Real Time Volcanic Cloud products for Aviation Alerts

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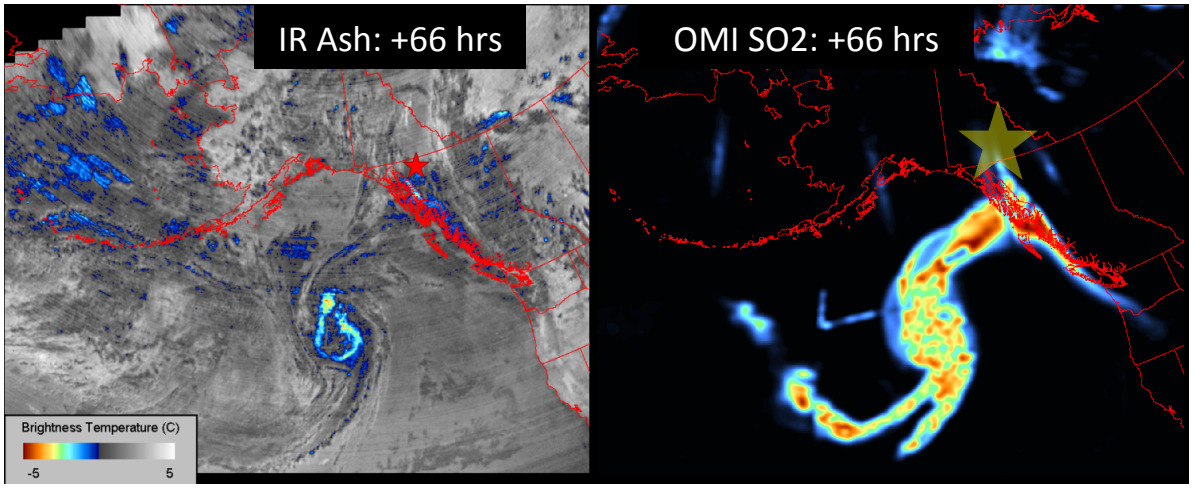
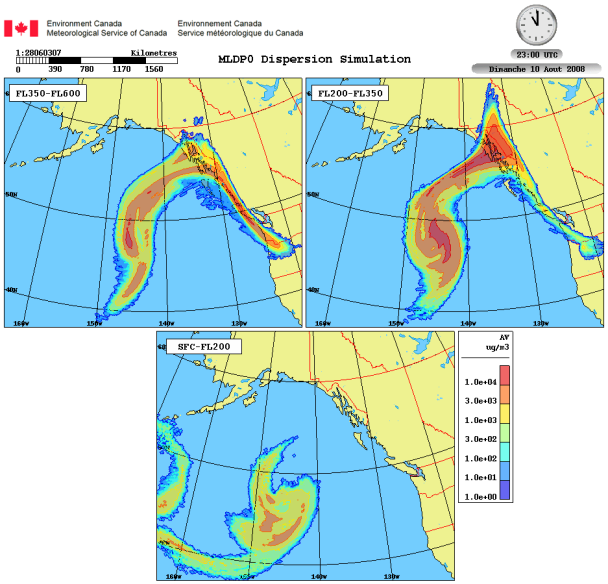
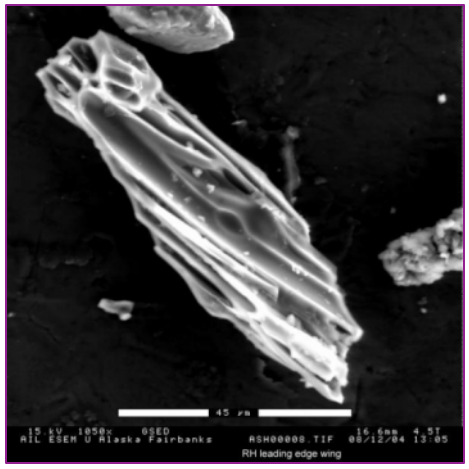
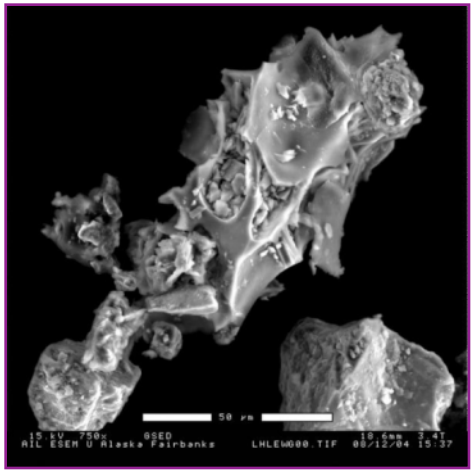
Why SO_2? Some ash is likely transported with volcanic SO_2 at levels that cannot be easily detected by infrared techniques (e.g., Kasatochi 2008 eruption)





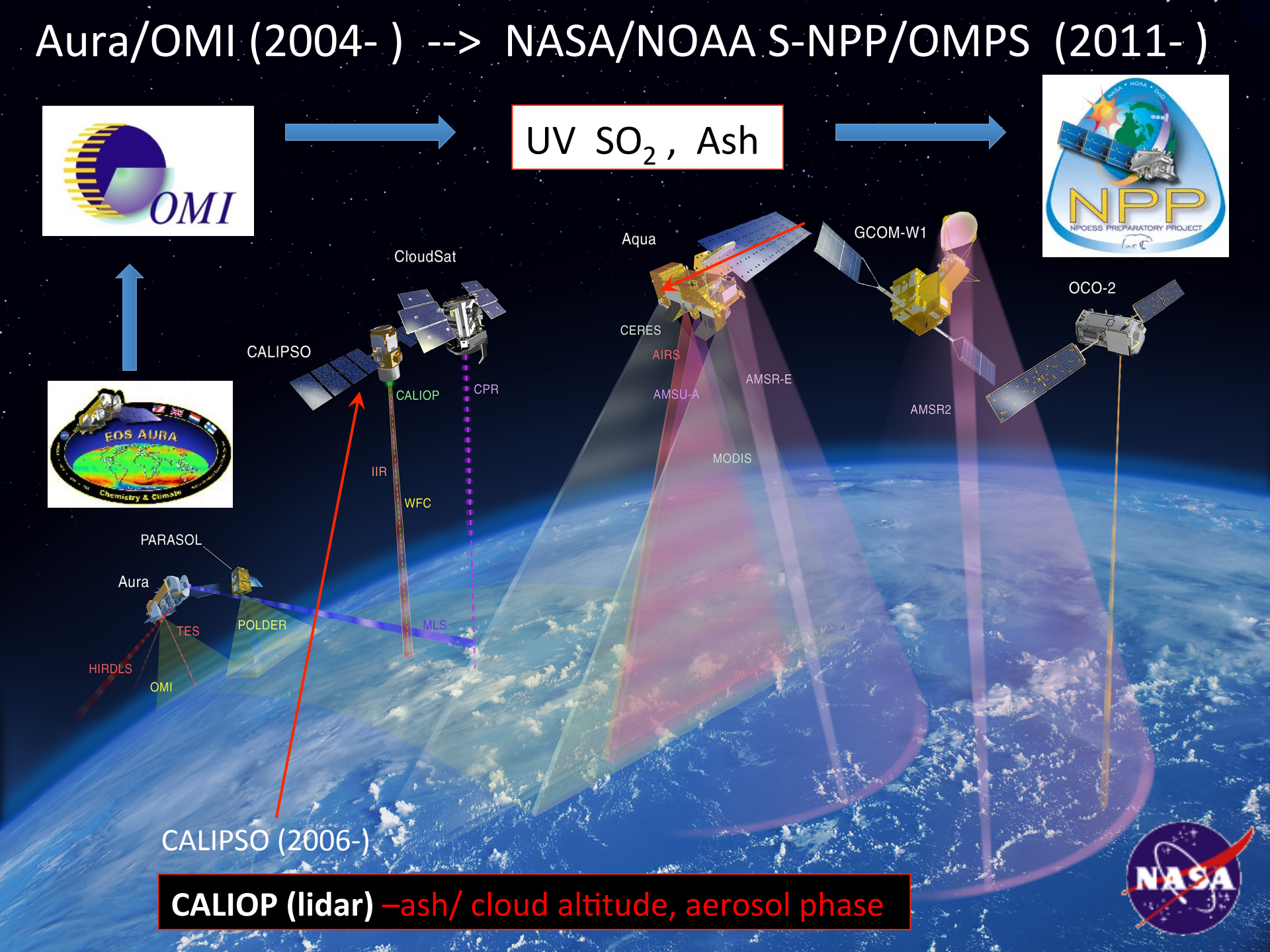




Ash collected from the leading edge of the wing of a commercial aircraft that had a non-damaging encounter with the Kasatochi volcanic cloud.

Courtesy Dave Dave Schneider , USGS

Aura/OMI (2004-) --> NASA/NOAA S-NPP/OMPS (2011-)



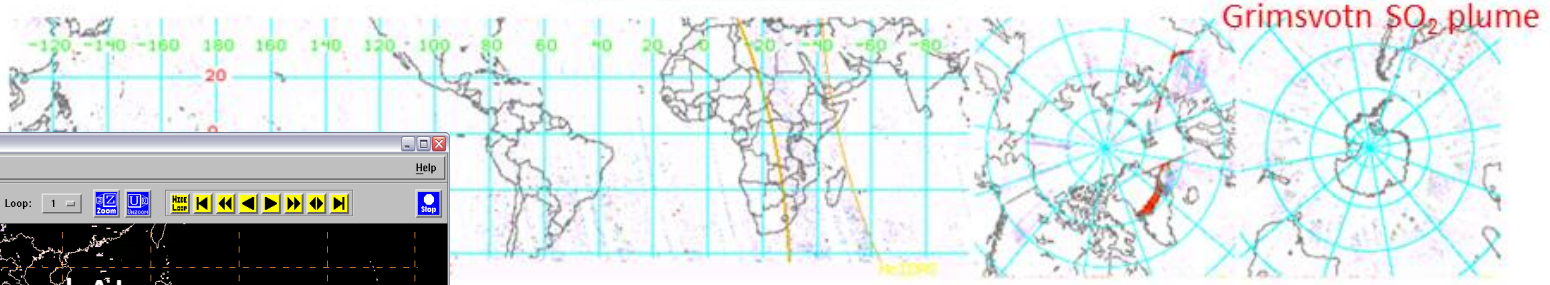
Near Real-time Volcanic Cloud Products for Aviation Alerts: NOAA operational NRT volcanic SO_2 site based on OMI SO_2 and AI data

NASA currently provides operational NRT volcanic SO_2 and AI data stream to NOAA

http://satepsanone.nesdis.noaa.gov/pub/OMI/OMISO2/index.html

Latest OMI SO2 Column 5Km - 24-Hour Composite Images

Important Information for OMI Data Users



2 Composites	Tropics	Northern Hemisphere	Southern Hemisphere
ous Digital Images , McIDAS, GIF	Tropics	Northern Hemisphere	Southern Hemisphere

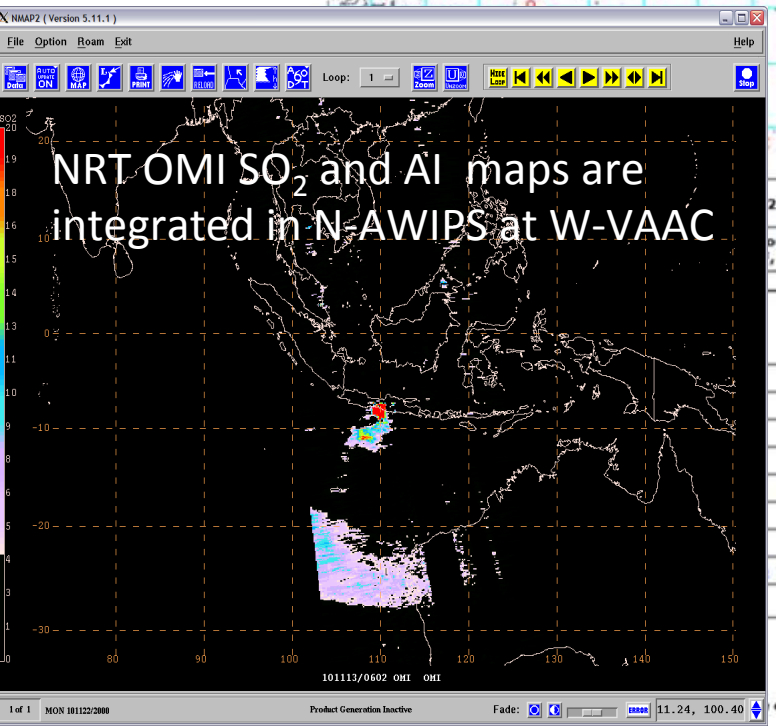
Latest OMI_SO2 Column 5Km by Volcano

Aleutian Islands, Alaska, USA	Anatahan, Mariana Islands	Cascade
Comoro Islands	Eastern China	Ecuador
Galapagos Islands, Ecuador	Hawaii, USA	Iceland
Java, Indonesia	Kamchatka, Russia	Mexico
New Zealand	North Western Europe	Northern Atlantic
Nyiragongo, DR Congo	Peru	Philippines
Red Sea	Reunion Island	Southern Chile
Sumatra, Indonesia	Tanzania	Vanuatu, South Pacific

DISCLAIM: This page is experimental and for testing purpose only

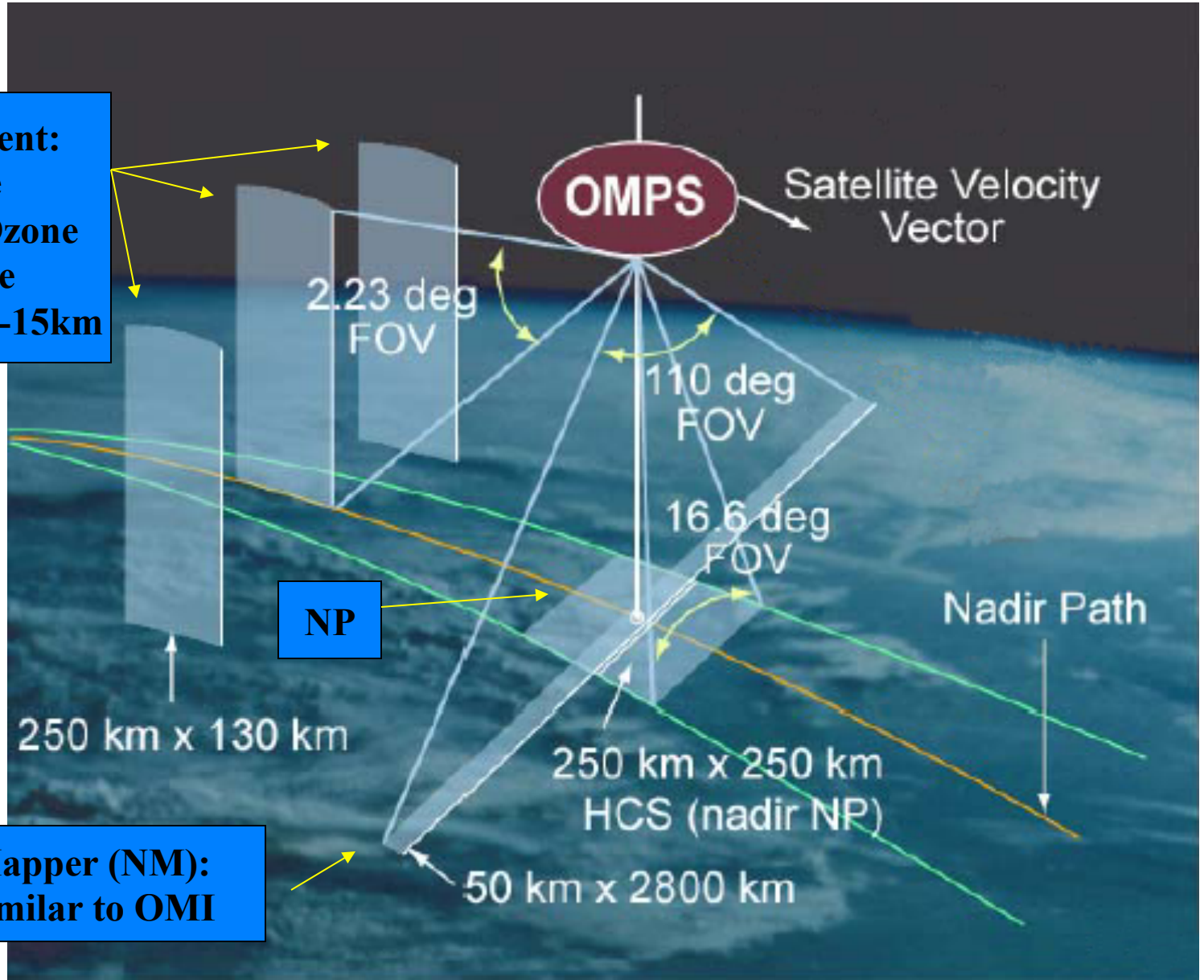
For AIRS SO2 products check the AIRS SO2 Alert Site

quality products check with NASA GES DISC and with the UMBC OMI Sulfur Dioxide Group



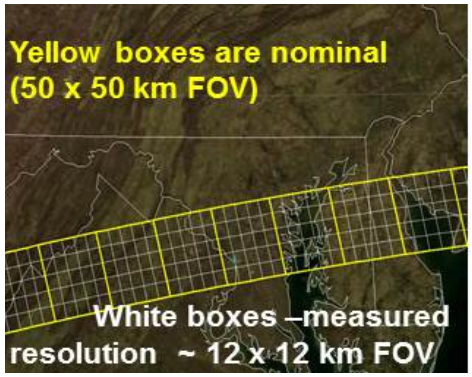
NRT OMI SO_2 and AI maps are integrated in N-AWIPS at W-VAAC

UV Ozone Monitoring and Profiling suite (OMPS) on Suomi-NPP (2011-) and future JP1 and JP2



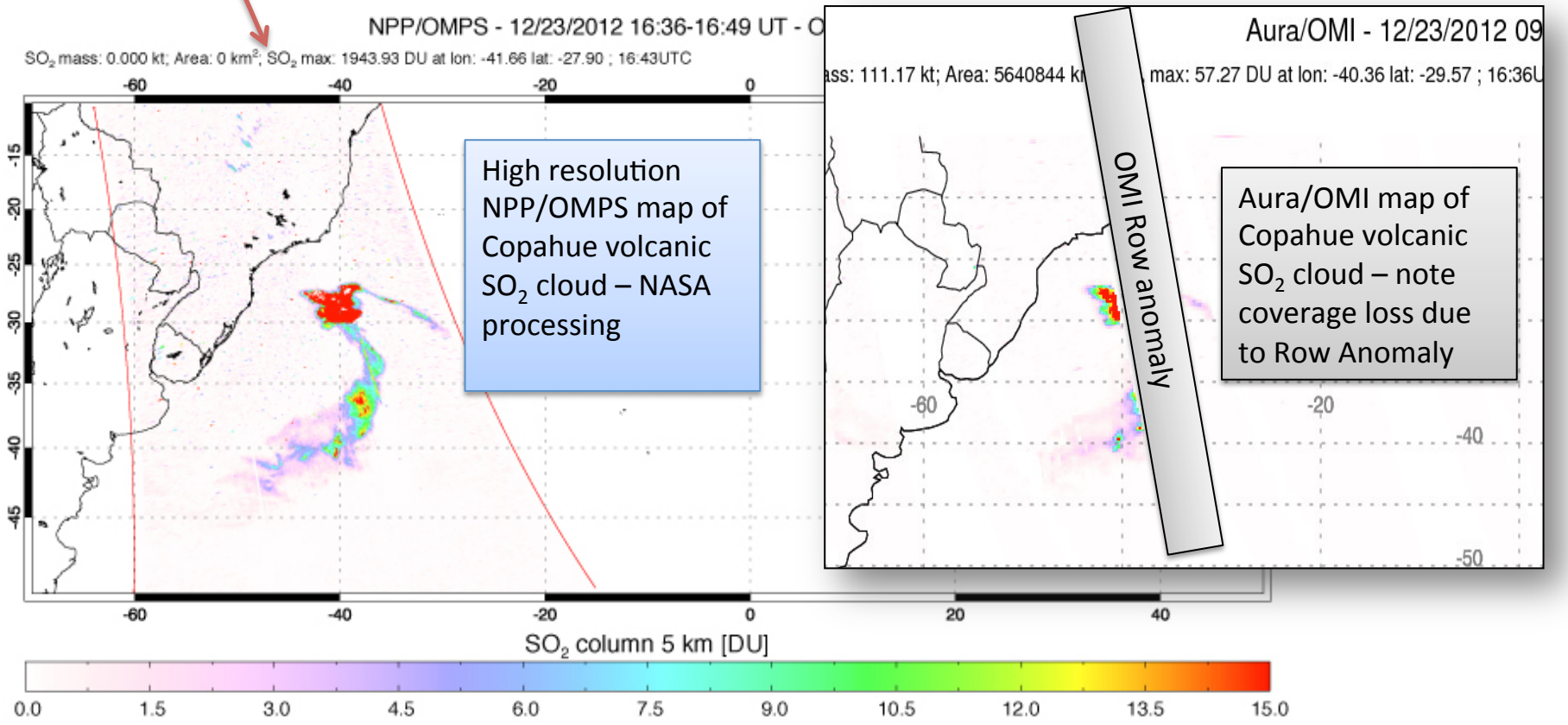
Near Real-time processing of Aura/OMI OMI and S-NPP OMPS volcanic AI and SO_2 at NASA

NASA currently processes high resolution OMPS data on Saturdays



OMPS NM operational SO_2 data

- Co-adding NM pixels on board results in low ground resolution ~50km (left map). Allowing higher data rate improves resolution to 12km by 12 km: better than current Aura OMI

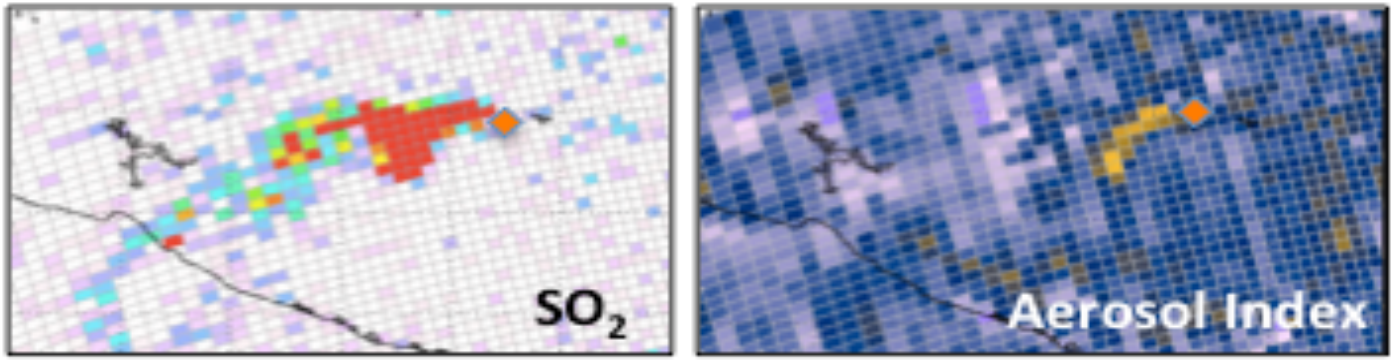


High resolution NPP/OMPS map of Copahue volcanic SO_2 cloud – NASA processing

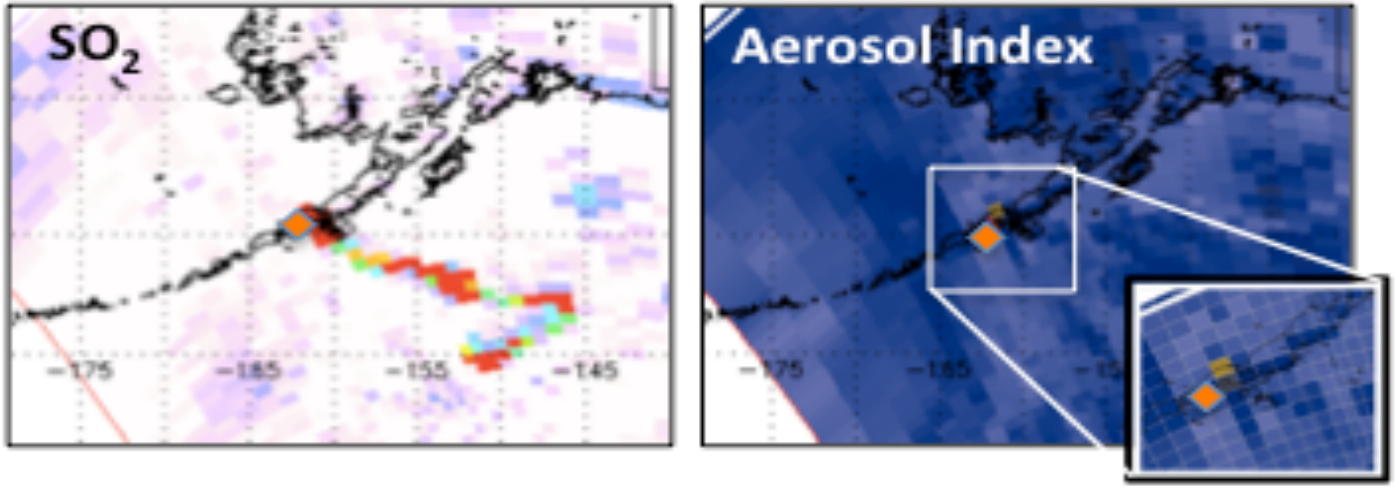
Aura/OMI map of Copahue volcanic SO_2 cloud – note coverage loss due to Row Anomaly

OMPS SO_2 and Aerosol Index data processed at NASA Ozone Product Evaluation and Algorithm Test Element (OPEATE). The files are ready to be ingested by NOAA

Eruption of Popocatepetl: May 17th 2013

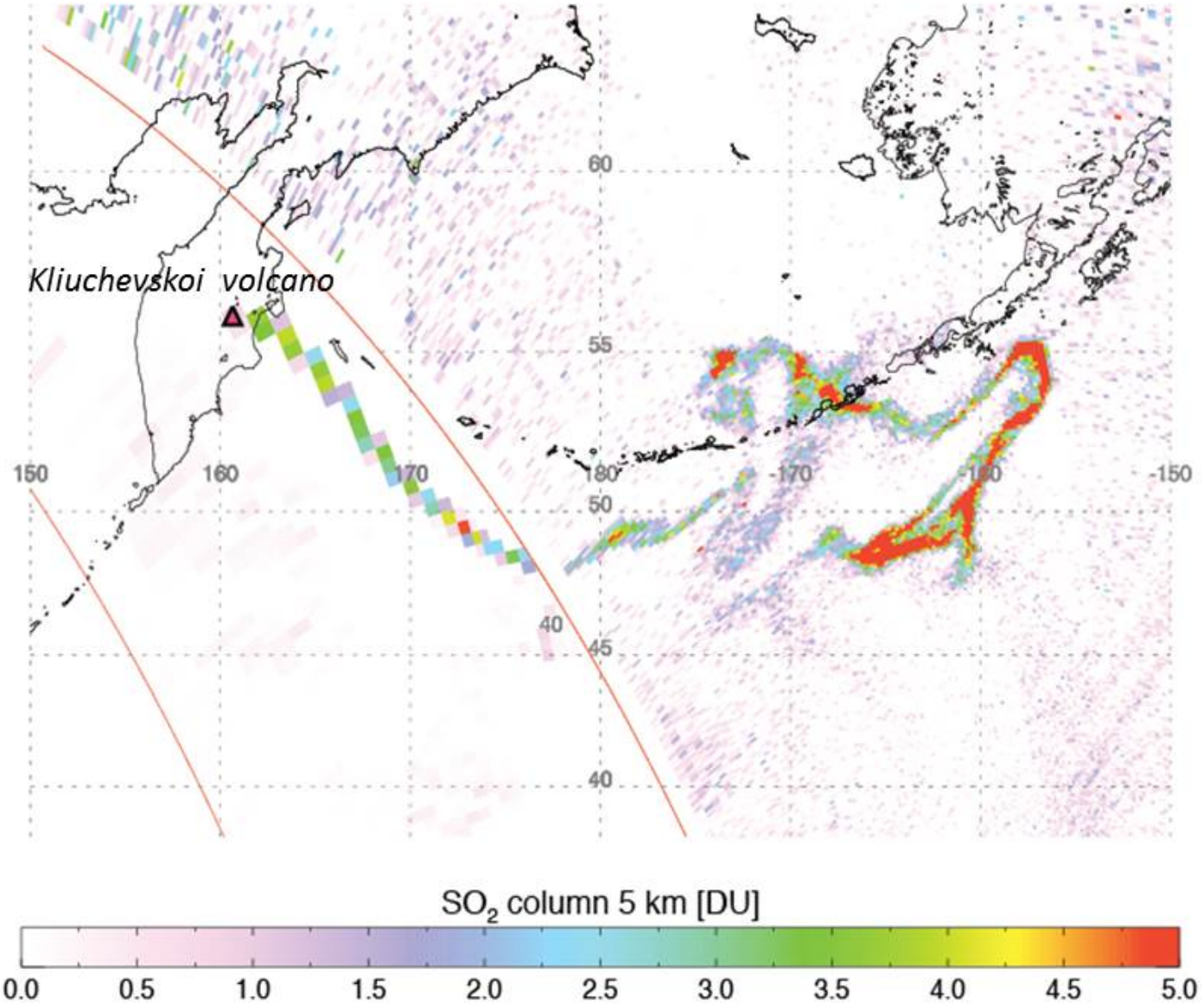


Eruption of Mt. Pavlof: May 19th 2013



Example of High resolution (12km) S-NPP OMPS SO_2 data processing at NASA Ozone PEATE.

The files are on the NASA server ready to be ingested by NOAA



Direct Readout data processing at FMI and UAF/GINA

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Direct Broadcast from Aura and S-NPP satellites

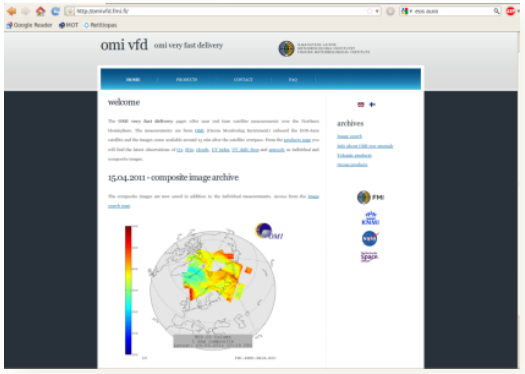
Receiving station in Sodankylä (FMI)

Receiving station at GINA/UAF in Fairbanks Alaska

OMI and OMPS DR processing in Sodankylä

NASA/GSFC Direct Readout Laboratory and NPP ozone PEATE create software package for local processing of NPP DR data

OMPS DR Processing at UAF/GINA

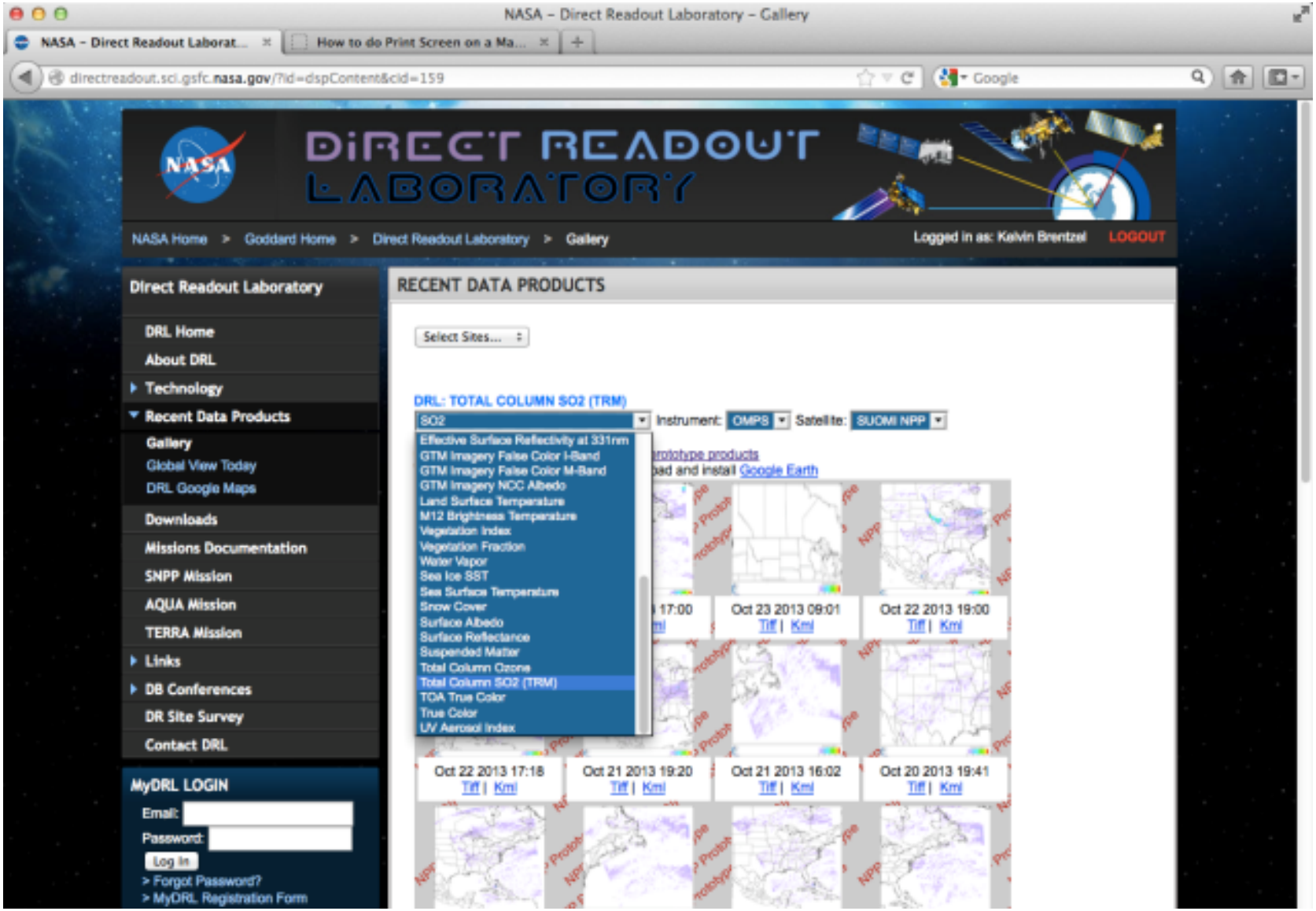


http://omivfd.fmi.fi

WWW and FTP services. Available within 20 min after data reception.

WWW and FTP services to Alaska Volcano Observatory. Available within 20 min after data reception.

Direct Readout S-NPP OMPS SO_2 and Aerosol Index data are Processed by NASA Ozone PEATE and Direct Readout Laboratory



Demonstrating Direct Readout Processing for NPP-OMPS volcanic SO_2 and Ash detection

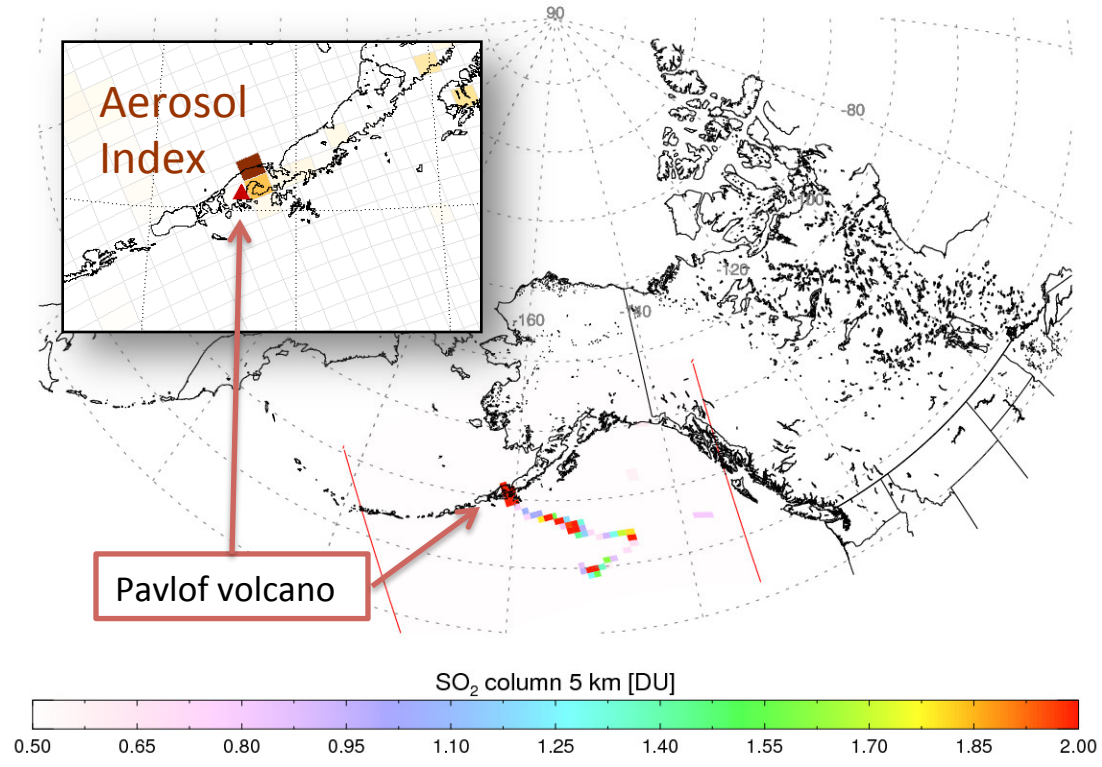


Figure: Suomi NPP /OMPS SO_2 map from Pavlof's eruption on May 19. Satellite SO_2 and ash data are used as proxy for hazardous volcanic ash plumes for aviation warnings in real time.

Insert: OMPS Aerosol Index shows Volcanic Ash aerosols near Pavlof's volcano (red triangle) moving in NE direction.

OMPS SO_2 data show volcanic air moving in narrow plume in SE direction at higher altitude before making sharp turn to the west. Using both ash and SO_2 data allows more accurate prediction of volcanic air movement.

- Suomi NPP direct broadcast stream has been received by GINA /UAF in Fairbanks, Alaska
- NASA's S-NPP ozone PEATE team has been working with the GSFC Direct Broadcast Laboratory (DRL) to process these data through the S-NPP science team's algorithms
- Successful "proof-of-concept" trials have taken place (figure above)
- Work currently underway to incorporate volcanic SO_2 and Aerosol Index algorithms into DRL's IPOPP environment
- Once implemented, the SW package will be provided to GINA for real time processing and delivering data to operational users (AVO, NWS, FAA) for aviation warnings

OMI and OMPS DR data processing at FMI: SO2 plume from November 22 Etna eruption

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volcanic products

Global Sulfur Dioxide Monitorin... | volcanic products

omi vfd omi very fast delivery

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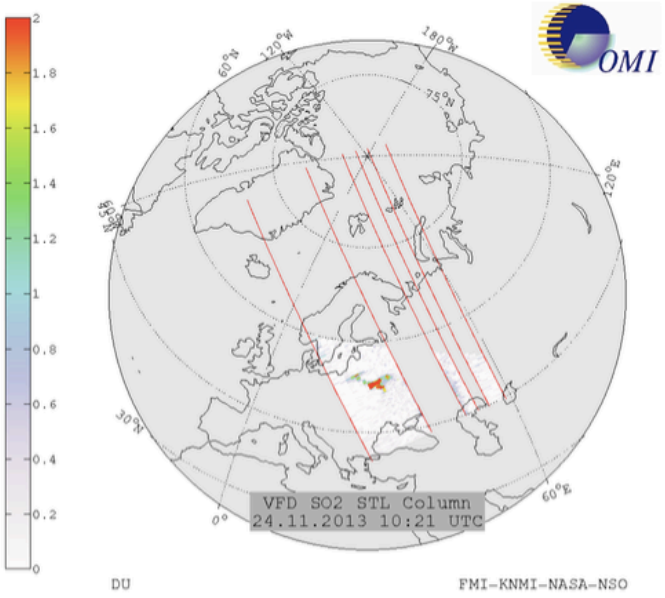
These products can be used to monitor volcanic eruptions.



SO2

SO21

SO22

SO23

SO24

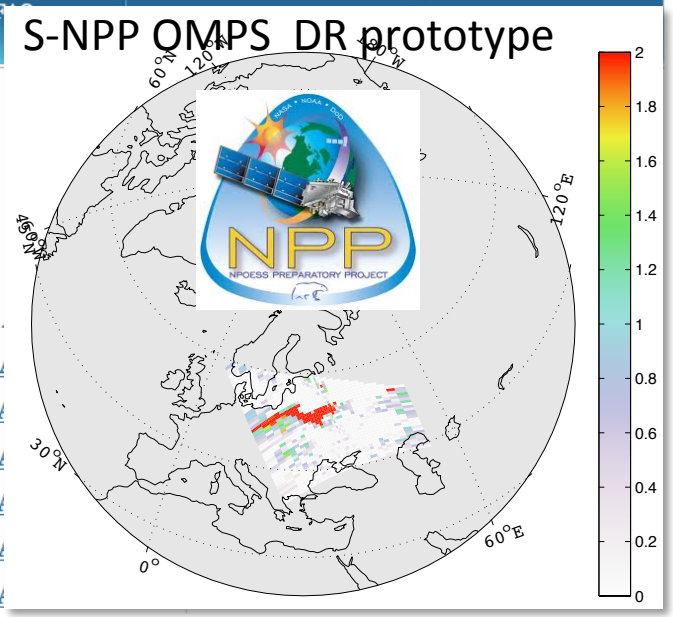
SO25

SO26

AI = Aerosol Index

CF = Cloud Fraction

S-NPP OMPS DR prototype



FMI

KNMI

NASA

Summary

- Step I of the project has been completed (Sep 2012- Sep 2013):
    - Maintain OMI AI/SO2 NRT data stream
    - New S-NPP OMPS AI/SO2 data are in forward processing at NASA and available to ingest by NOAA
    - NRT AIRS SO_2 data are processed and available to ingest
    - OMPS Direct Readout data processing has been demonstrated
        - In NASA DRL environment
        - In GINA-UAF environment
        - In FMI VFD environment
- Step II proposal submitted to NASA in November 2013