Near Real Time Applications to retrieve Wind Products for Maritime Situational Awareness

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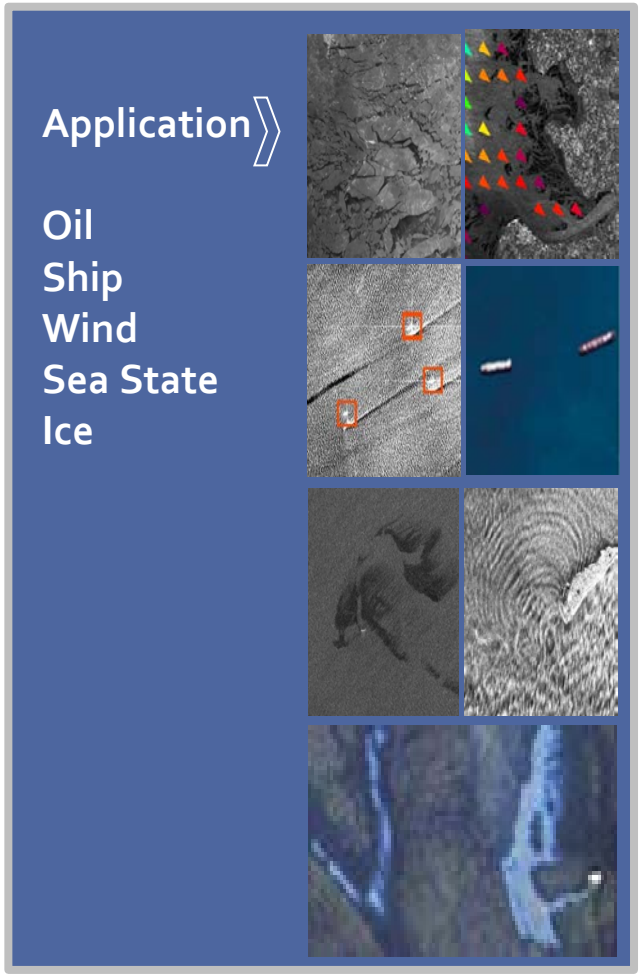
Outline

- Maritime Applications
- Wind Detection Workflow
- Summary

Applications for Maritime Awareness



System engineering and development for:

- **efficient use of the processing environment (parallel processing)**
- **operational use of research findings**
- **processing of different sensors and modes (Multi- Mission)**
- **operational data fusion of different data sources like EO data and T-AIS or S-AIS**
- **product development**
- **dissemination systems development**

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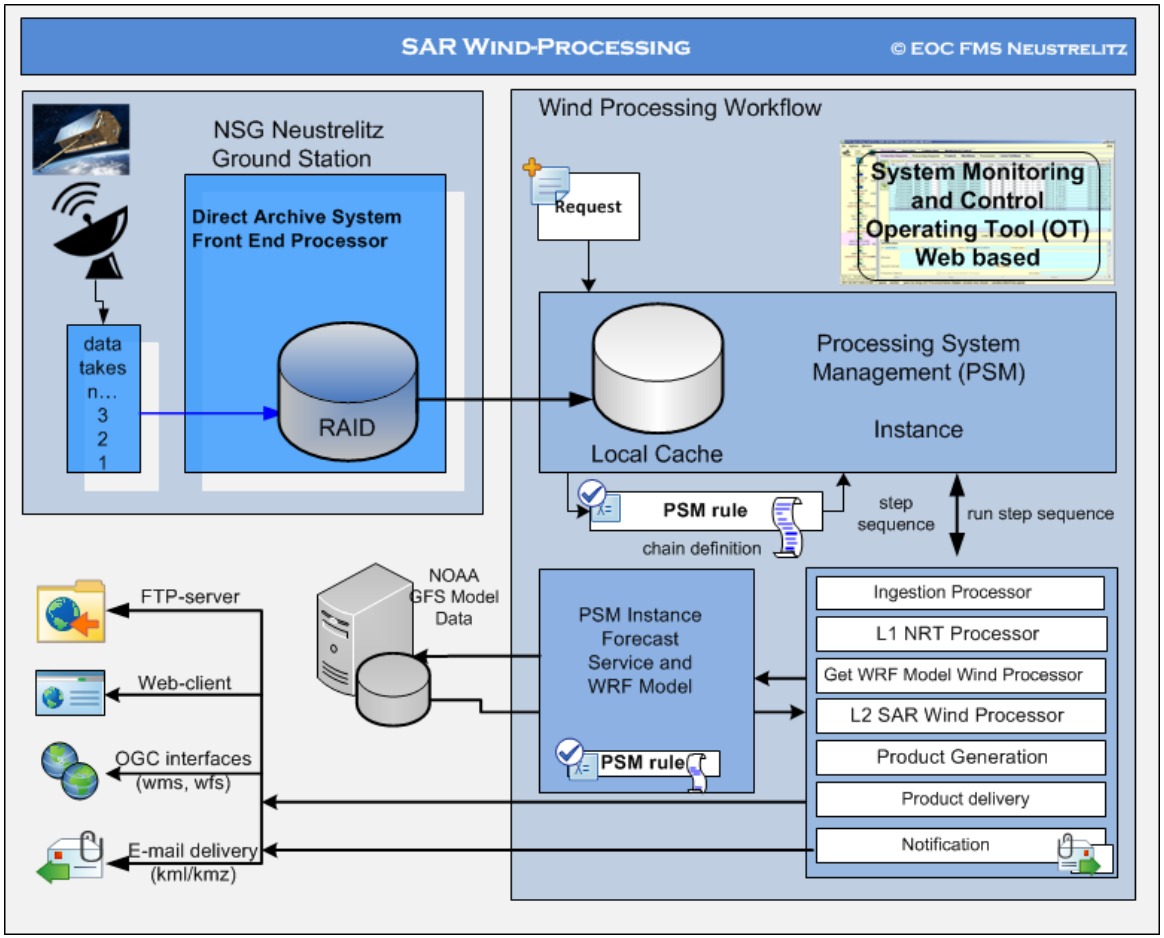
SAR Wind Detection System

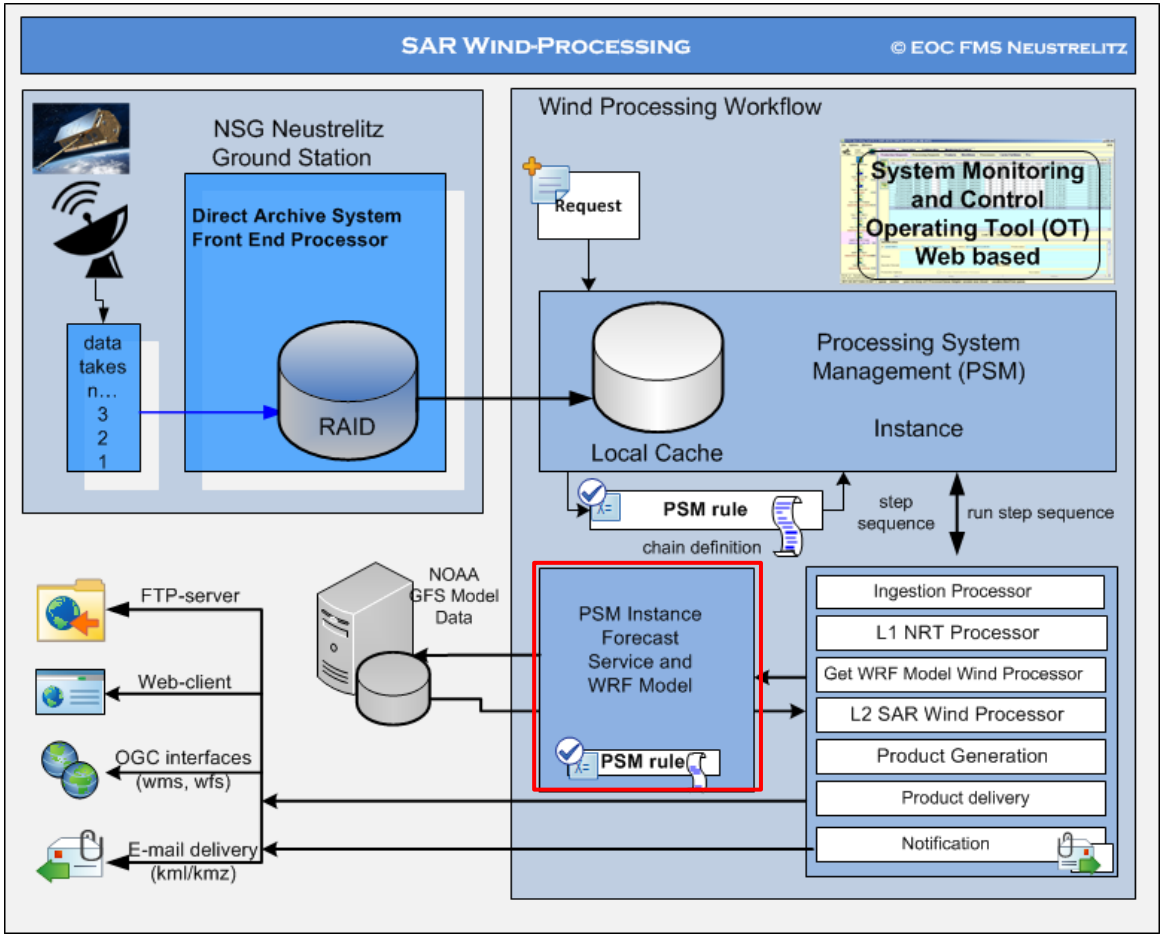
- **Supported satellites:**
  - **TerraSAR-X / TanDEM-X**
  - **Radarsat-2**
  - **Sentinel 1A**
- **Based on Processing System Management (PSM)**
- **Parallel processing**
- **Fully automated**
- **GUI for monitoring and control**



SAR Wind Detection System

Weather Research and Forecasting Model (WRF)

- is a numerical weather prediction (NWP) and atmospheric simulation system designed for research and operational applications
- It is a supported “community model”, i.e. a free and shared resource with distributed development and centralized support
- Uses GFS data from NOAA as input



- **Outputs:**
- **TSX1_NSG_12960_20160812T171044_wrfout.kmz**
- **TSX1_NSG_12960_20160812T171044_wrfout.nc**

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SAR Wind Detection System

Weather Research and Forecasting Model (WRF) - Output-Products

Netcdf -File

- netcdf TSX1_NSG_12960_20160812T171044_wrfout {
- dimensions:
  lon = 28 ;
  lat = 35 ;
  lev = 1 ;
  time = UNLIMITED ; // (7 currently)
- variables:

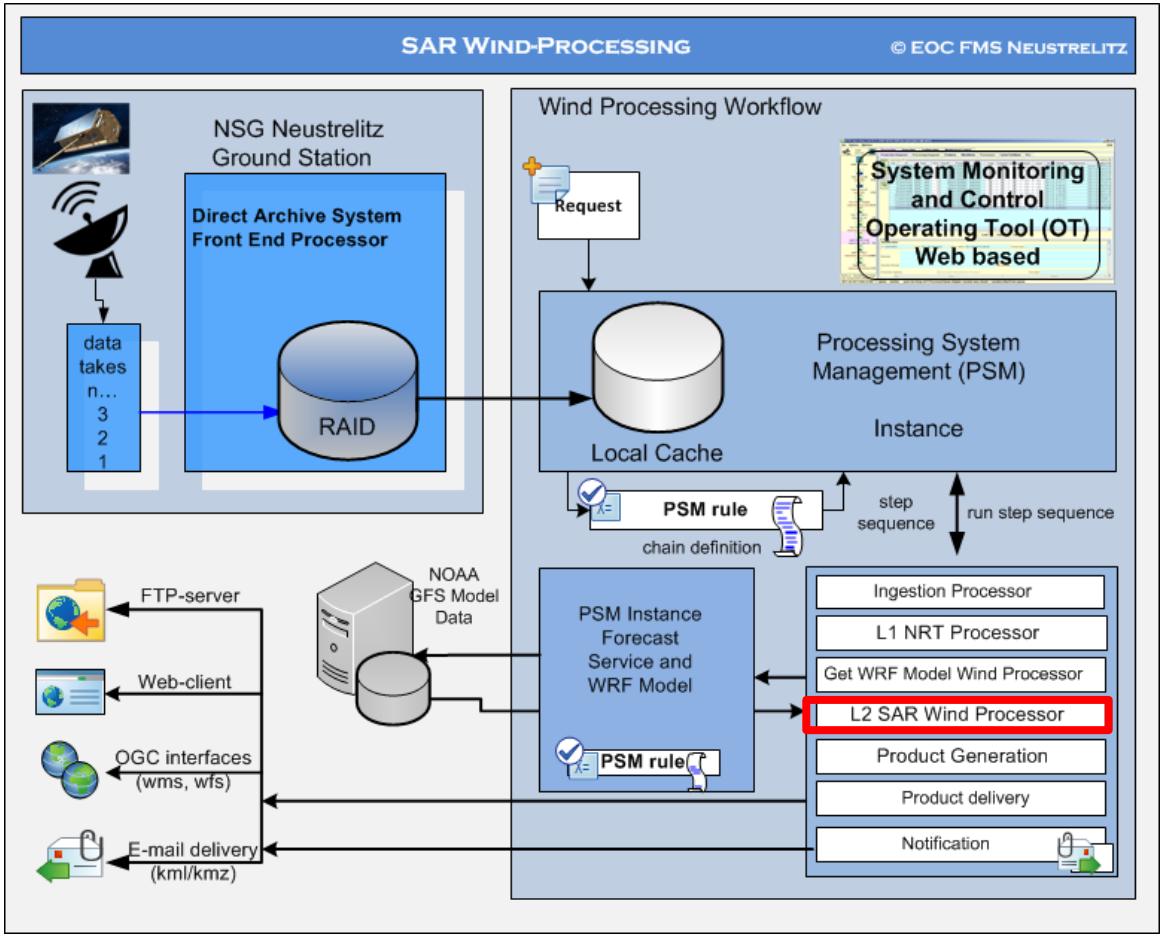
double lon(lon) ;
double lat(lat) ;
double time(time) ;
time:standard_name = "time" ;
time:units = "hours since 2016-08-12 15:00:00" ;
time:calendar = "standard" ;
float ws10(time, lev, lat, lon) ;
ws10:long_name = "Wind Speed at 10 M (m s-1)" ;
ws10:_FillValue = 1.e+30f ;
ws10:missing_value = 1.e+30f ;
float wd10(time, lev, lat, lon) ;
wd10:long_name = "Wind Direction at 10 M (Degrees)" ;
wd10:_FillValue = 1.e+30f ;
wd10:missing_value = 1.e+30f ;
.
.

Kmz-File

Wind Detection System

SAR AIS Integrated Toolbox (SAINT)

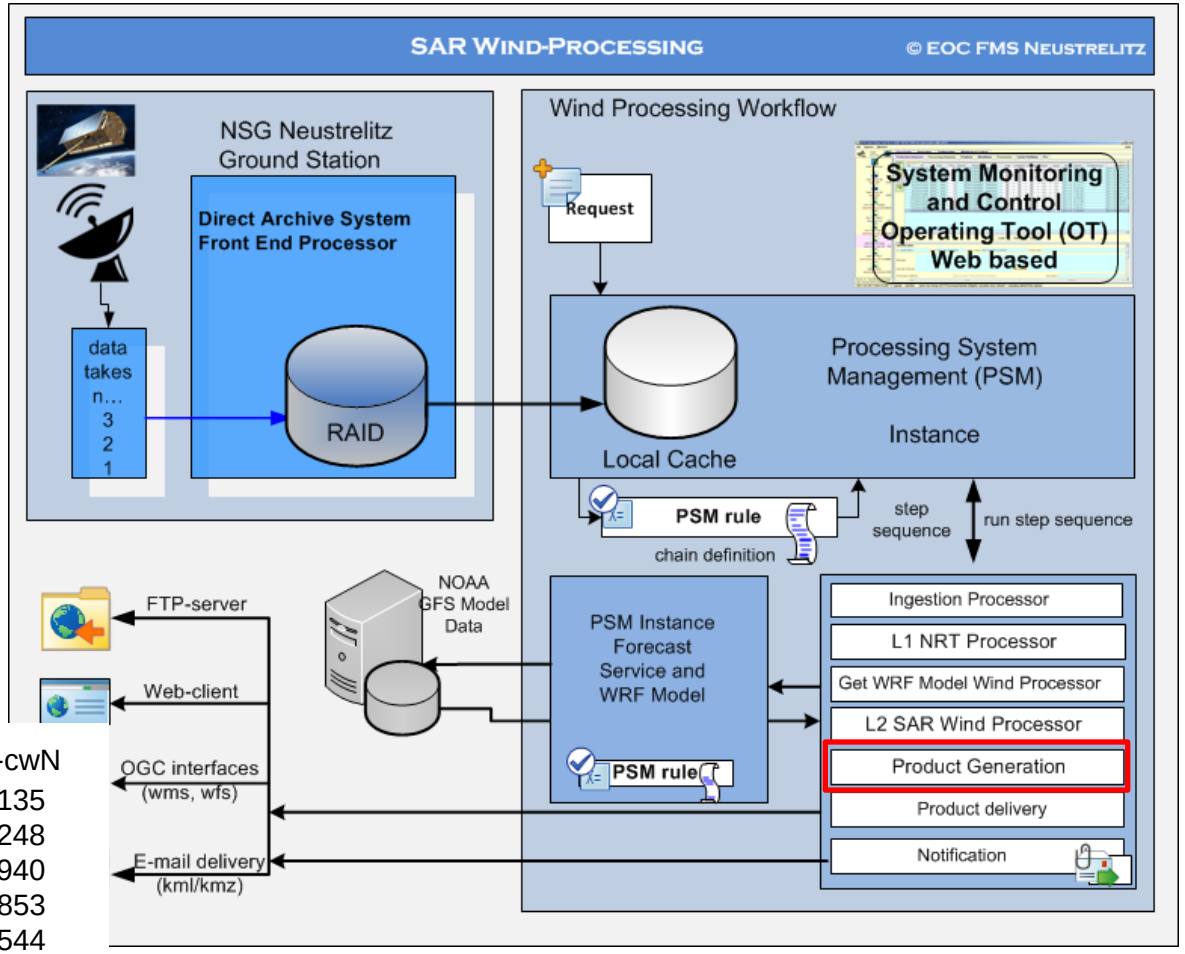
- Our main SAR detection processor
- Object detection (ship/iceberg)
- Wind and wave detection
- Very fast (a few second to process huge SAR image unless there are thousands of detections)
- Developed at Maritime Security Lab Bremen, part of DLR's Remote Sensing Technology Institute



Wind Detection System

Product Generation

- .txt
- .kmz
- .shape
- .nc
- .tiff



„original_SAINT_windfield.txt“

LAT	LON	U10	windDir-cwN
54.327797	8.013083	6.945118	306.907135
54.309814	8.019656	6.972426	306.841248
54.291836	8.026226	7.170168	306.775940
54.273853	8.032791	7.140850	306.711853
54.255871	8.039352	7.069013	306.648544
54.237888	8.045909	6.765116	306.586151

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Wind Detection System

Product Delivery Services

Powered by:

UKIS
http://dlr.de/

Leaflet
http://leafletjs.com/

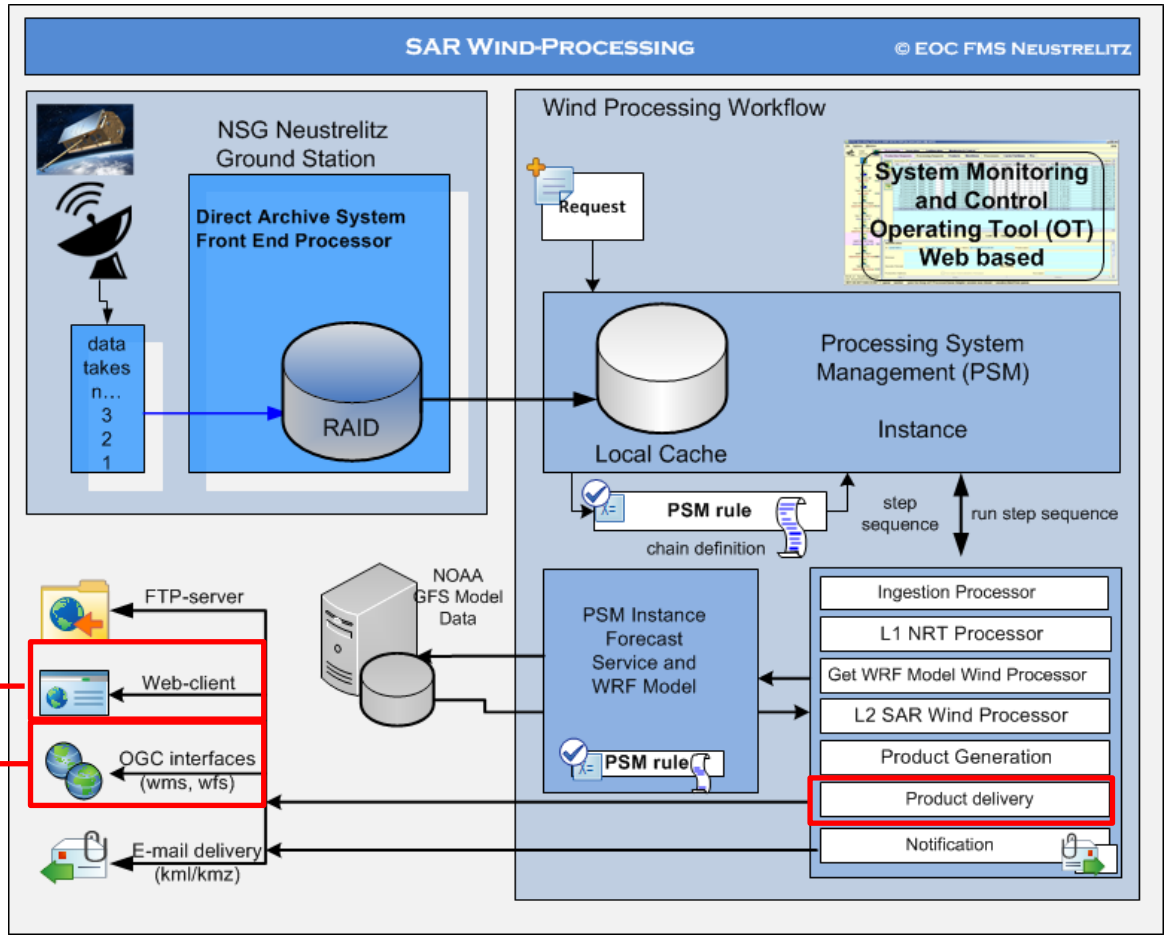
ANGULARJS by Google
http://angularjs.org/

node JS
https://nodejs.org

http://tomcat.apache.org/

GeoServer
http://geoserver.org/

PostgreSQL
https://www.postgresql.org/



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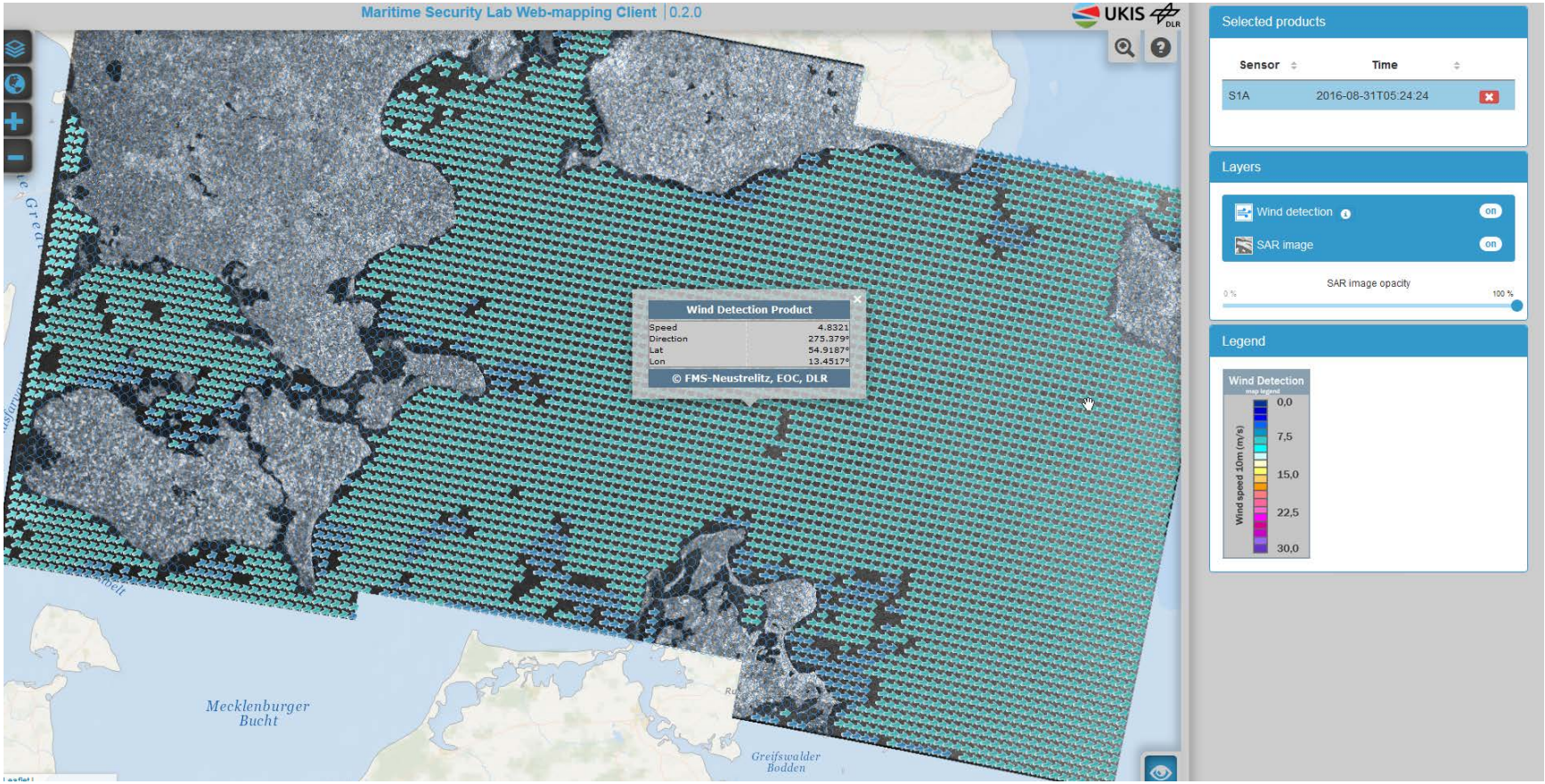
Wind Detection System

Product Delivery Services

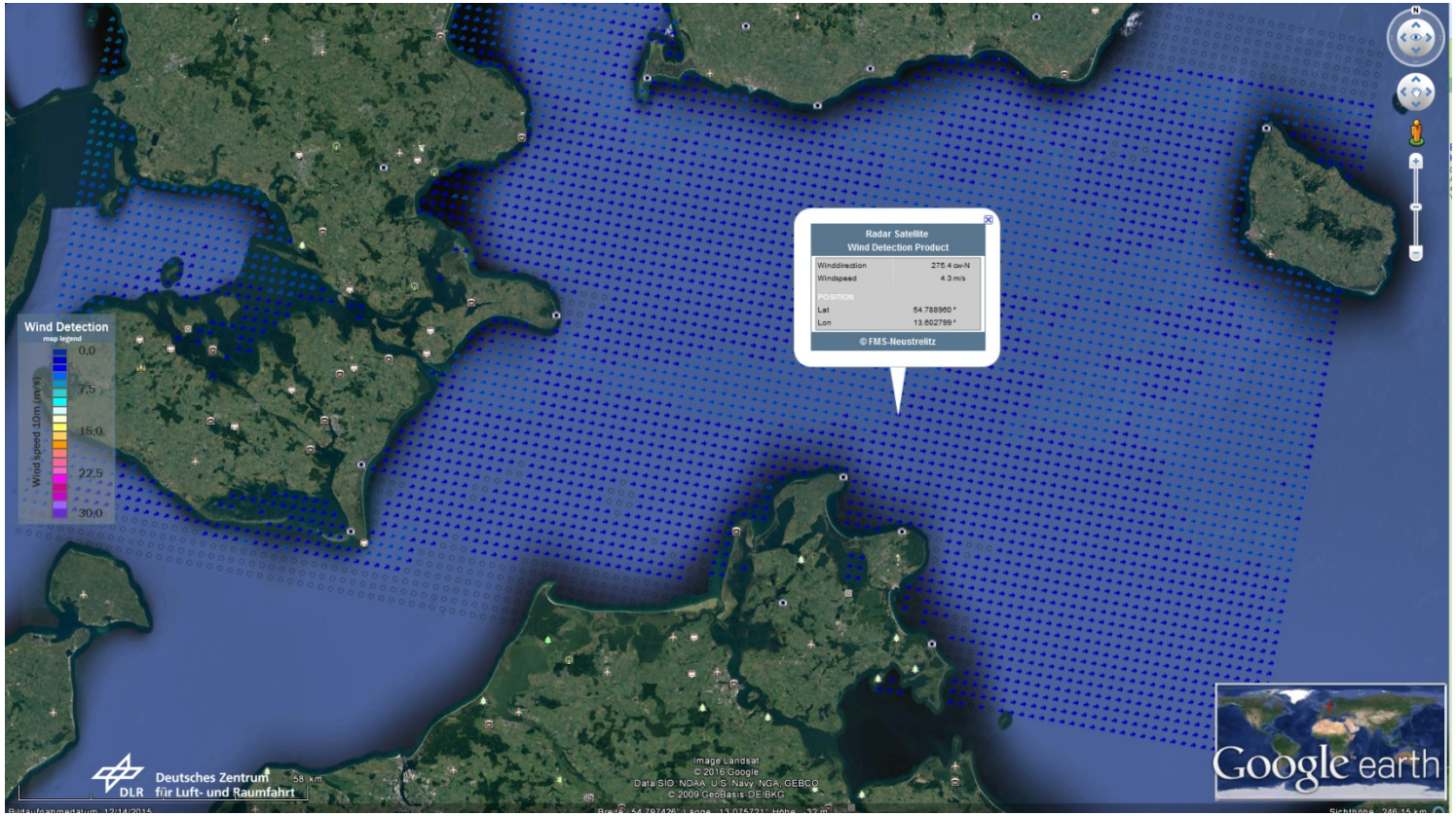


Sentinel 1A Sensor IWS, 2016/08/31T052424

View from web-mapping client

Wind Detection System

Product Delivery Services



Sentinel 1A Sensor IWS, 2016/08/31T052424

View from Google Earth

SAR Wind Detection

Summary

- **Operational satellites:**
  TerraSAR-X / TanDEM-X / (PAZ), Radarsat-2, Sentinel 1A / (1B)

- **Results in Near Real Time after image acquisition**
- **Fully automated**
- **Continuously improving algorithms and hardware environment**

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Thank you very much for your attention!

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