

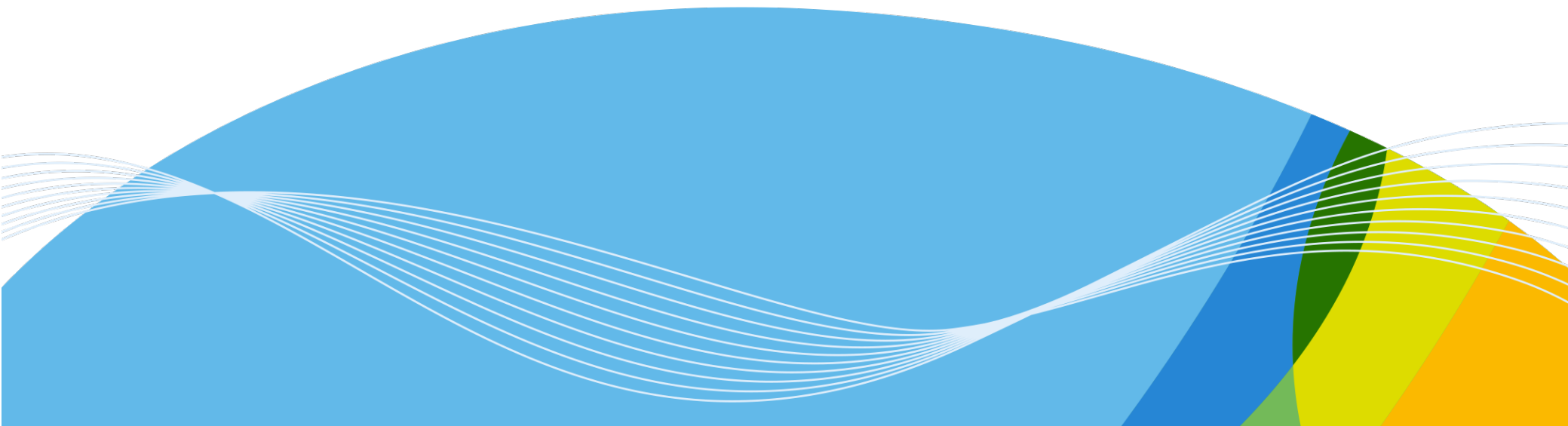
Sodankylä satellite data centre and almost real-time monitoring of atmospheric composition in Northern Europe

ATMOS 2015
8-12 June, 2015, Heraklion, Greece

J. Tamminen, S. Hassinen, S. Tukiainen,
J. Hakkarainen, I. Ialongo, R. Kivi,
T. Ryyppö, J. Heilimo, A. Lindfors, FMI

P. Levelt, P. Veefkind, KNMI

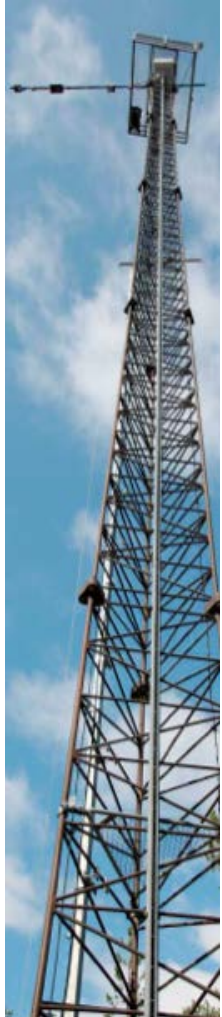
P.K. Bhartia, J. Joiner,
N. Krotkov, K. Brentzel NASA



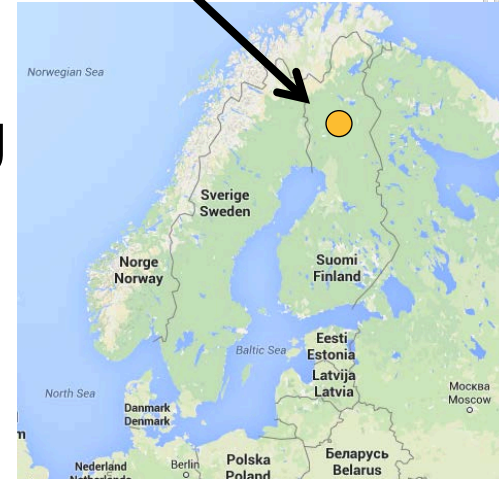


Sodankylä - FMI's high latitude site

- Arctic research site
- In situ and remote sensing observations
- Satellite validation



Sodankylä,
Finland





Sodankylä Satellite Data Centre



2.4 m X-band



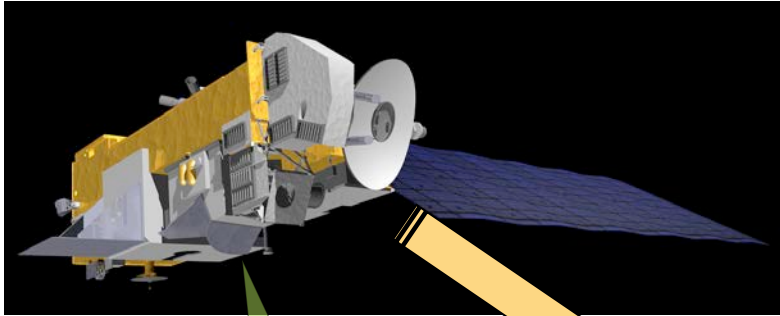
7.3 m X-band



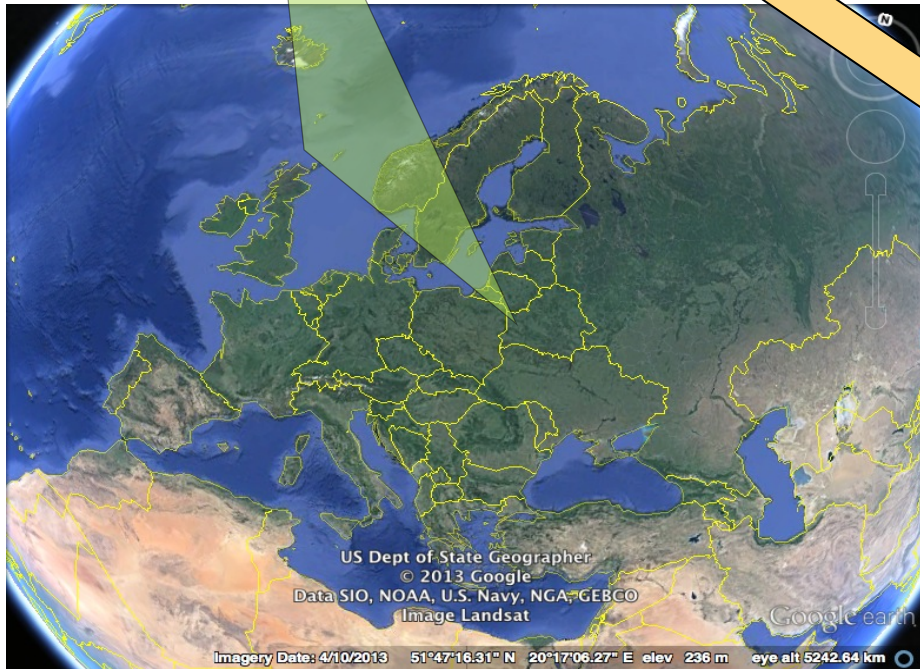
10 Gbit /s network

National satellite data center providing satellite data reception, data processing services and data products to national and international users.

Direct Broadcast data reception in Sodankylä



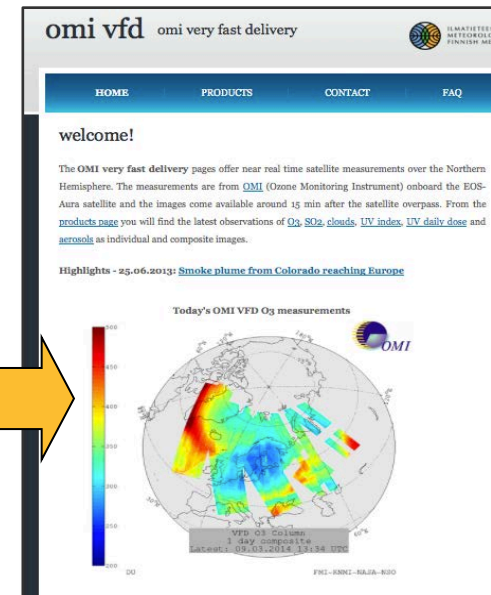
- Aura / OMI data since 2006
- Suomi NPP / OMPS implemented in 2014.
- Products available within 15-20 min after the satellite overpass.



Observations



Direct Broadcast receiver

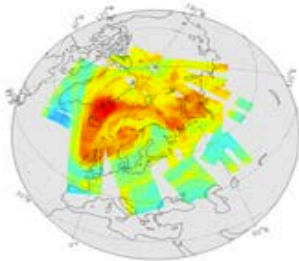


Distribution in the web

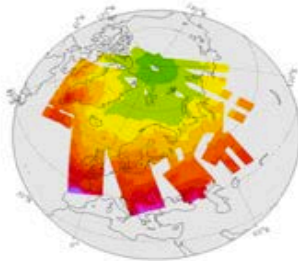


OMI and OMPS 'real time' products

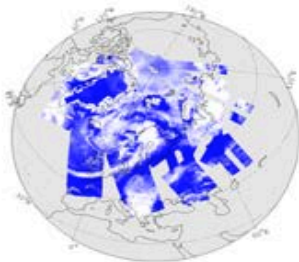
o3



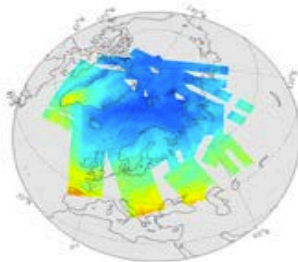
uv index



cloud fraction



uv daily dose



so2



uv aerosol index



• Products:

- Ozone
 - UV-radiation
 - Cloud Fraction
 - SO₂
 - Aerosol Index
-
- Coverage: Most of Europe
 - Extension to use data reception in Alaska planned



FINNISH METEOROLOGICAL INSTITUTE

SAMPO service

Satellite Measurements from Polar Orbit

- Instantly delivered Direct Readout Products

- Previously known as OMI VFD Service which was developed in collaboration with KNMI, NASA, NSO and FMI.
- Web site targeted for general public: Individual orbits and daily composite images.
- Data users include:
 - **NASA, KNMI, FMI**
 - **Volcanic Monitoring: SACS, SAVAA, Finnair**
 - **UV: FMI, Icelandic Radiation Authorities**
 - **CAL/VAL activities at Sodankylä**
- Service developed with national funding (Tekes, FMI)

SAMPO Satellite Measurements from Polar Orbit
- Instantly delivered Direct Readout products

ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE

HOME PRODUCTS CONTACT FAQ

These pages provide direct readout satellite data of the Northern Hemisphere atmosphere. The measurements are from the OMI and OMPS instruments, published about 15 min after overpasses of the EOS-Aura and Suomi-NPP satellites. The products include [O3](#), [SO2](#), [clouds](#), [UV index](#), [UV daily dose](#) and [aerosols](#). For older images, you can use [image search](#).

Today's OMI O3
Today's OMPS O3

Image search
Volcanic products
Ozone products
Highlights

FMI
NASA
NOAA
KNMI
Netherlands Space

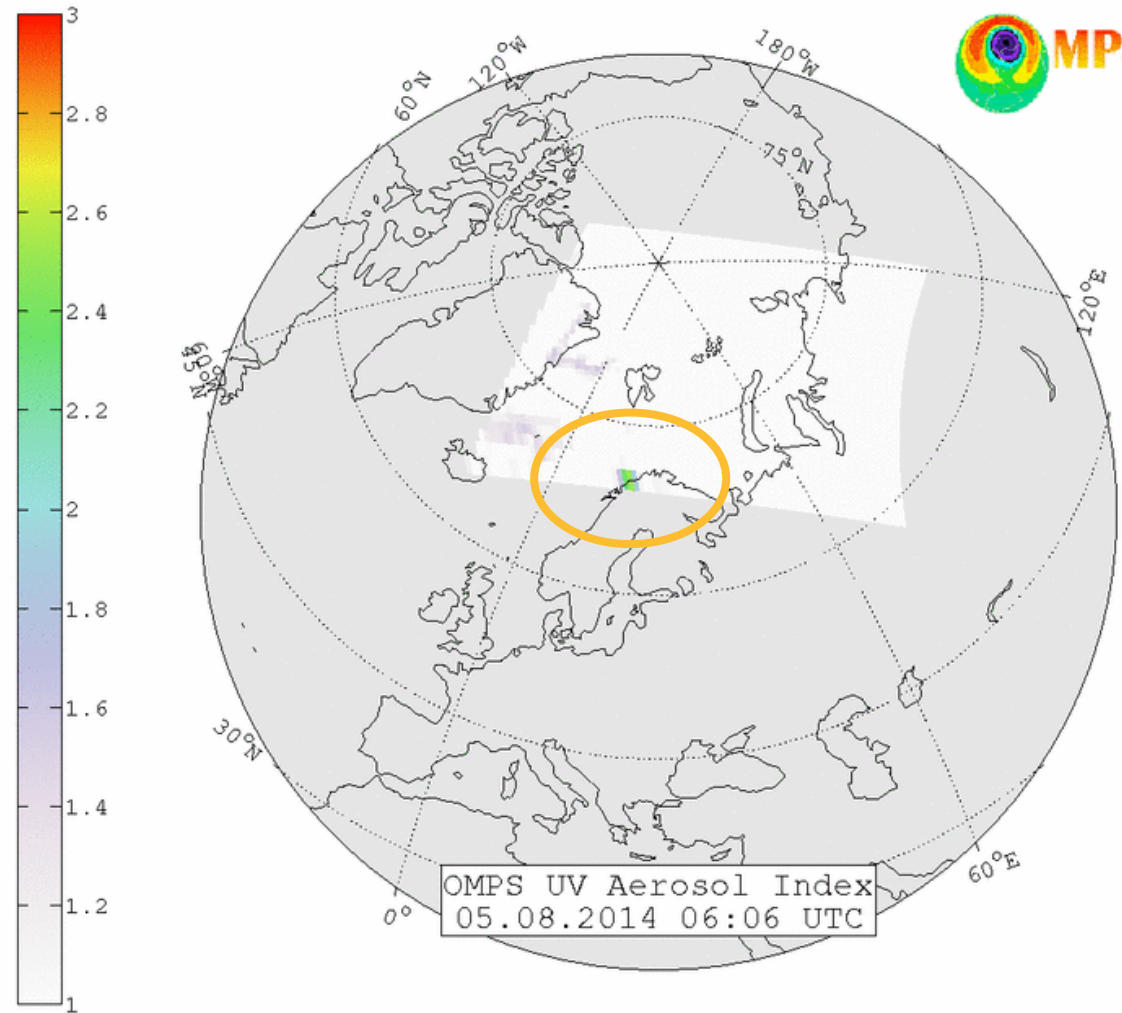
sampo.fmi.fi

Please, contact us if you are interested



Forest fires in Sweden August 2014

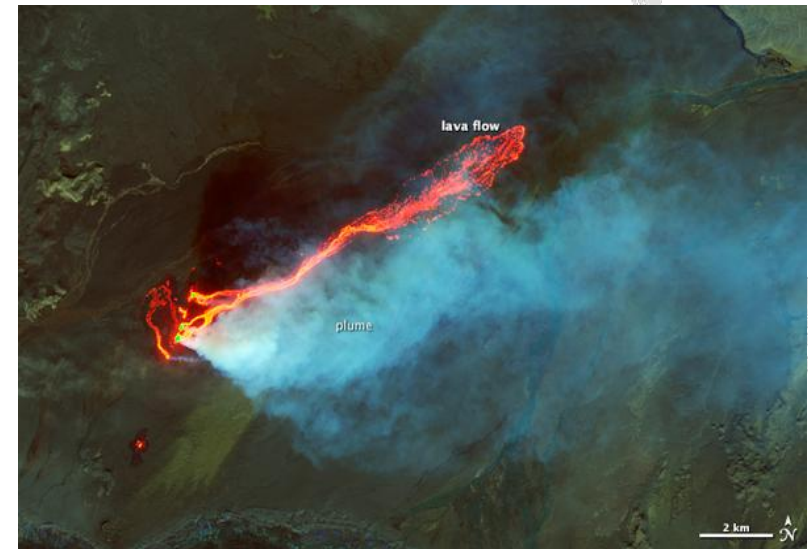
- Smoke originating from forest fires in Sweden were followed by OMPS on four successive orbits August 5th, 2014.
- Temporal sampling about 100 min.
- Good temporal sampling can be obtained during summer months at high latitudes.



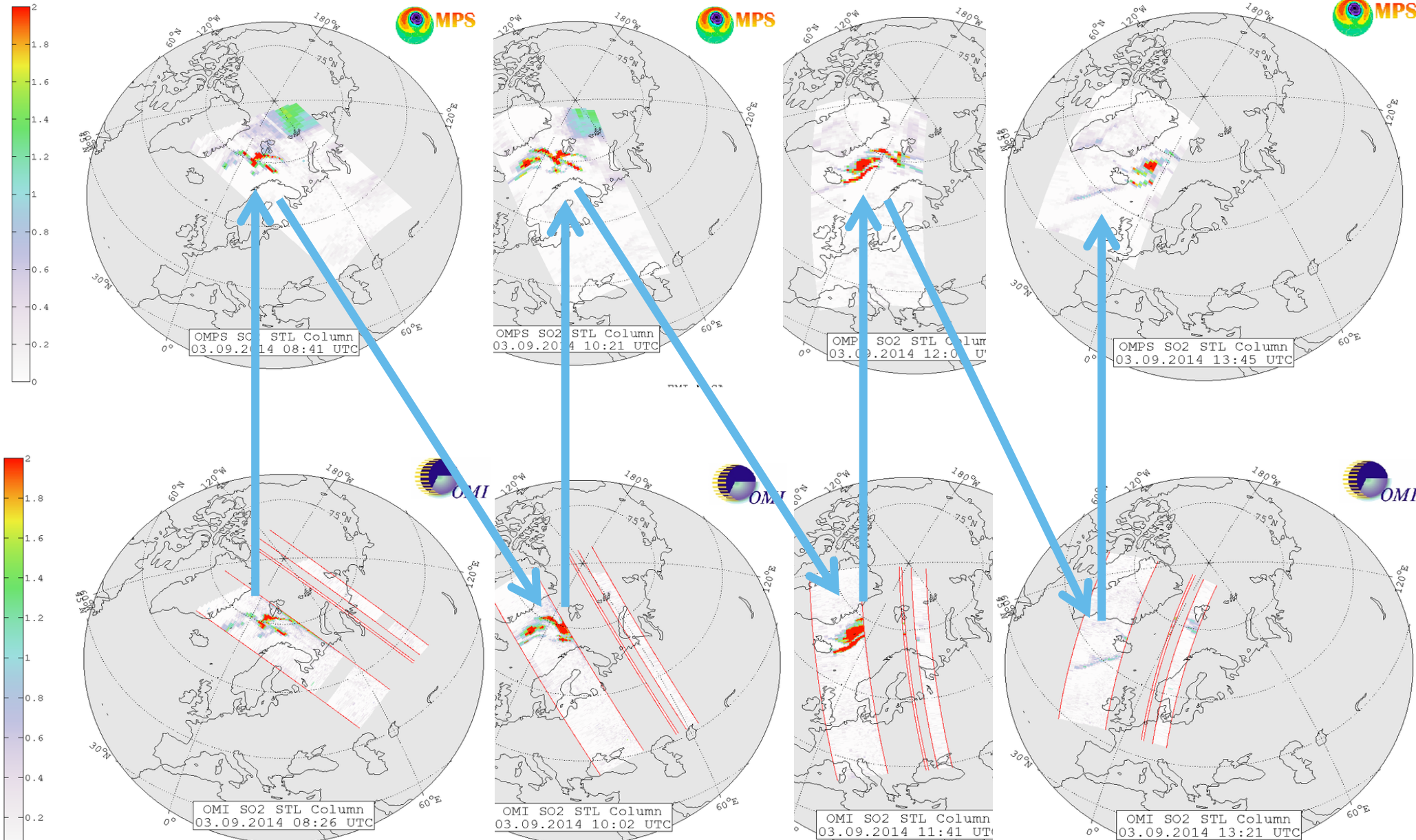


Bárðarbunga/Holuhraun fissure eruption

- 31 August 2014 volcanic eruption started in the Holuhraun fissure, located northeast from Bárðarbunga volcano
- It was a continuous effusive fissure eruption, without explosive activity
- Both OMI and OMPS Direct Readout products available



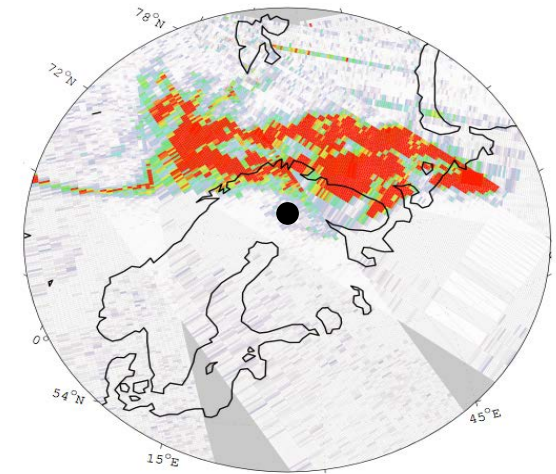
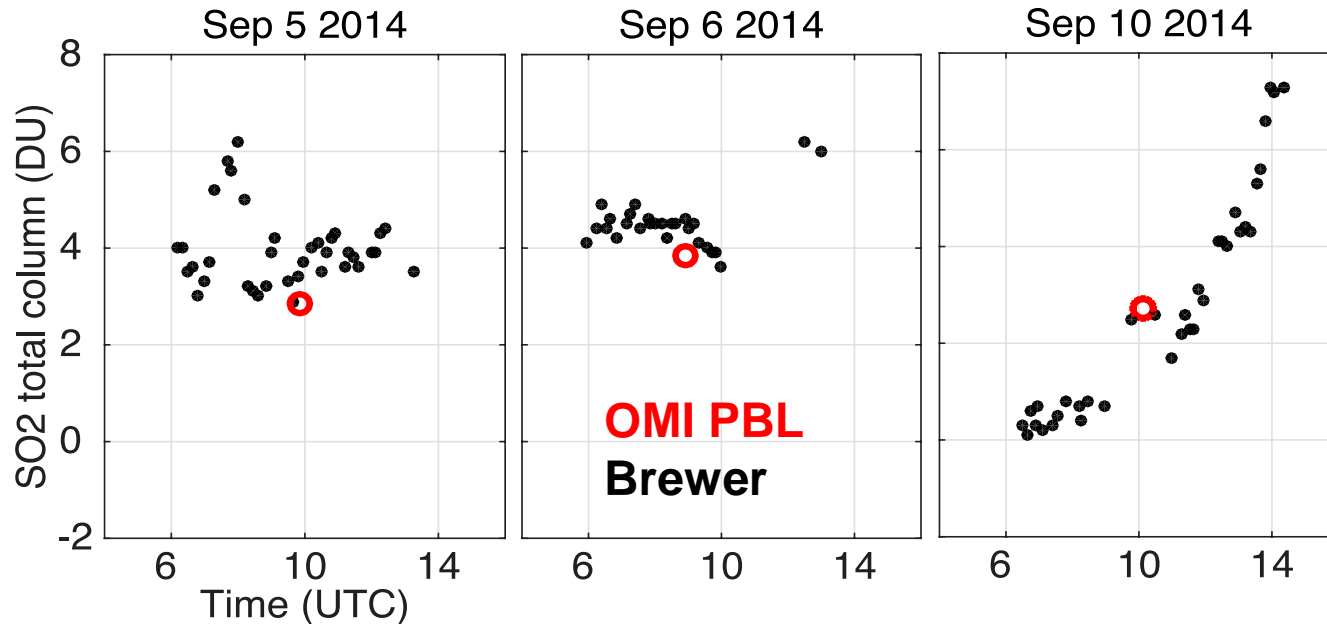
Direct Readout OMI/OMPS SO₂ on Sep. 3





OMI SO₂ vs Sodankylä Brewer

- On September 5th, 2014 SO₂ plume arrived in Northern Finland
- Elevated values were also measured with Sodankylä Brewer: opportunity for validating satellite SO₂ at high latitudes
- OMI PBL SO₂ product assuming plume height at 0.9 km was found to agree best with Brewer observations.

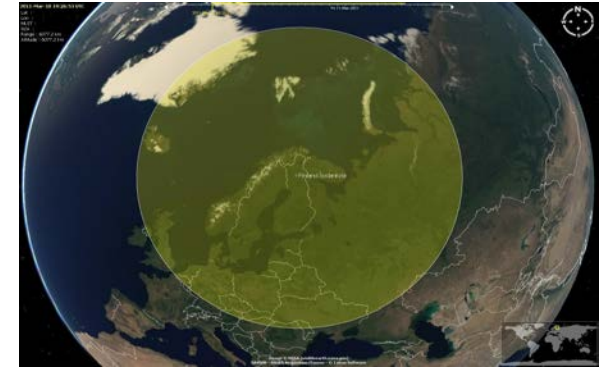


For more detailed comparison: *Ialongo, I. et. al.: Validation of satellite SO₂ observations in northern Finland during the Icelandic Holuhraun fissure eruption, AMT, 2015.*

Sodankylä Satellite Data Centre

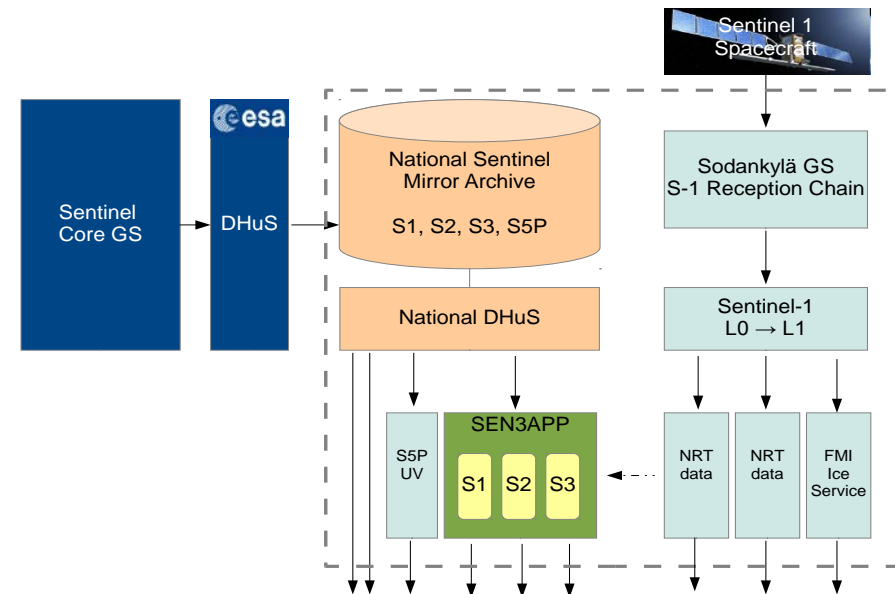
Current operational data reception/processing (Free access)

- Aura (OMI), Suomi NPP (VIIRS, OMPS), Terra (MODIS), FY-3A (MERSI)



Finnish Sentinel Collaborative Ground Segment Initiative, Agreement signed in Jan 2015 with ESA

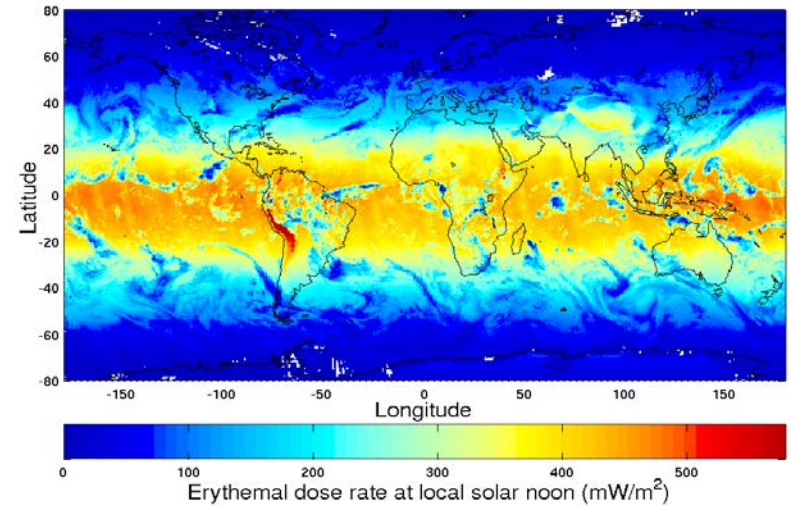
1. Collaborative Acquisition Site
 - S1: Baltic Sea Ice monitoring
2. Collaborative Archiving Centre (S1, S2, S3, S5P)
 - Data download from CollHub already ongoing
 - Rolling archive and long-term data archive
- Preliminary plans exist to expand the station with a new antenna





Surface UV-radiation for S5-P

- Motivation:
 - Human health
 - Ecosystems, vegetation (plant response, DNA damage)
 - Air quality and Climate (photochemistry and oxidization)
 - Supporting protocol monitoring
 - Interest of general public
 - FMI has heritage from OMI and GOME-2
- Surface UV-processing developed as in-kind contribution of FMI to S5-P
- Implementation done in the Collaborative Ground Segment framework
- **Status:**
 - Preliminary version is running based on OMI and GOME-2 heritage algorithms
 - Testing and further development on-going
 - Aim: both NRT and off line products (UV-index, Erythemal doses, spectral information)



Surface UV product PI:
Anders Lindfors, FMI



Summary

- SAMPO service (previously OMI VFD) demonstrates how user needs on fast products can be fulfilled using direct broadcast/readout data.
- In particular, volcanic products of OMI and OMPS are found useful when forecasting the transport of volcanic plumes.
- The experience of Sodankylä OMI and OMPS data reception and processing can be used for developing fast services for coming Sentinel missions.
- Global S5P Surface-UV products will be developed as part of Finnish Collaborative Ground segment.

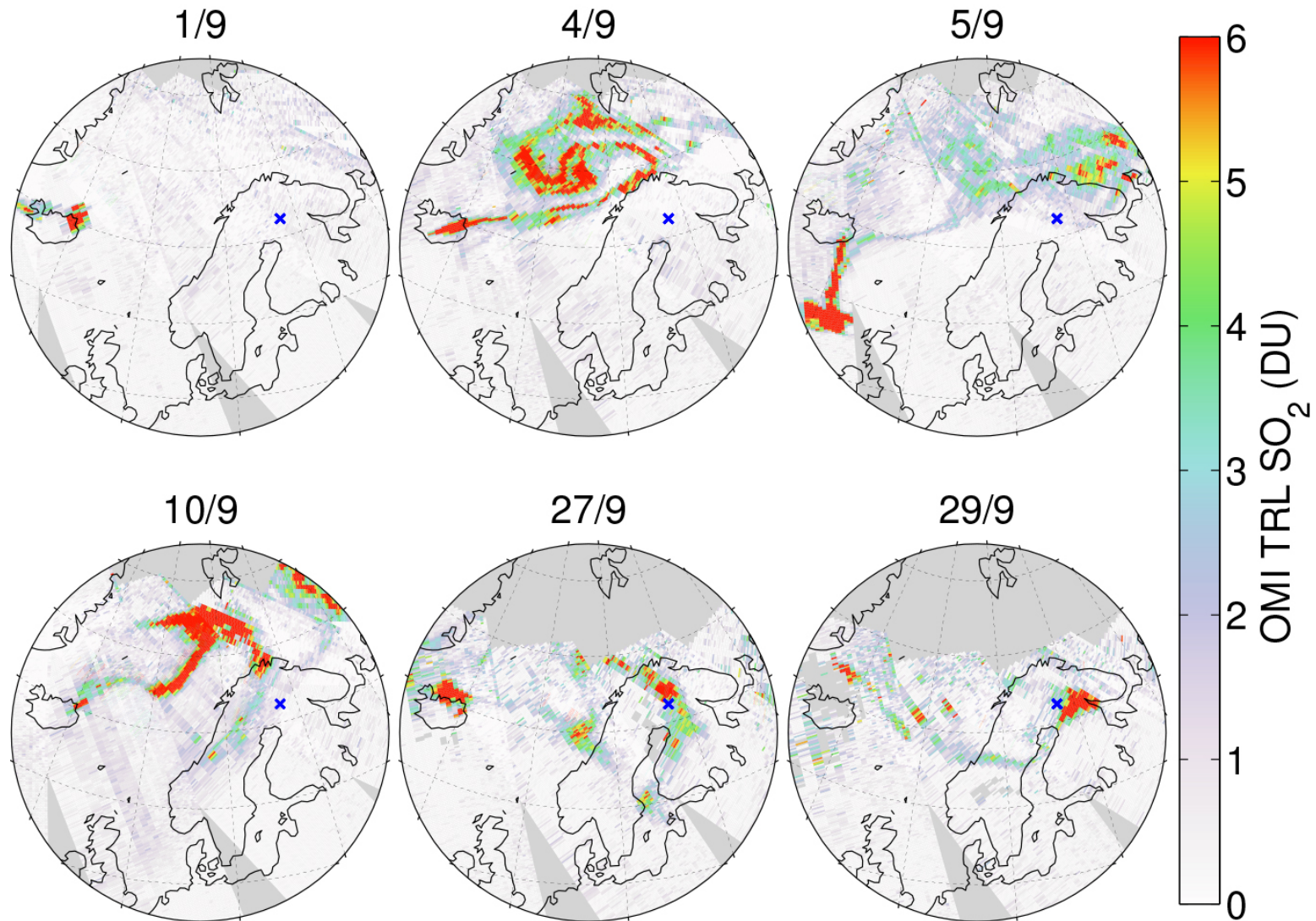


Photo: Matias



Timeline of Holuhraun eruption

OMI

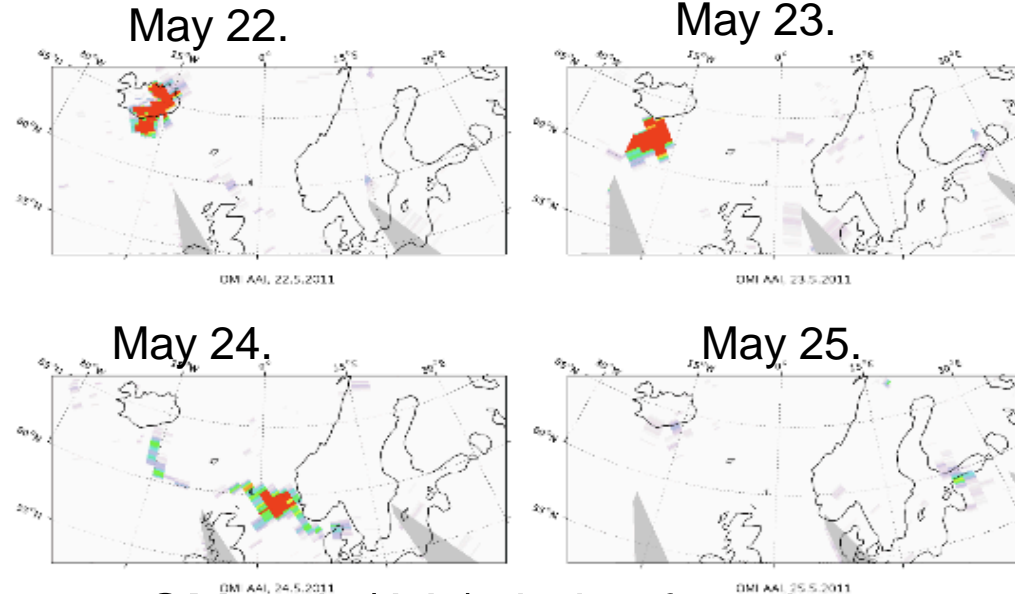




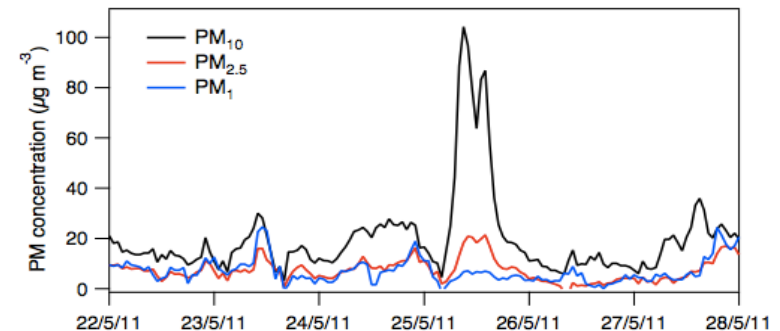
Grimsvötn volcanic eruption May 21st 2011



- **Fast availability of data important for forecasts to support aviation**
- OMI VFD used to follow the transport of the ash and to constrain the dispersion forecasts.
- The eruption was strongest on 22 May and on 25th it arrived to Southern Finland
 - Increased PM10 values clear on May 25th
 - Concentration of smaller particles not increased



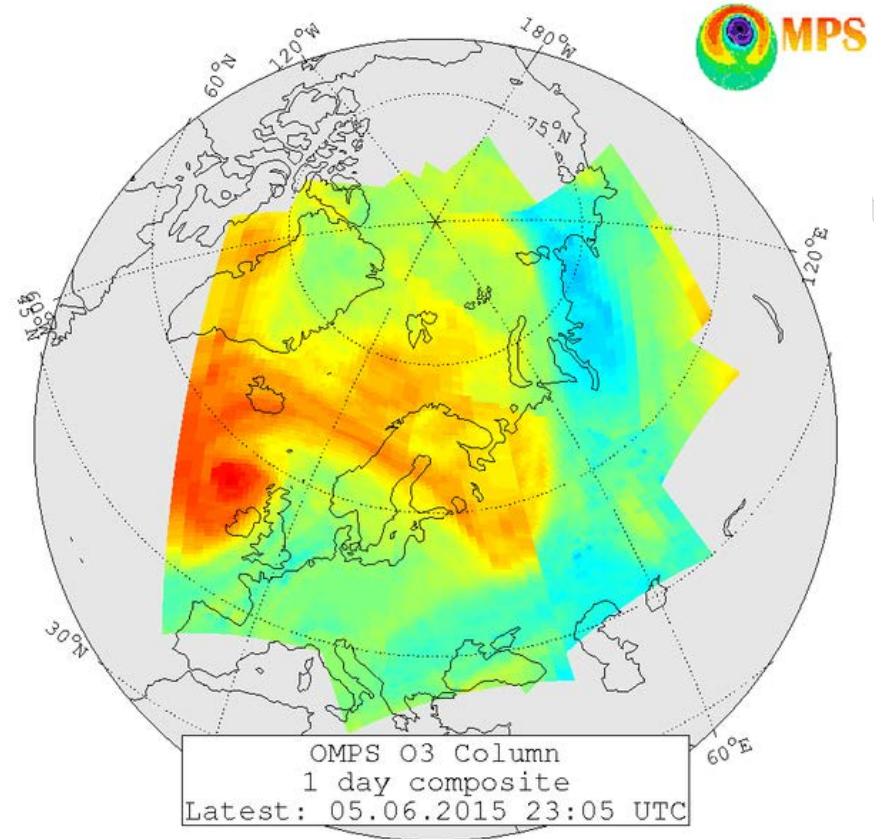
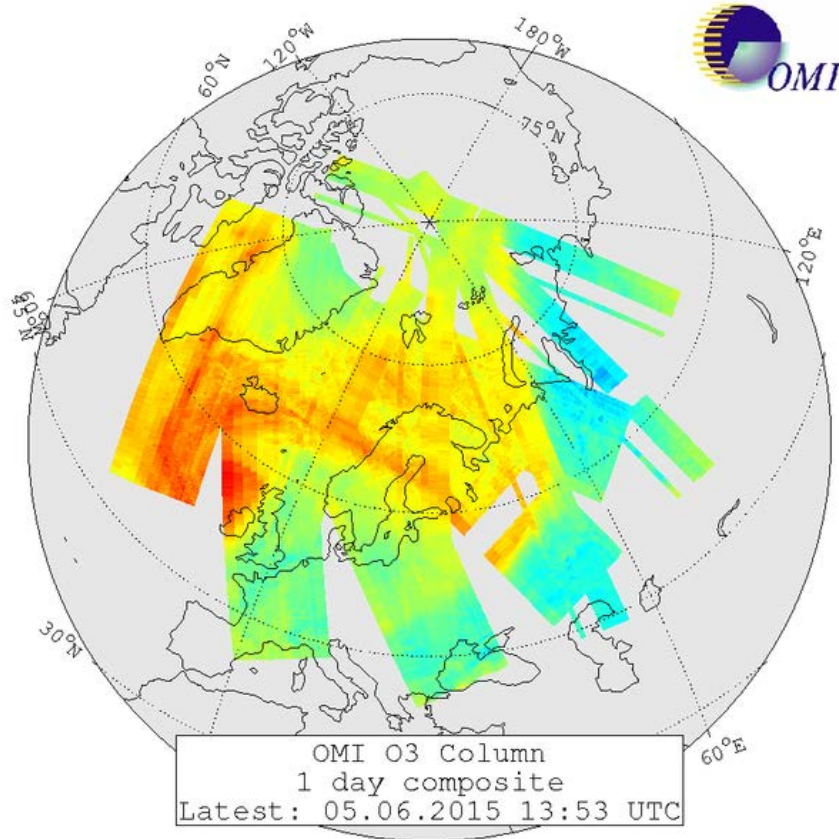
OMI ash (AAI) during four days



Particulate matter in Helsinki May 22-28, 2011



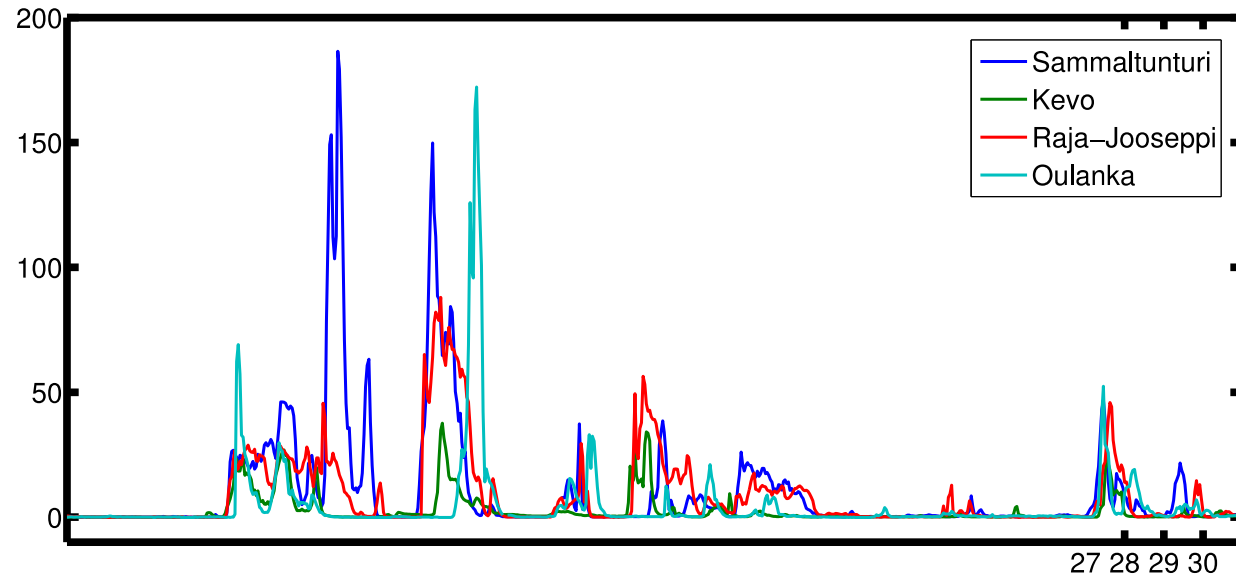
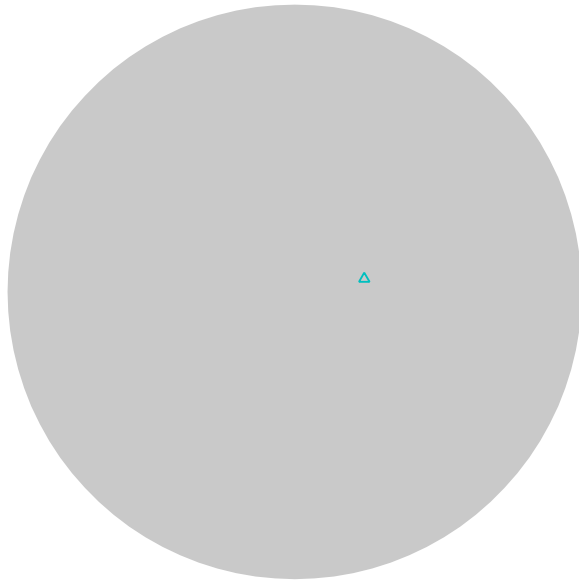
Coverage of Direct Readout data received at Sodankylä

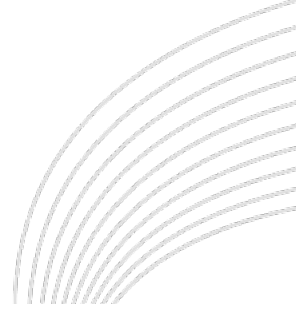




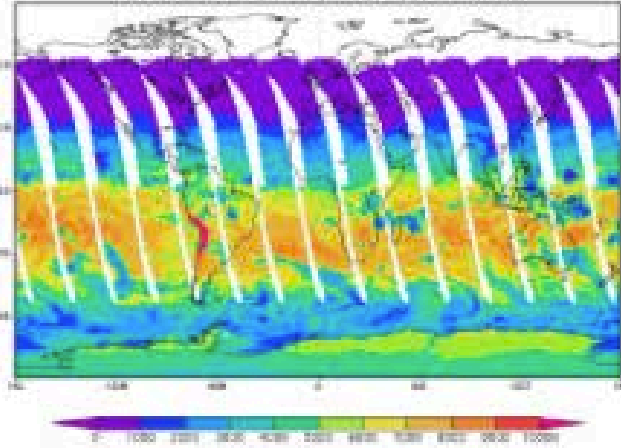
SO₂ surface concentration in northern Finland

Sep 10, 2014

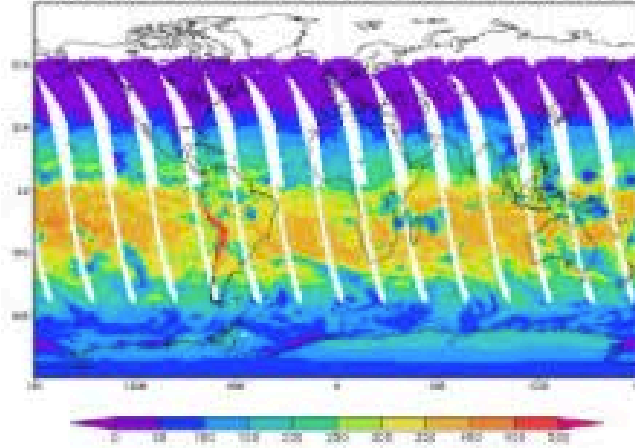




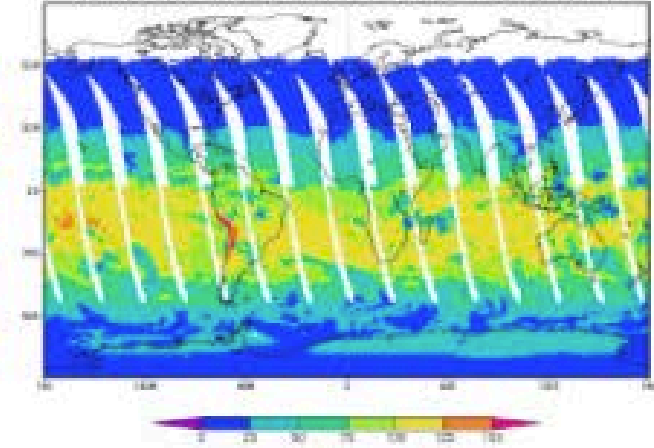
11 Jan 2015
OMUVBd erythemally weighted daily dose (J/m^2)



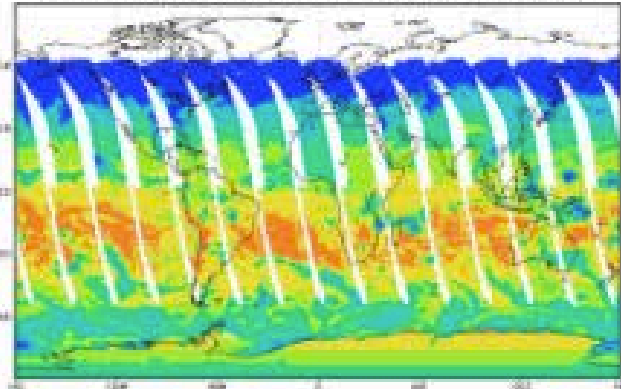
11 Jan 2015
OMUVBd erythemally weighted dose rate of local solar noon (mW/m^2)



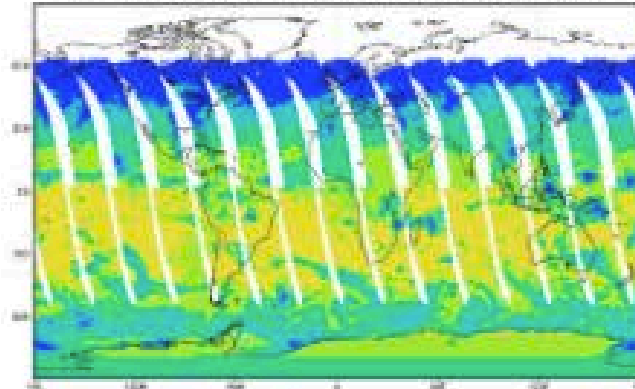
11 Jan 2015
OMUVBd Local solar noon irradiance at 305 nm ($mW/m^2/nm$)



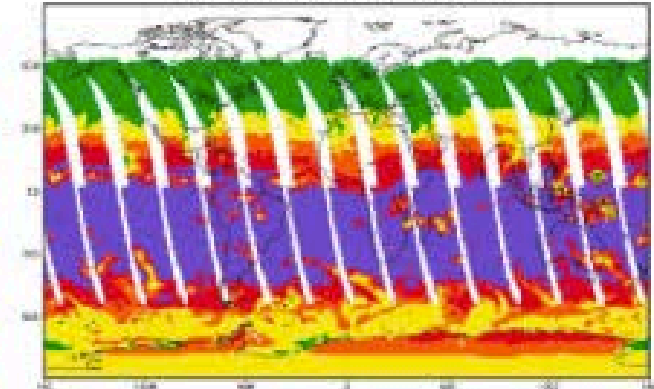
11 Jan 2015
OMUVBd Local solar noon irradiance at 324 nm ($mW/m^2/nm$)



11 Jan 2015
OMUVBd Local solar noon irradiance at 380 nm ($mW/m^2/nm$)



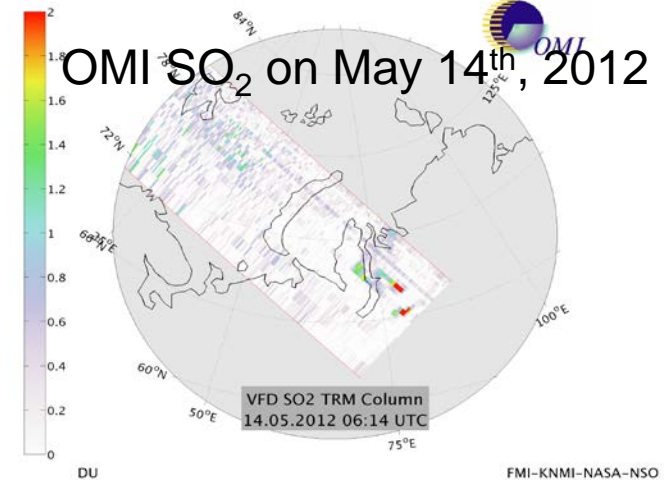
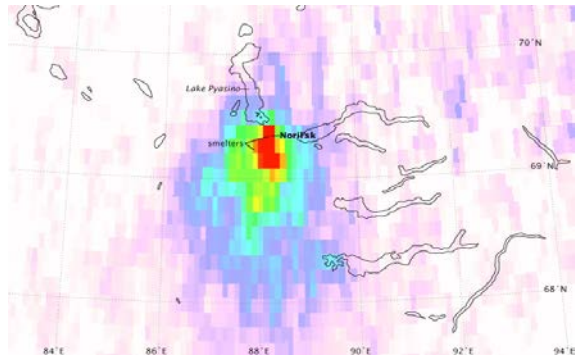
11 Jan 2015
OMUVBd UV index at local solar noon





Sulfur dioxide from metal smelters in Siberia

Averaged SO₂: Jun-Aug, 2005-07



June 2013 – Smoke plume from Colorado

The smoke plume originating from the wildfires in Colorado reached Europe in 25th June 2013

