New SO_2 Product from OMPS

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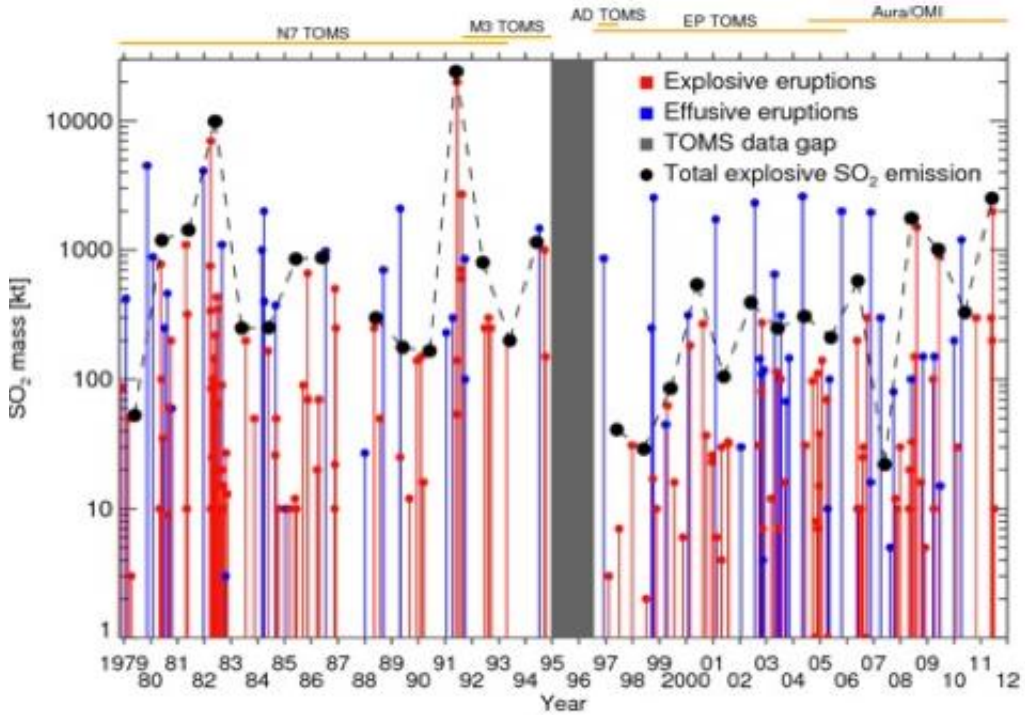
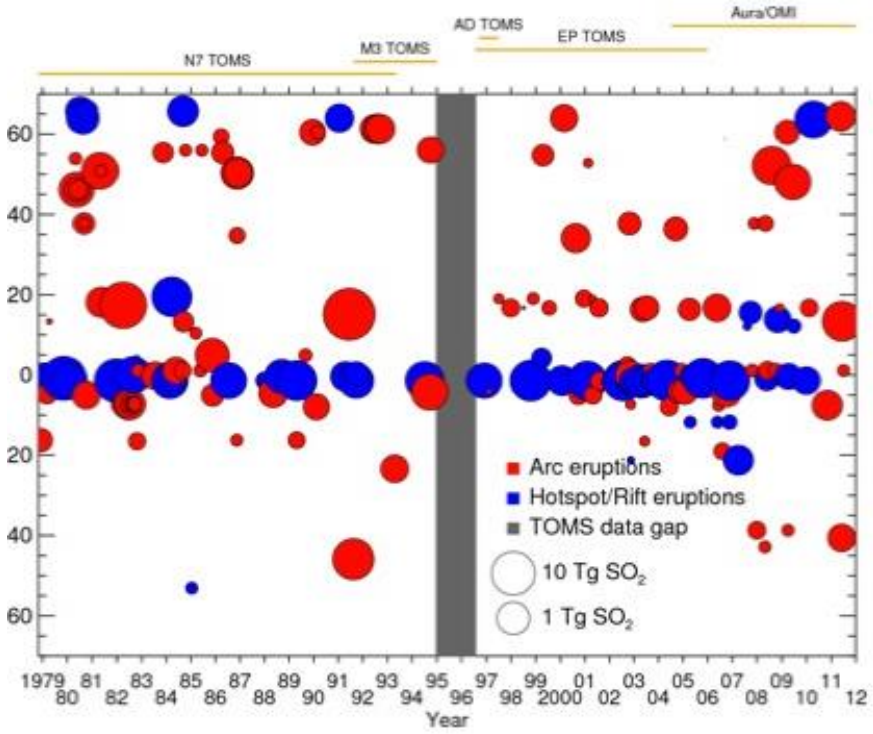
Outline

- Long-term SO_2 EDR
- OMPS: Goals and Algorithms
- Sample OMPS Results and Comparisons with OMI
- Summary

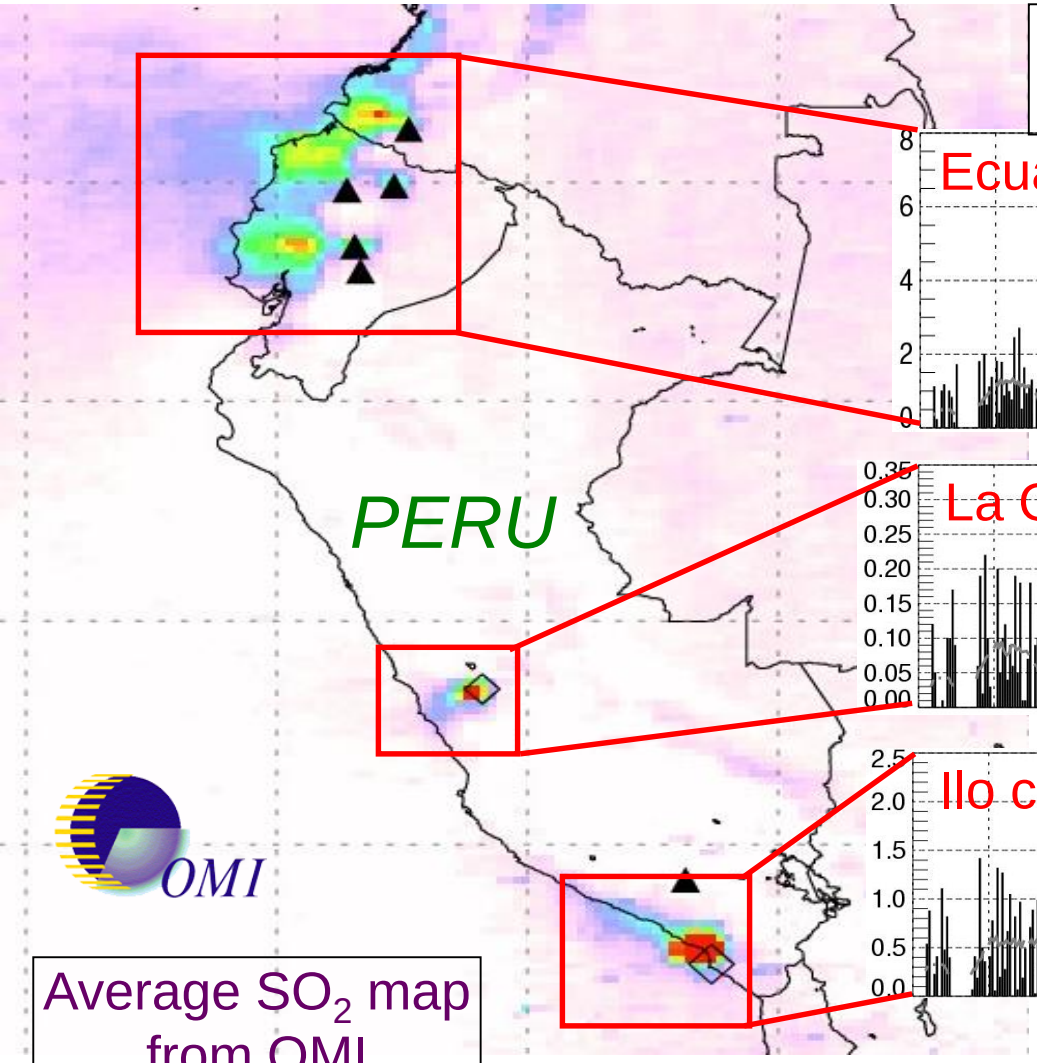
SO_2 EDR: Inventory of Emission from Volcanic Eruptions

TOMS & OMI: 1978 - Present



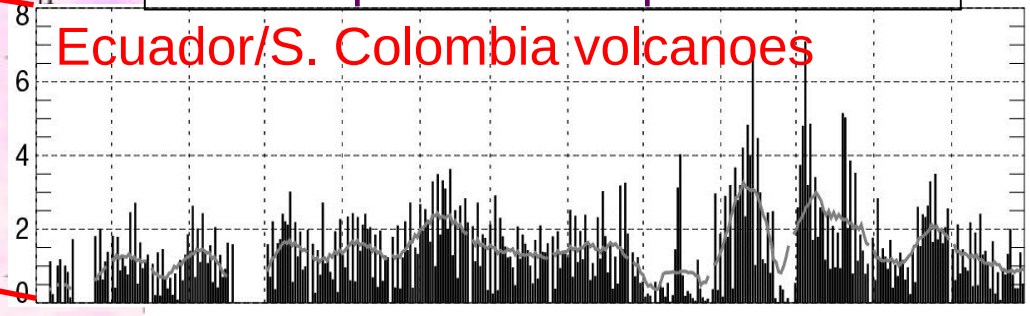


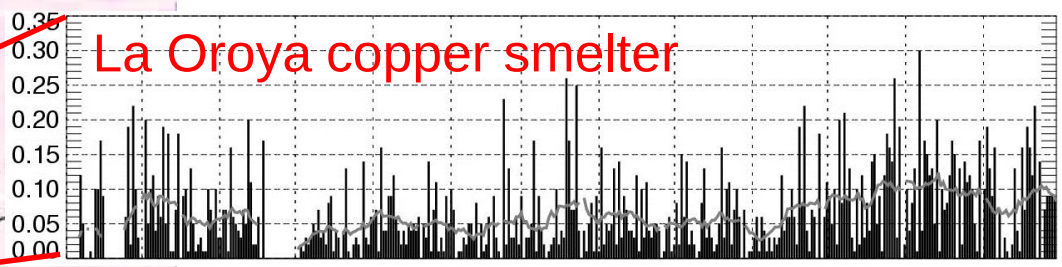
SO_2 EDR: Volcanic Degassing & Anthropogenic Emissions

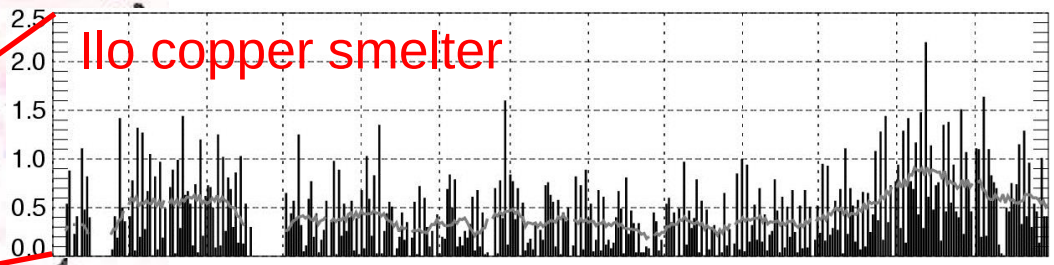


Average SO_2 map from OMI

Daily SO_2 emissions (kilotons)
Sept 2004 - Sept 2005







OMPS Nadir Mapper (NM)
SO_2 Products Goals

- Continue the long-term sulfur dioxide (SO_2) EDR from TOMS and OMI

- Provide near-real-time (NRT) detection and monitoring of volcanic plumes for aviation hazard mitigation

OMPS NM SO_2 Processing

Standard Product: Spectral Fitting Algorithm

- Retrieve ozone and SO_2 simultaneously
- Suitable for quantify full range of SO_2

Near-Real-Time Product: LF (linear-fit) Algorithm

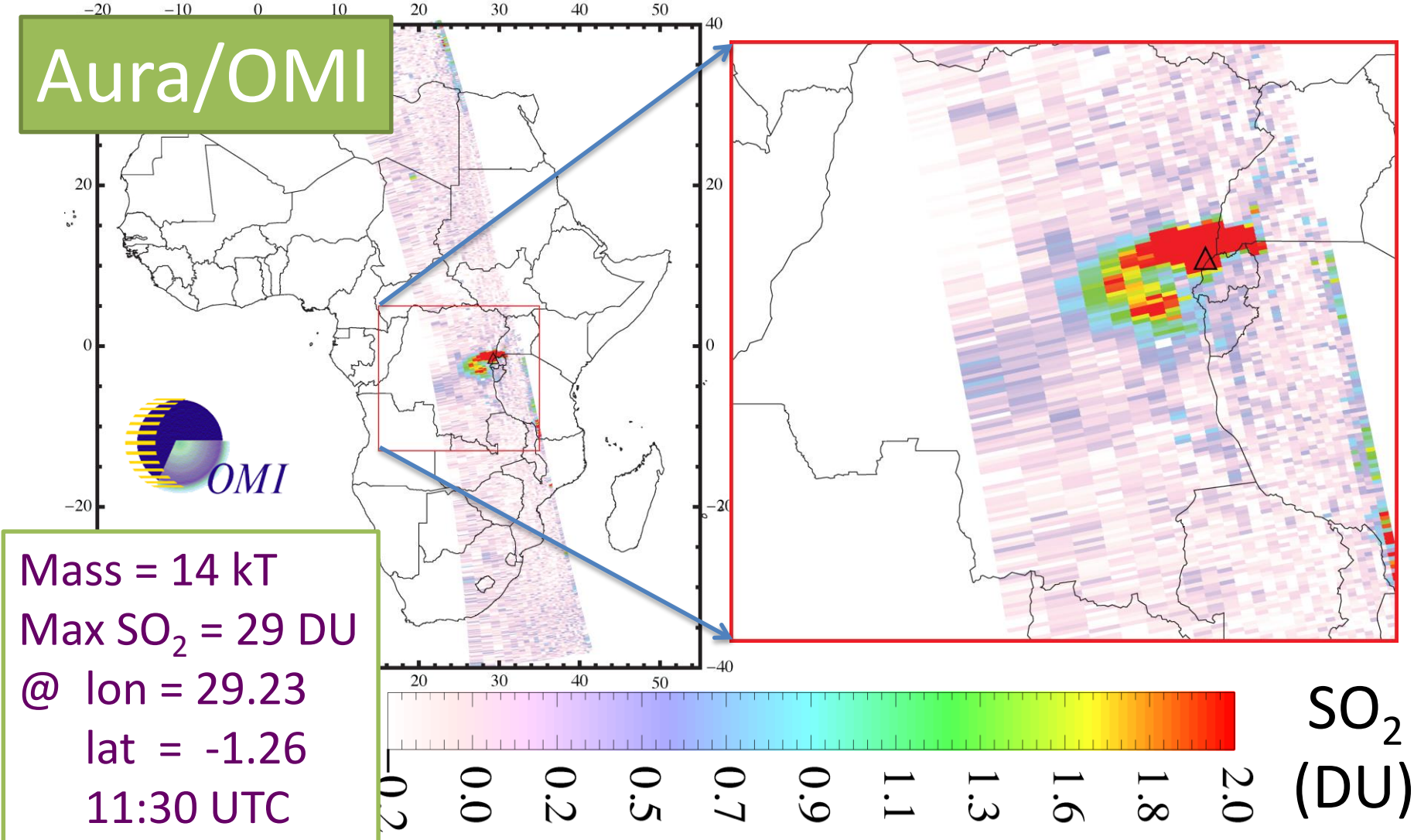
- Use outputs from operational total ozone processing
- Fast and reliable in detecting volcanic plumes

Same algorithms used for the corresponding OMI products.

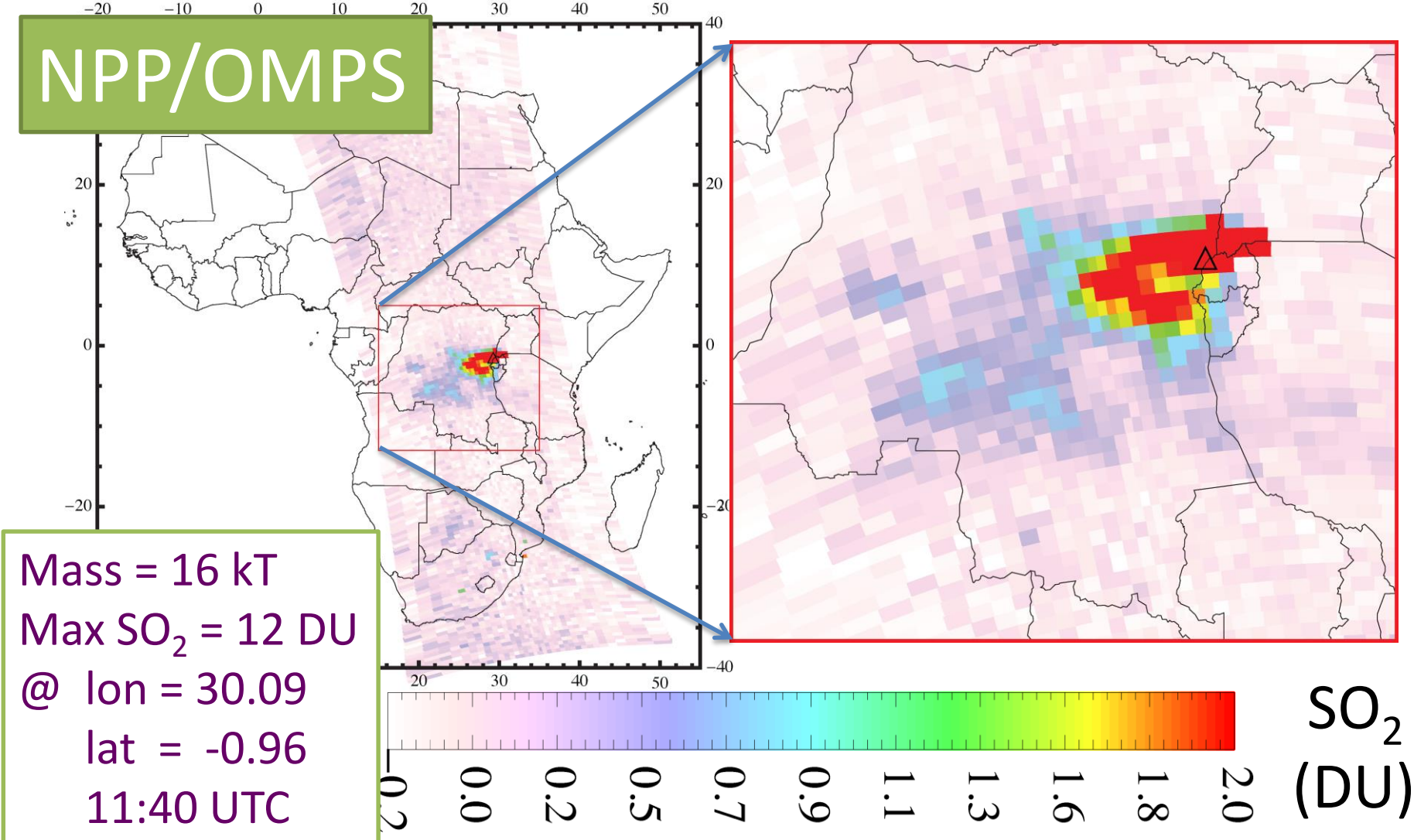
Sample Results and Comparison: Volcanic Eruption

(SO_2 in Upper Troposphere and Lower Stratosphere)

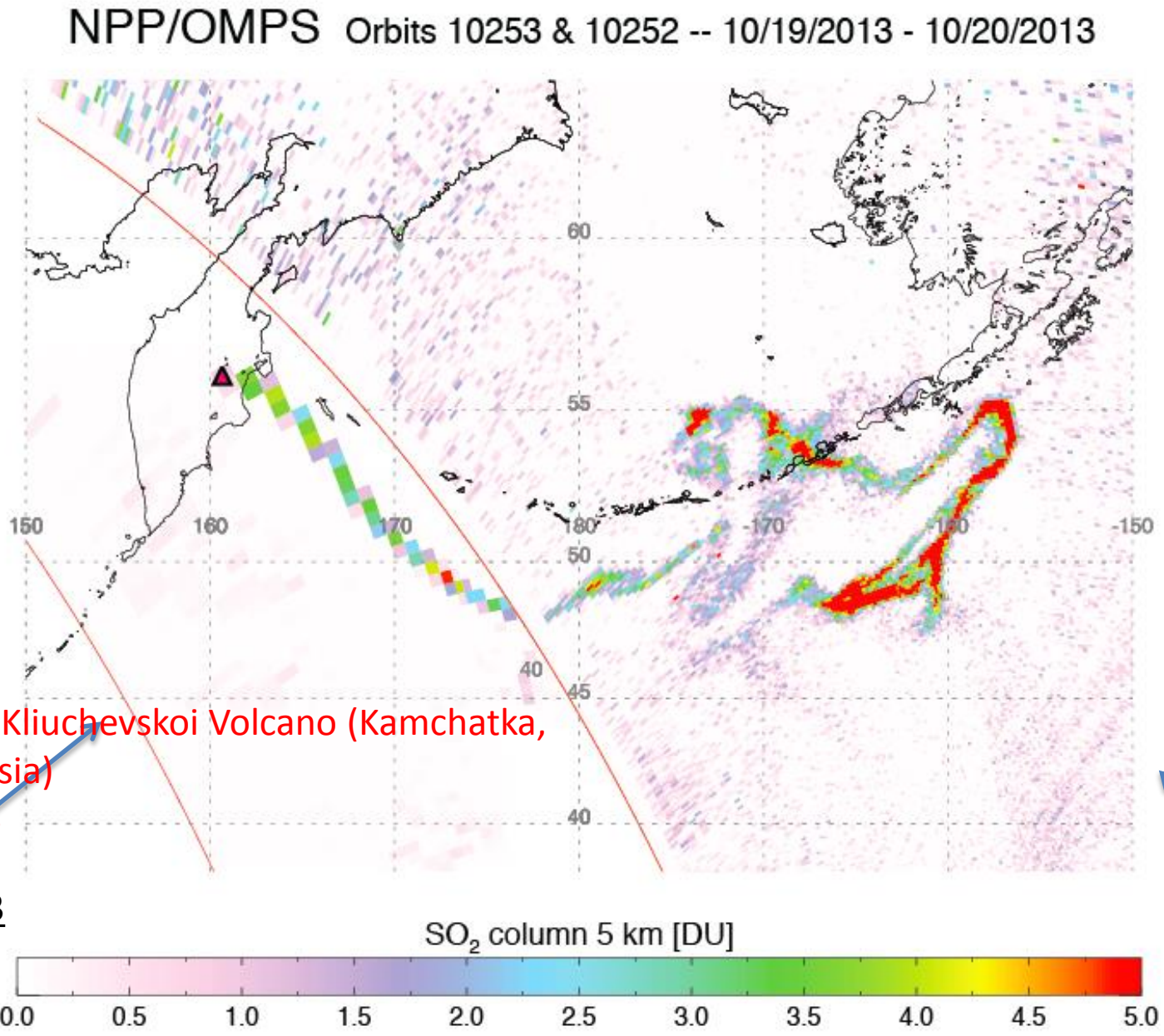
Volcanic Eruption: 2012-05-08
Nyiragongo (DR Congo)



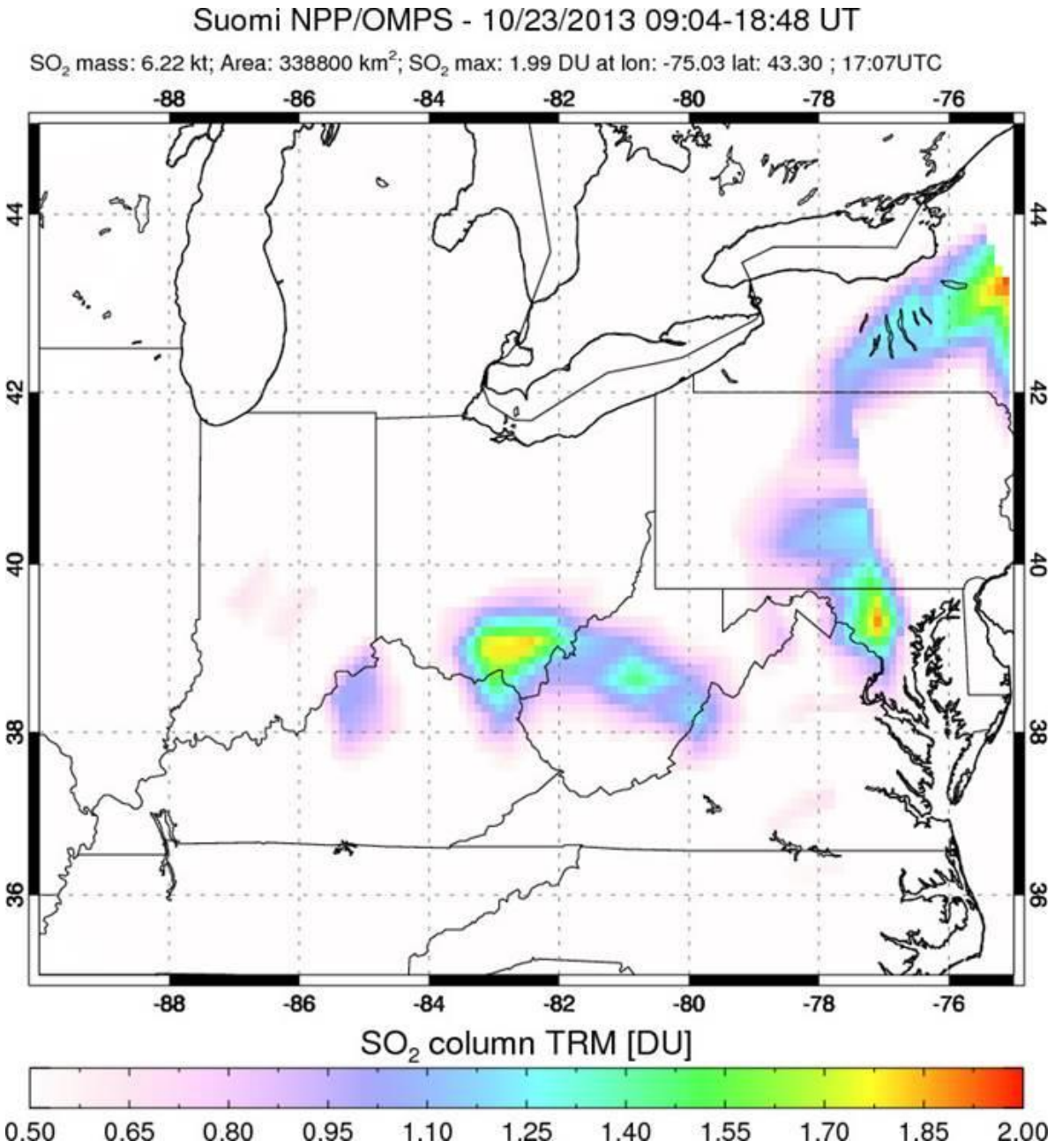
Volcanic Eruption: 2012-05-08
Nyiragongo (DR Congo)



Near-Real-Time OMPS SO_2 Product



SO_2 Over US : validation of OPMS with ground-based measurements

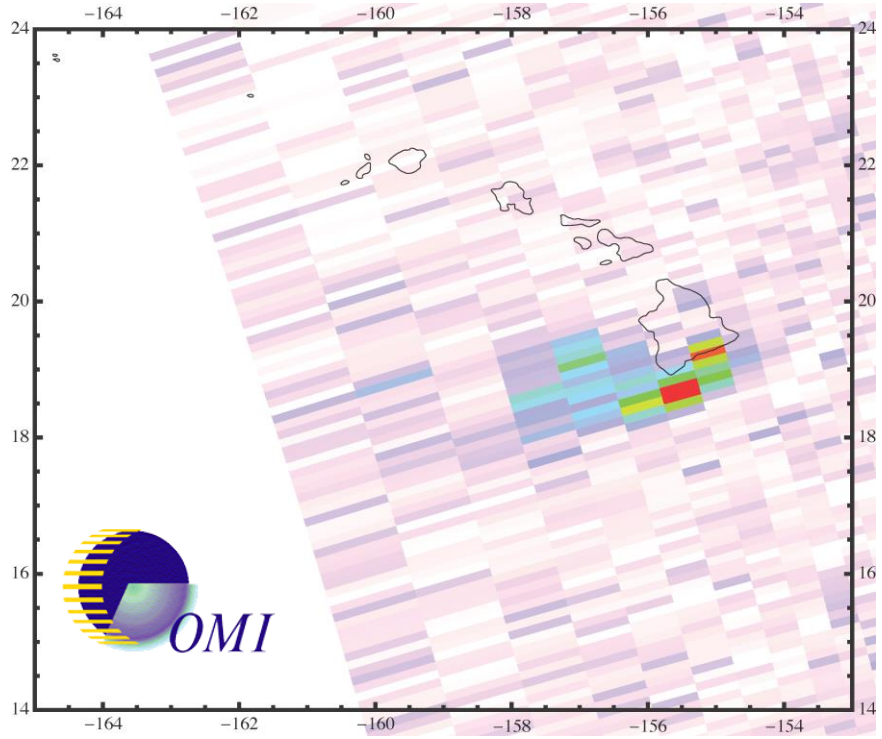


Sample Results and Comparison: Volcanic Degassing

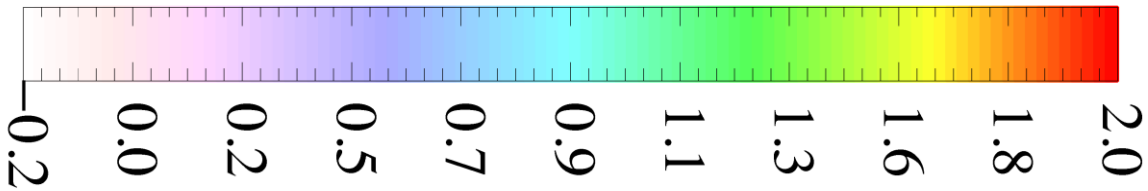
(SO_2 in Lower Troposphere)

Volcanic Degassing: 2012-10-04
Kilauea (Hawaii)

Aura/OMI



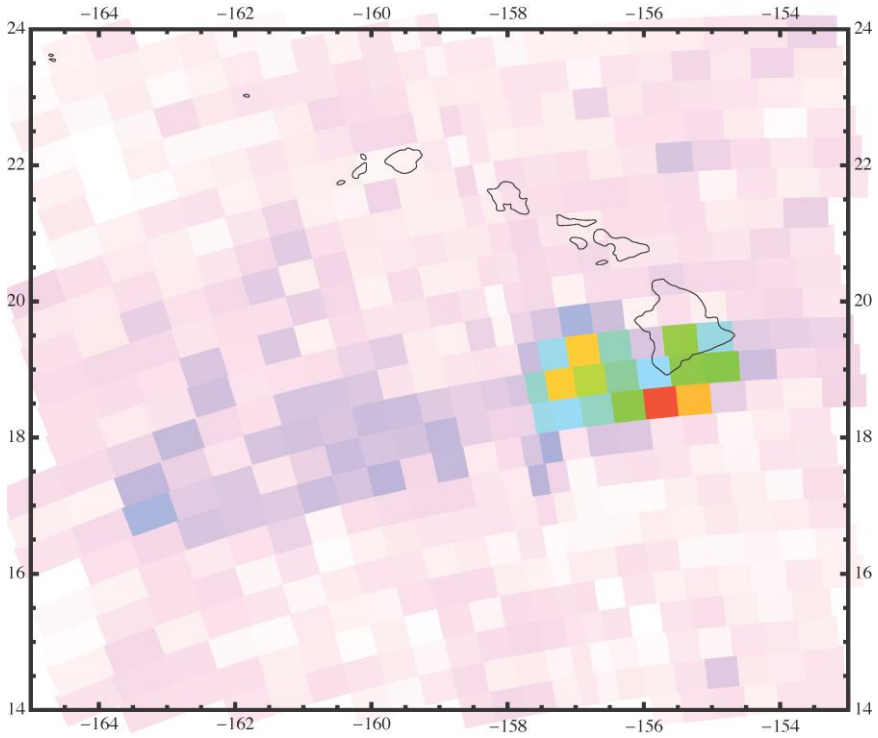
Mass = 1.2 kT
Max SO_2 = 1.9 DU
@ lon = -155.48
lat = 18.65
23:25 UTC



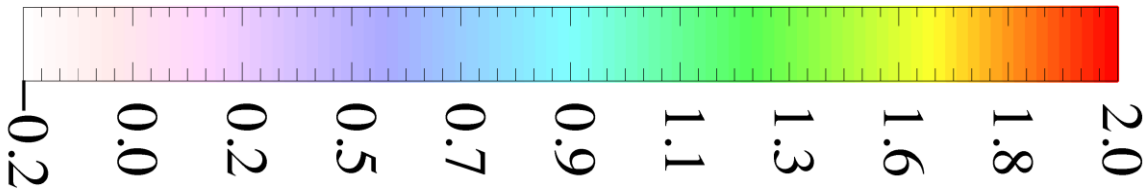
SO_2 (DU)

Volcanic Degassing: 2012-10-04
Kilauea (Hawaii)

NPP/OMPS



Mass = 1.4 kT
Max SO_2 = 1.7 DU
@ lon = -155.74
lat = 18.53
23:41 UTC

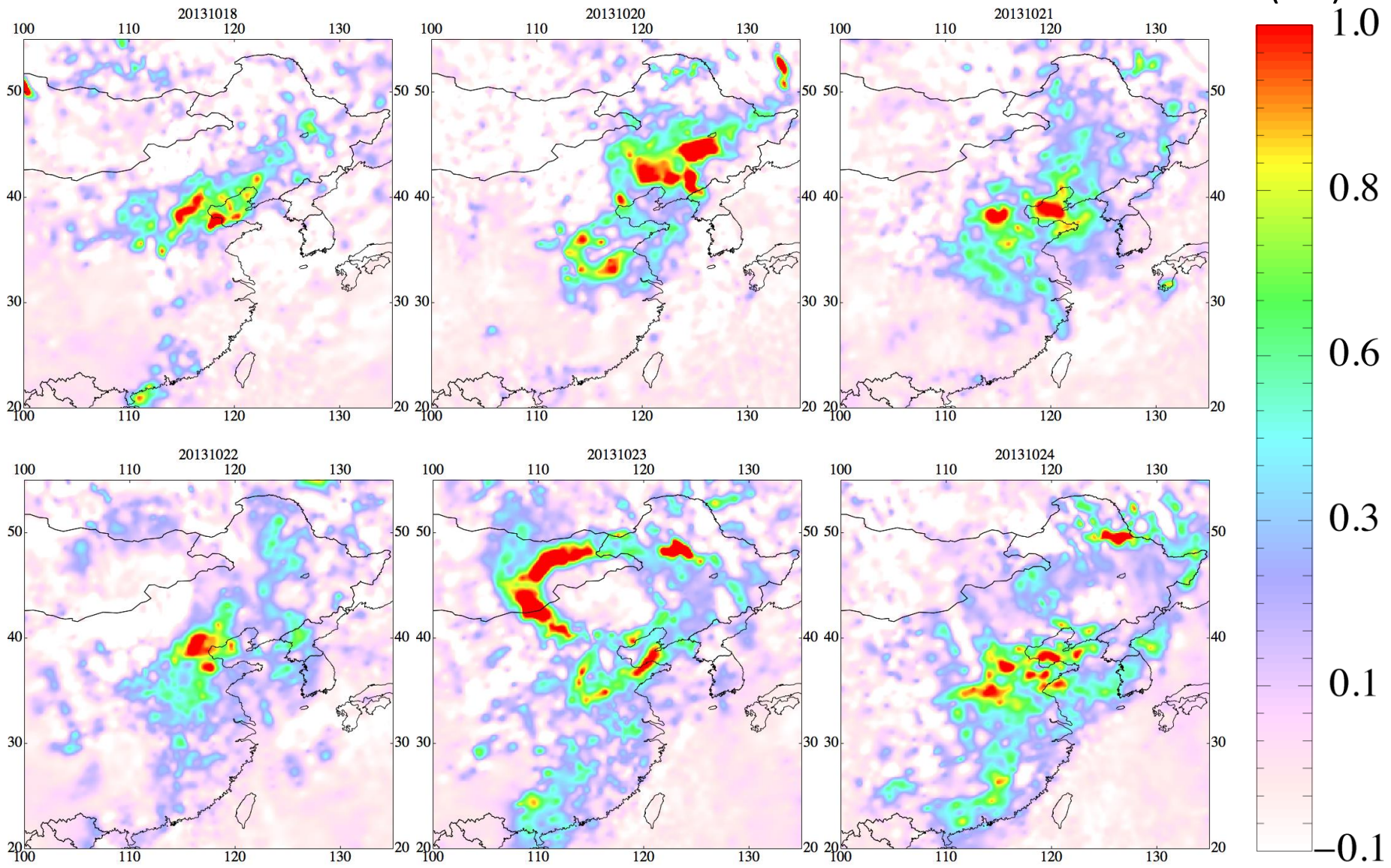


SO_2 (DU)

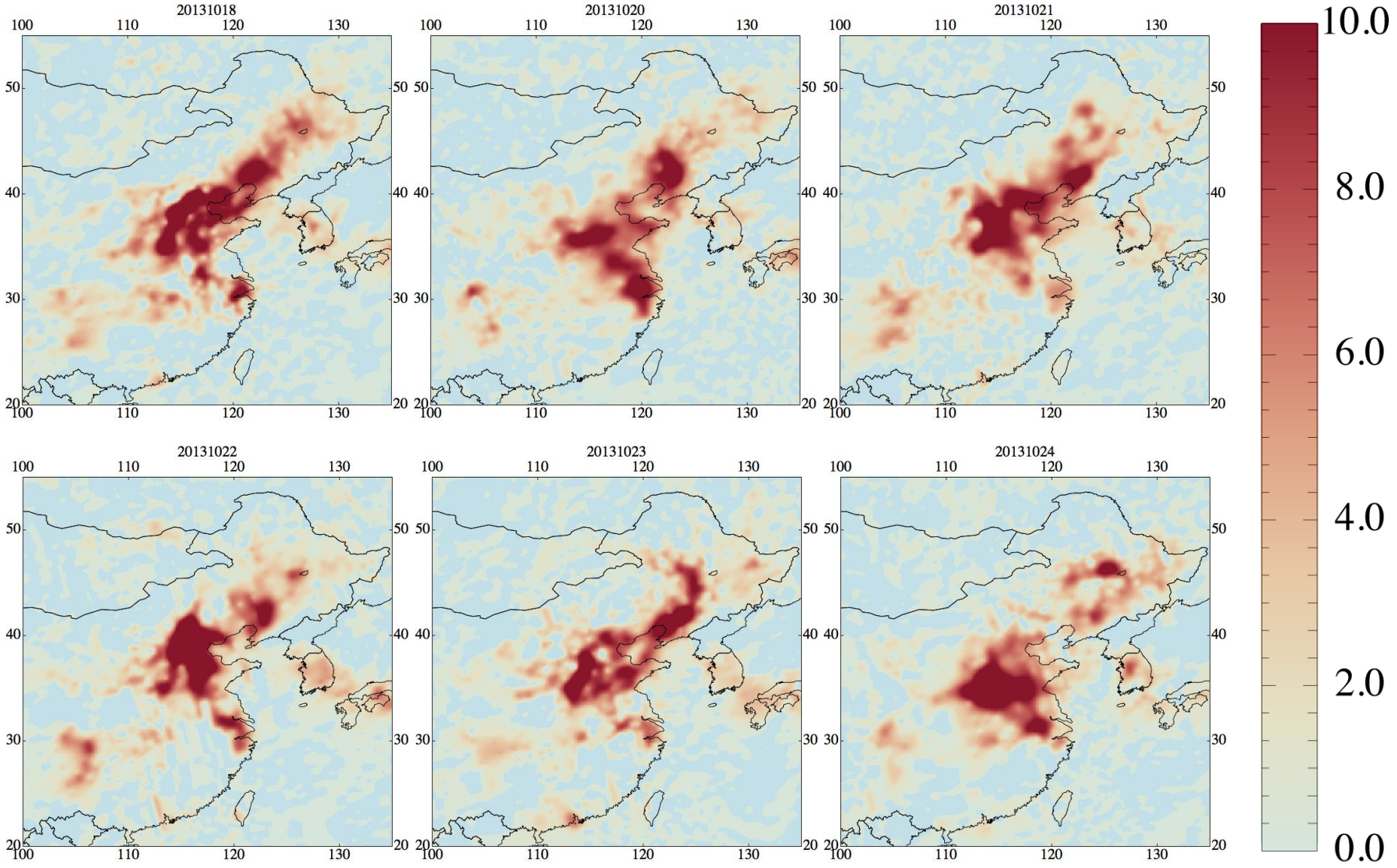
OMPS/NM Sample Results: Anthropogenic Emission

(SO_2 in the Boundary Layer and Lower Troposphere)

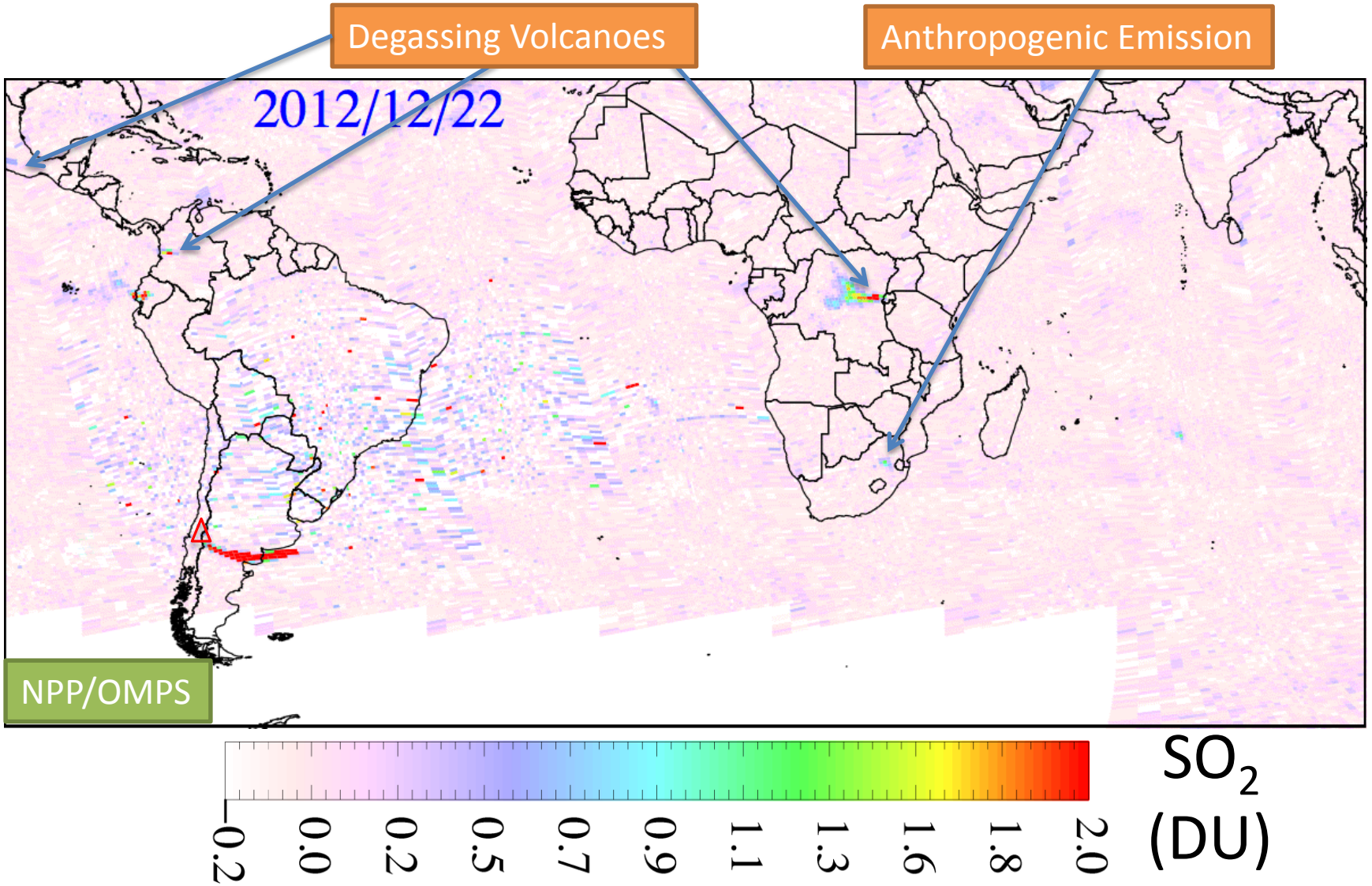
OMPS SO_2 Measurements



OMPS NO_2 Measurements



Monitoring of SO_2 Plumes: Copahue (Argentina and Chile)



Summary

- OMPS NM provides high signal-to-noise ratio UV measurements, stable instrument performance (no degradation detected). Correction needed and developed to reduce stray-light contamination.
- NRT software implemented and tested. OMPS NM provides reliable data for NRT global monitoring of eruptive volcanic plumes.

Summary (continued)

- Good agreements in total loadings between OMPS and OMI for both volcanic degassing and eruption. TOMS and OMI long-term volcanic EDR can be extended with OMPS record.
- We have accomplished high quality retrievals for SO_2 in the boundary layer and lower troposphere. Boundary layer SO_2 EDR from OMI can be extended with OMPS data.