

# Routine operation of the DLR volcanic ash algorithm VADUGS within the German Weather Service facilities: Outcome of the LuFo project TeFiS



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We present the current state of the algorithm VADUGS (Volcanic Ash Detection Utilizing Geostationary Satellites) and its implementation within the satellite processing facilities at German Weather Service. The algorithm is designed to reveal information on the column mass concentration ( $g/m^2$ ) and top altitude of volcanic ash layers. Furthermore it allows to extrapolate the movement of volcanic ash objects into the future.

## The LuFo project TeFiS

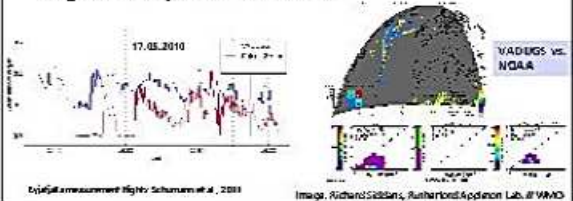
LuFo TeFiS was a national project (January 2014 to March 2017) funded by the German Federal Ministry for Economic Affairs and Energy. It addressed several aviation issues and was led by the DFS Deutsche Flugsicherung GmbH. The project part for aeronautical meteorology was led by the German Weather Service DWD.

Two meteorological issues were treated:

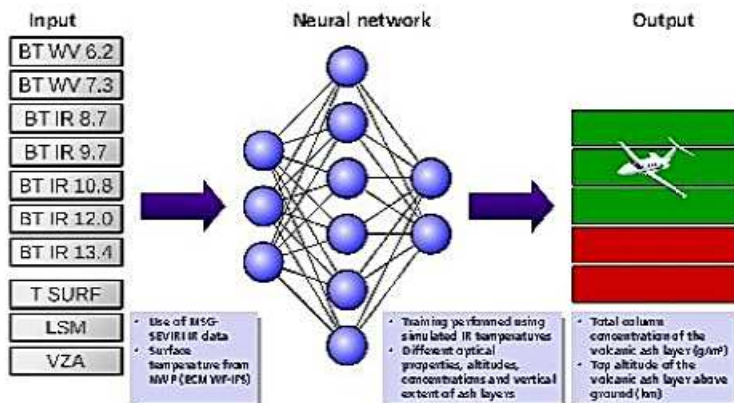
- Low visibility detection at Munich airport by cloud radar observations
- Meteorological products for strategical and tactical flight planning. Met products for volcanic ash and turbulence advisory were validated as well in the flight preparation and in the cockpit on the Electronic Flight Bag (EFB).

## The algorithm VADUGS

- Triggered by the volcanic eruptions in 2010, VADUGS was developed within the DLR project VolcATS, and optimized and adapted in close collaboration of DLR and DWD within TeFiS
- VADUGS was compared to DLR Falcon data of the Eyjafjalla 2010 eruptions and participated in the intercomparison of volcanic ash algorithms organized by WMO in 2015



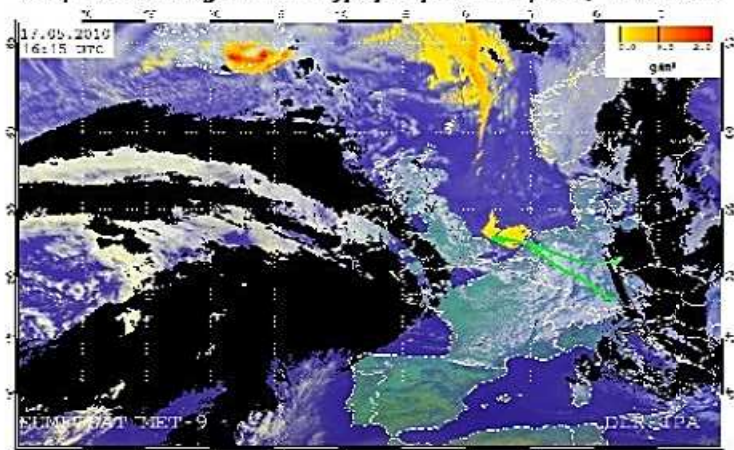
## Design of the volcanic ash algorithm VADUGS



## Implementation

- Starting from a "research algorithm", the code was optimized and adapted according to the needs of the German Weather Service
- User needs of different stakeholders like airline dispatchers, air traffic controller, aviation meteorology staff were taken into account, to meet the user needs
- The code was implemented in the DWD satellite facilities
- The processing queue is implemented as an ecfLOW/SMS job
- The output is converted to GRIB2, allowing for further processing and the conversion to polygons (small file size)

## Output of the algorithm – Eyjafjallajökull eruption, 17.05.2010



## Outlook

Future plans include

- to migrate the processing and visualization of the data from IDL to python/pytroll
- to extend the algorithm to data from the AHI instrument aboard the Japanese Himawari 8/9 satellites, the ABI aboard the GOES-R satellite, and upcoming data from the FCI aboard the Meteosat Third Generation (MTG) satellites
- to participate in the upcoming second WMO intercomparison of satellite algorithms on volcanic ash, currently planned for 2018.

