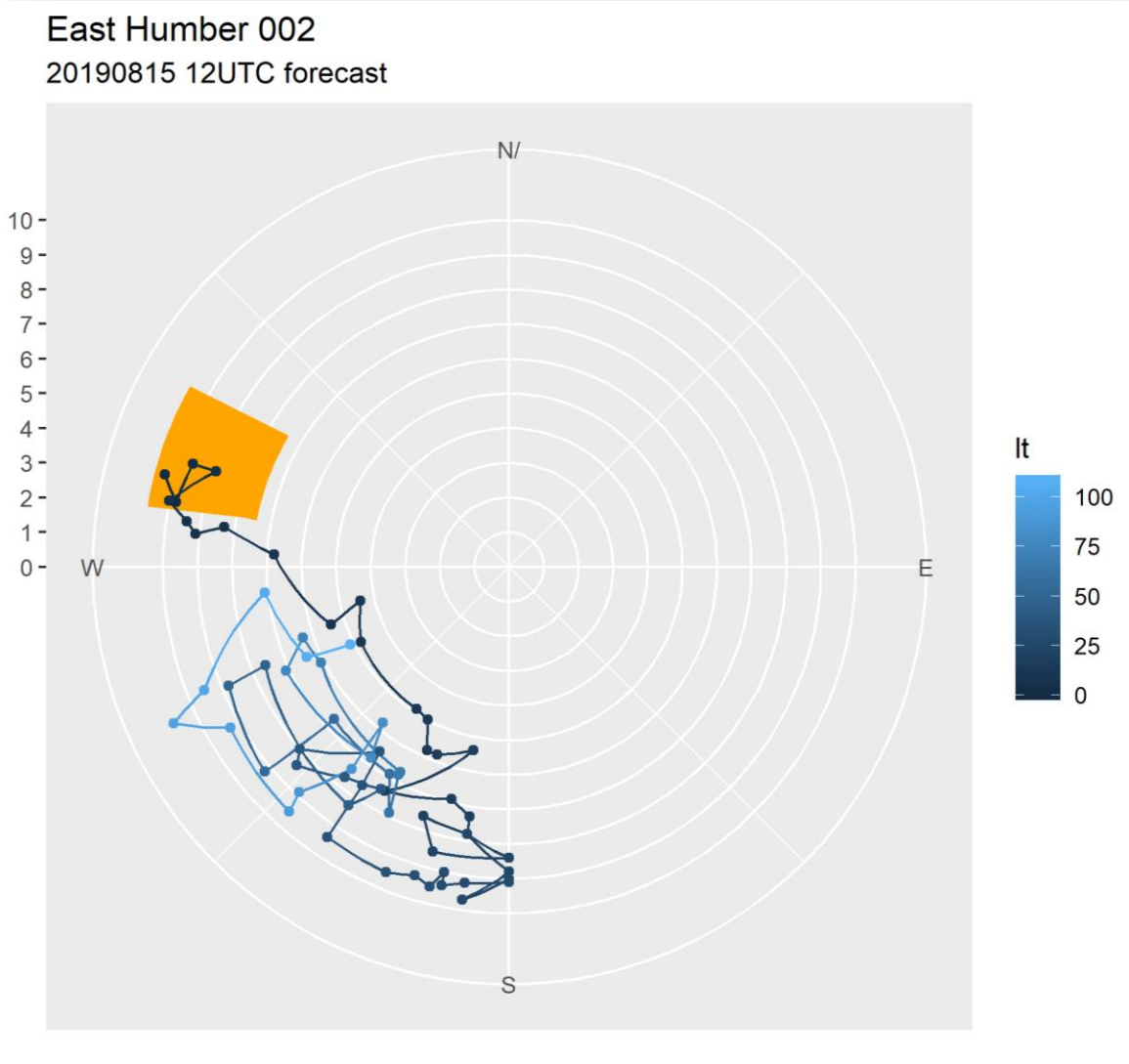
Problem statement

1. “Wind direction” is often visualized as direction versus time with direction ranging from 0 to 360 degrees. When visualized as lines and if/when direction varies over the North arrow, this introduces artefacts.
2. Adverse wind conditions often comprise a combination of wind direction and wind velocity. Such a combined ‘threshold’ is difficult to visualize.


FEWS-Wales 2.0.5 - Delft-FEWS version 2020.01 #92918 (patched from 92675) (Stand alone)
File Tools Dashboards Options Help
Data Viewer
Selections
Filters
Hydrological
Meteorological
Class A
Wave Buoy
Forecasts
Fluvial
Coastal
Class A
Wind Wave
Locations
Anglesey (CSM)
Cardigan (CSM)
Cardigan Bay
Carmarthen Bay (CSM)
Colwyn (CSM)
Fishguard (CSM)
Flat Holm
Hinkley Point
Liverpool Bay
Parameters
Swell Direction Forecast
Swell Height Forecast
Swell Period Forecast
Total Wave Direction Forec
Total Wave Height Forecast
Total Wave Period Forecast
Wind Direction Forecast
Wind Speed Forecast
Wind Wave Direction Forec
Wind Wave Height Forecas
Wind Wave Period Forecas
Open Forecasts
< Select a statistical function >
Anglesey (CSM)
Wind.forecast.dir [1]
Wind Direction (degrees)
“Artefact” which manifests itself when wind direction varies over the North arrow.
External: [1] 06-04-2020 05:15:00 GMT
Map
Data Display
Logs
06-04-2020 18:44:26 INFO - 2529 icons updated in 0s, cpu 36%, 105 kB memory used by icons
06-04-2020 18:44:23 INFO - Config.Info: New default file found: SystemConfigFiles/TimeSeriesDisplayConfig 1.42 default.xml
06-04-2020 18:41:54 INFO - Config.Info: New default file found: SystemConfigFiles/TimeSeriesDisplayConfig 1.42 default.xml
06-04-2020 18:41:40 INFO - 2529 icons updated in 0s, cpu 32%, 105 kB memory used by icons
06-04-2020 18:41:15 INFO - ********** Workflow ImportExternal Completed with ERRORS **********
06-04-2020 18:41:15 INFO - TASKRUN.Complete.ImportExternal: Task run SA3 0 (WorkflowId 'ImportExternal') completed
Logs
Jan Verkade
Current system time:06-04-2020 18:30 GMT
18:44:42 GMT
20:44:42 CEST
Archive: Deltares Archive Server Wales - Test - Duty 2017.02
Stand alone
-41245 , 351349
0.0 MB/s

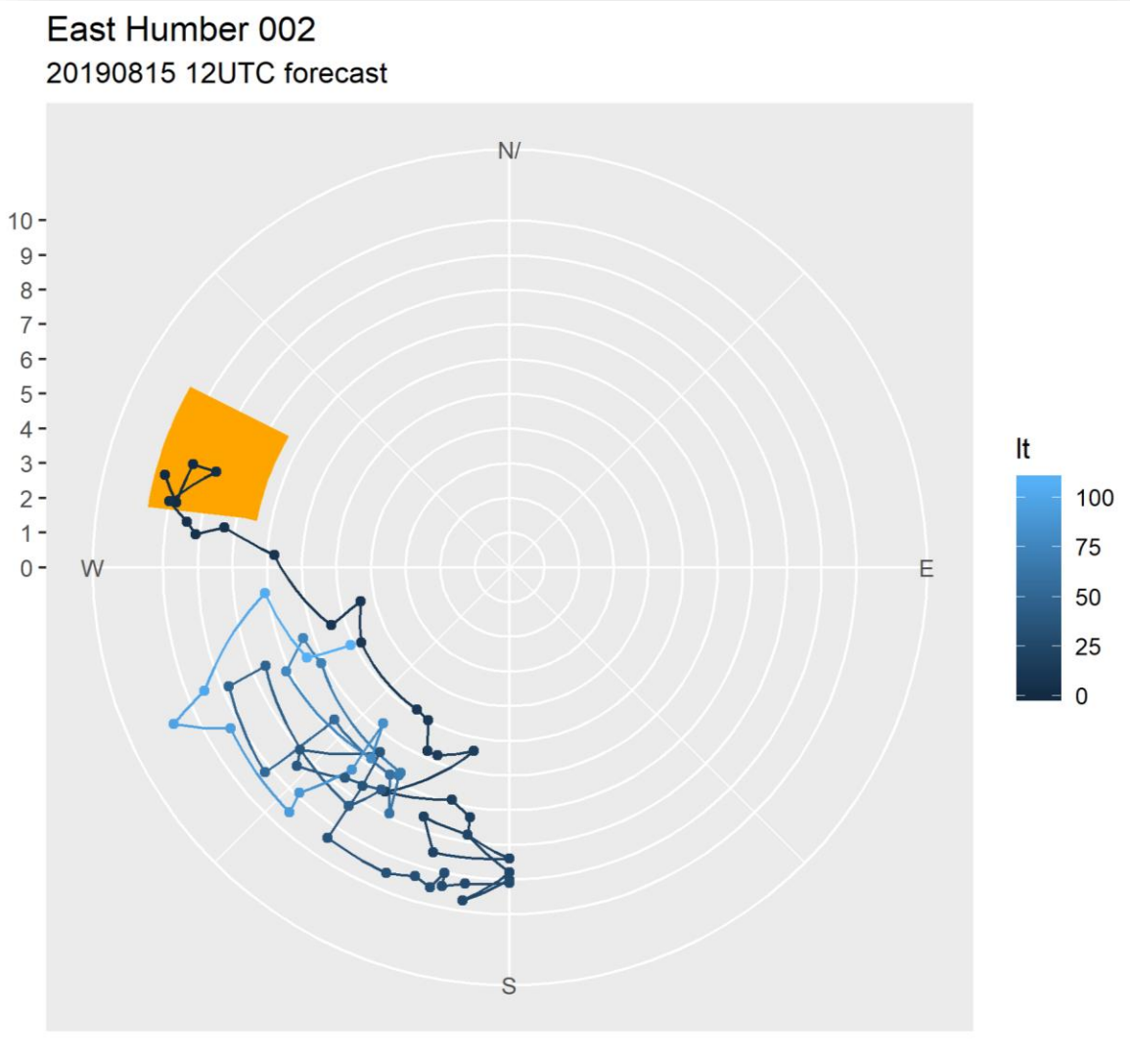
Proposed solution: polar wind plots

- Combine wind direction and wind velocity in single (polar) plot
- Visualize critical conditions by colour-coding parts of the plot



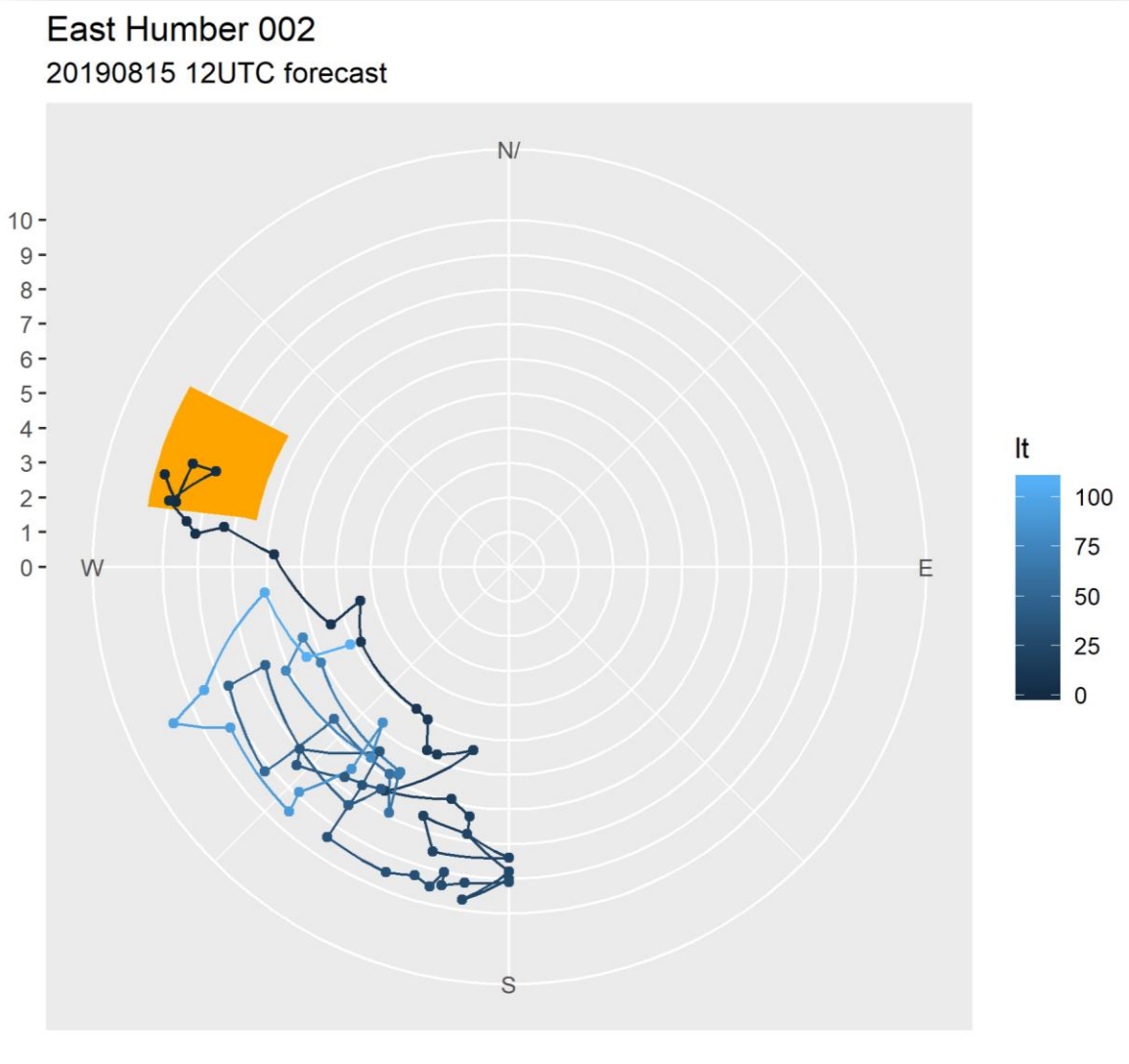
Initial mock-up

- Circle is annotated with compass directions (North, East, South, West)
- Distance from origin denotes velocity (here, ranges from 0 – 10 m/s)
- Critical conditions are highlighted in yellow/orange
- Forecast time (“T0”) is shown as metadata; lead-time is colour-coded



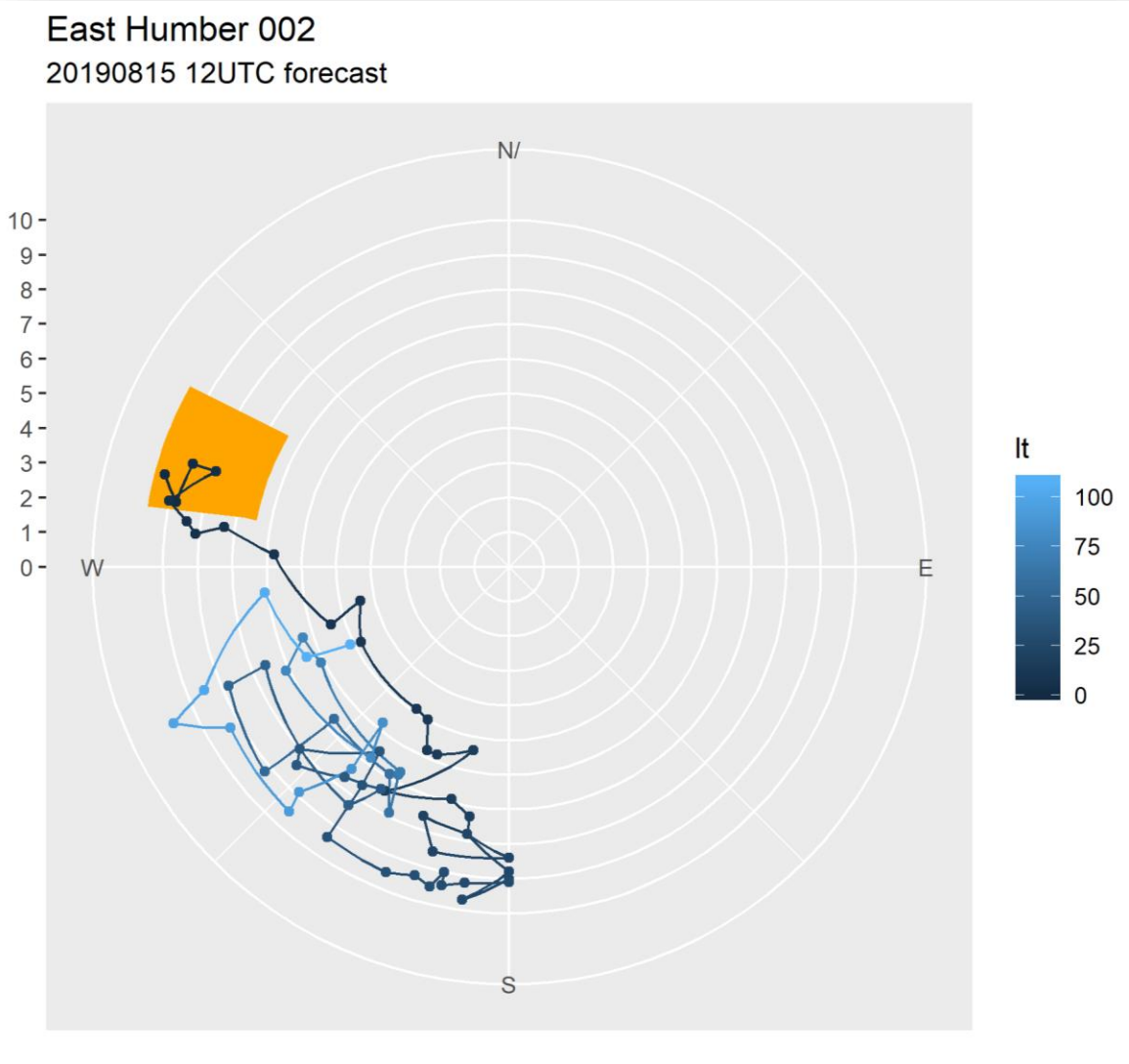
Interpretation

- Number of points within colour-coded area is indicative for the time during which the critical conditions are met.



Ensembles

- Plot allows for multiple forecasts (ensembles) to be included. Again, the relative number of points in the shaded area is indicative for the duration/probability of critical conditions being met.
- Multiple realizations would probably require relatively thin lines and small plot positions



Options / fine-tuning

- Position of the velocity axis: probably best inside the plot (i.e., on the vertical axis from origin, in any direction)
- Hovering over a point to show it's 'valid time'
- A time slider (similar to that in the spatial display) which would result in any point being high-lighted.

Call for crowd-funding

- Development would require approx. 20 days
- Natural Resources Wales has pledged to fund 5 days
- We're looking for funding of the remaining 15 days…

- If interested, contact either
  - Delft-FEWS product management
  - Dr Jan Verkade (NRW account manager; jan.verkade@deltares.nl; +31 88 335 8348)