



Direct sampling of tropospheric volcanic plumes in Ecuador and Colombia during TC⁴

S. Carn¹, N. Krotkov², M. Schoeberl³, P. Wennberg⁴, J. Dibb⁵, B. Anderson⁶, G. Diskin⁶, G. Sachse⁶, S. Vay⁶, K. Yang², A. Krueger¹, S. Arellano⁷

1. Joint Center for Earth Systems Technology (JCET), UMBC, Baltimore, MD
2. Goddard Earth Sciences and Technology Center (GEST), UMBC, Baltimore, MD
3. Code 610.3, NASA GSFC, Greenbelt, MD
4. Geological and Planetary Sciences, Caltech, Pasadena, CA
5. Dept of Earth Sciences, University of New Hampshire, Durham, NH
6. Chemistry and Dynamics Branch, NASA LaRC, Hampton, VA
7. Instituto Geofisico-Escuela Politecnica Nacional, Quito, Ecuador



Sulfur Dioxide Group

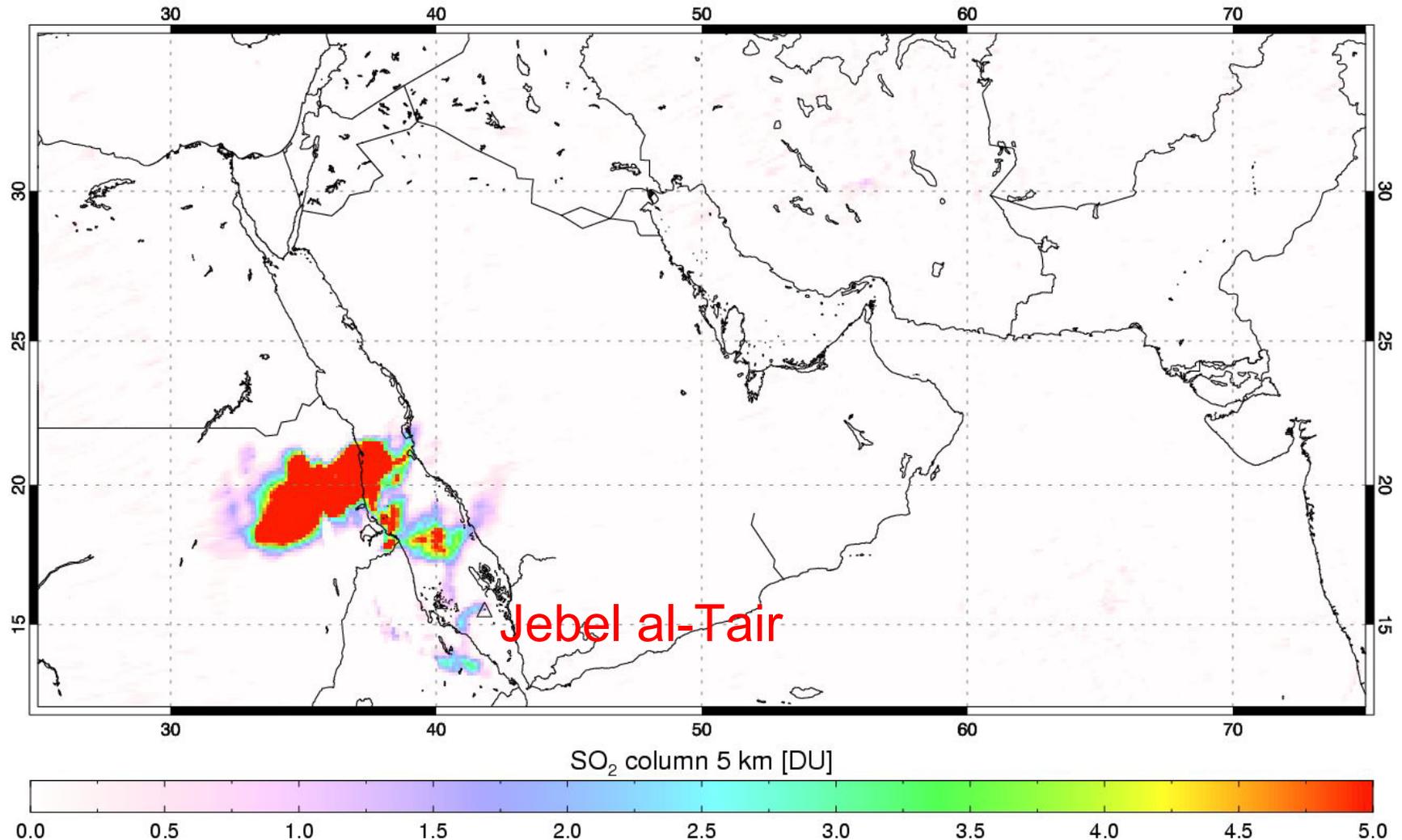


Aura Science Team Meeting - Oct 2007

Breaking news

Aura/OMI - 10/01/2007 07:42-12:39 UT

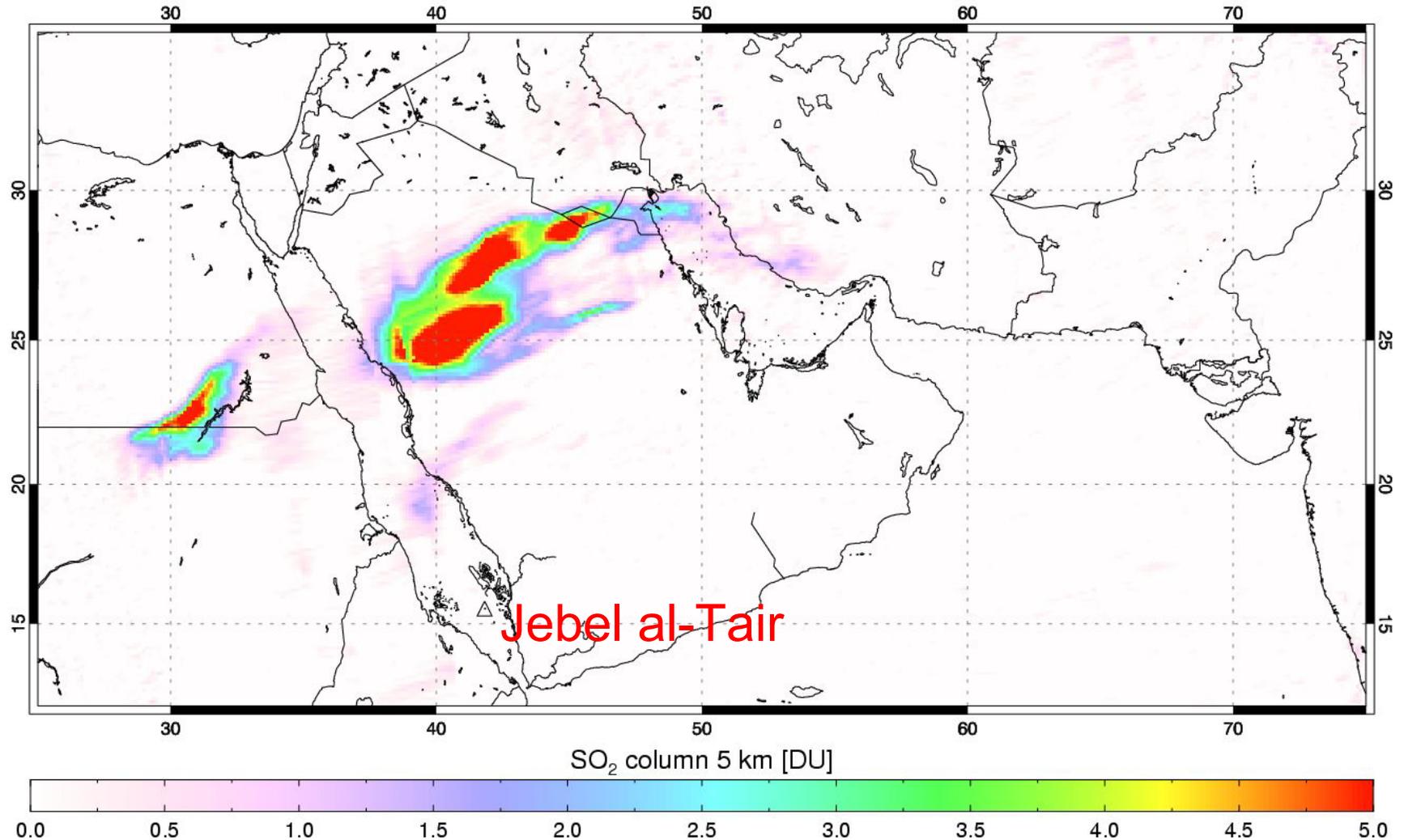
Mass: 51.501 kt; Area: 321871 km²; SO₂ max: 35.05 DU at lon: 37.15 lat: 20.32 ; 10:59UTC



Breaking news

Aura/OMI - 10/02/2007 08:23-11:47 UT

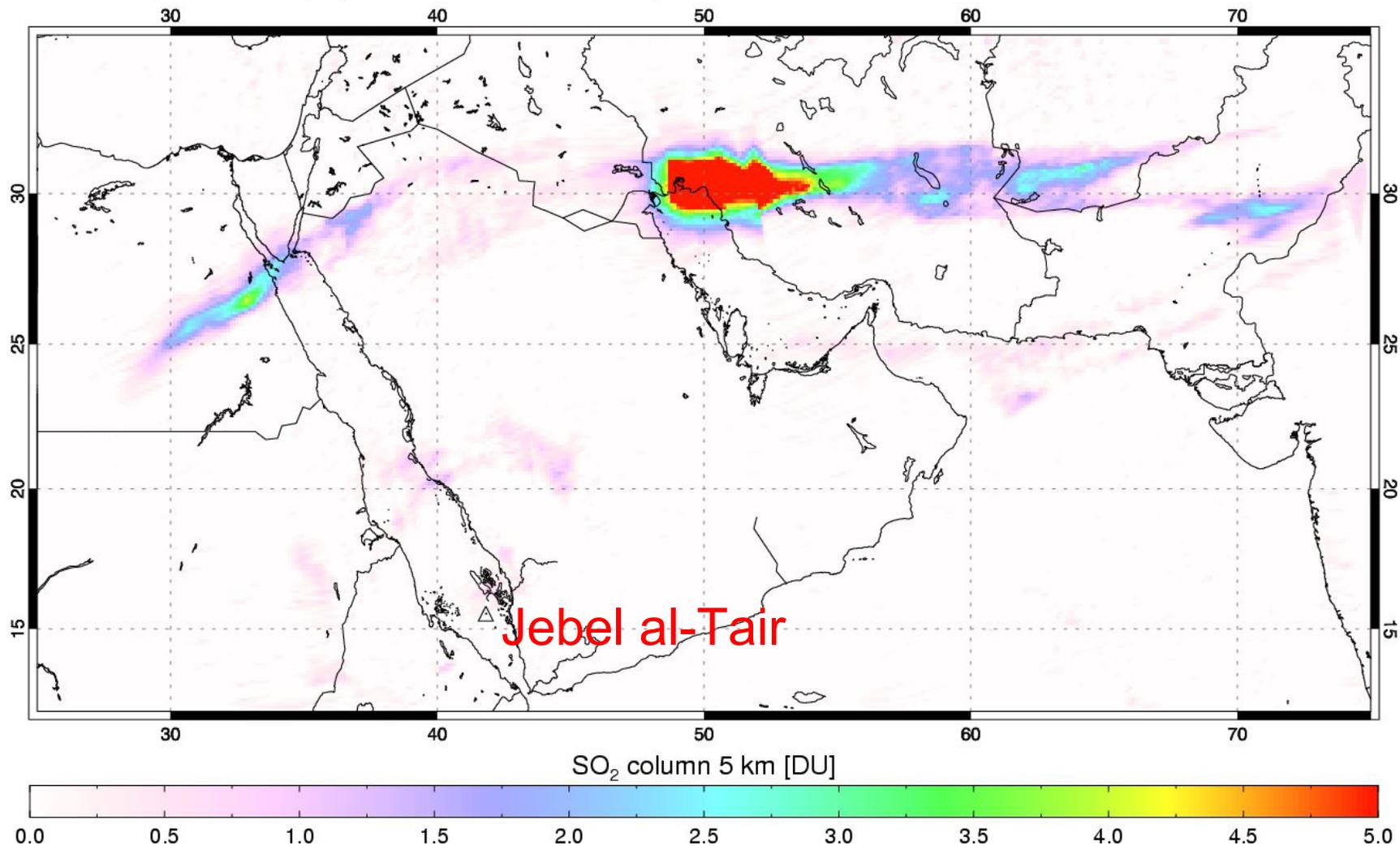
Mass: 46.631 kt; Area: 535947 km²; SO₂ max: 9.48 DU at lon: 40.72 lat: 25.12 ; 10:06UTC



Breaking news

Aura/OMI - 10/03/2007 07:32-10:52 UT

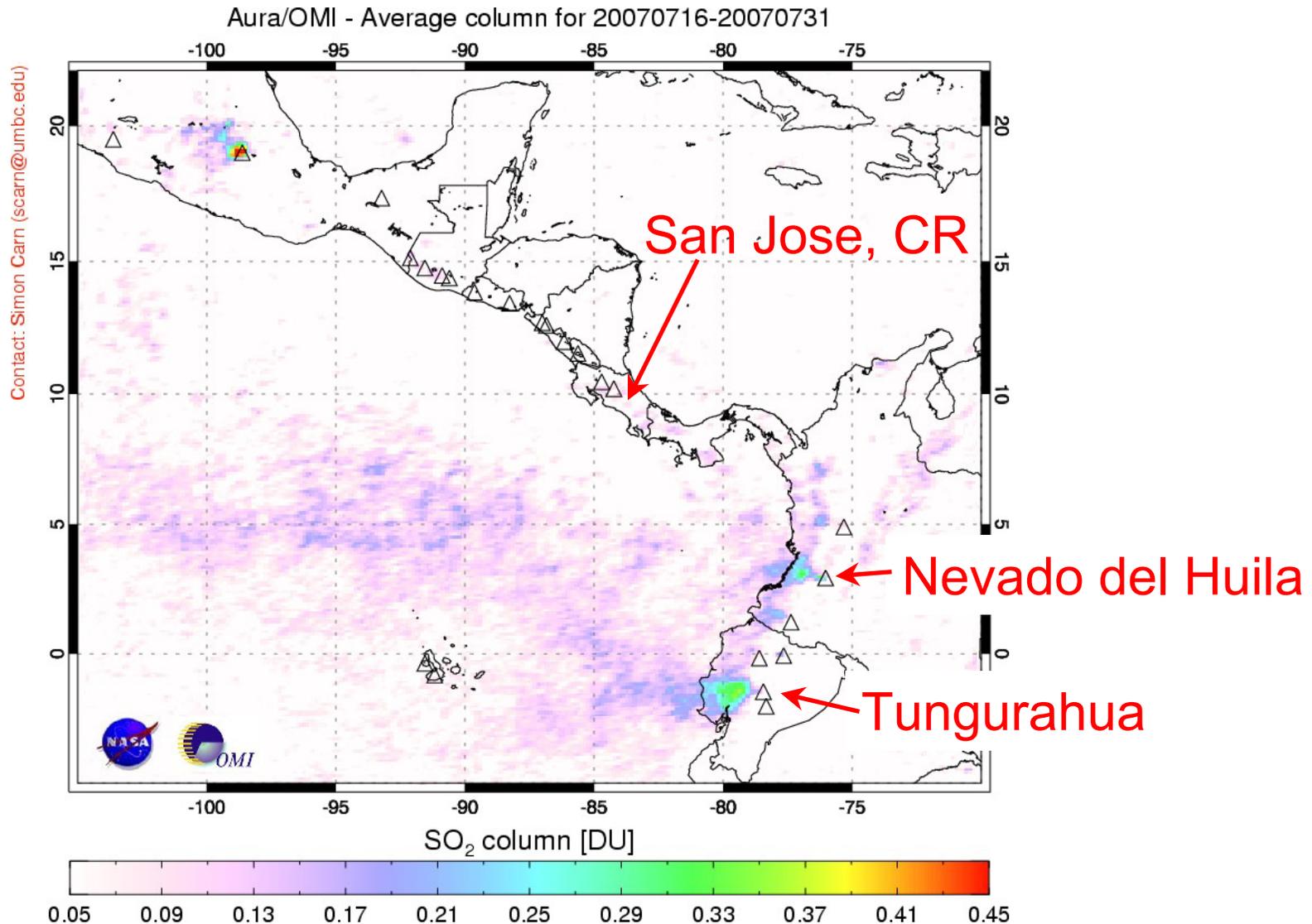
Mass: 38.573 kt; Area: 532622 km²; SO₂ max: 12.74 DU at lon: 50.64 lat: 30.52 ; 10:50UTC



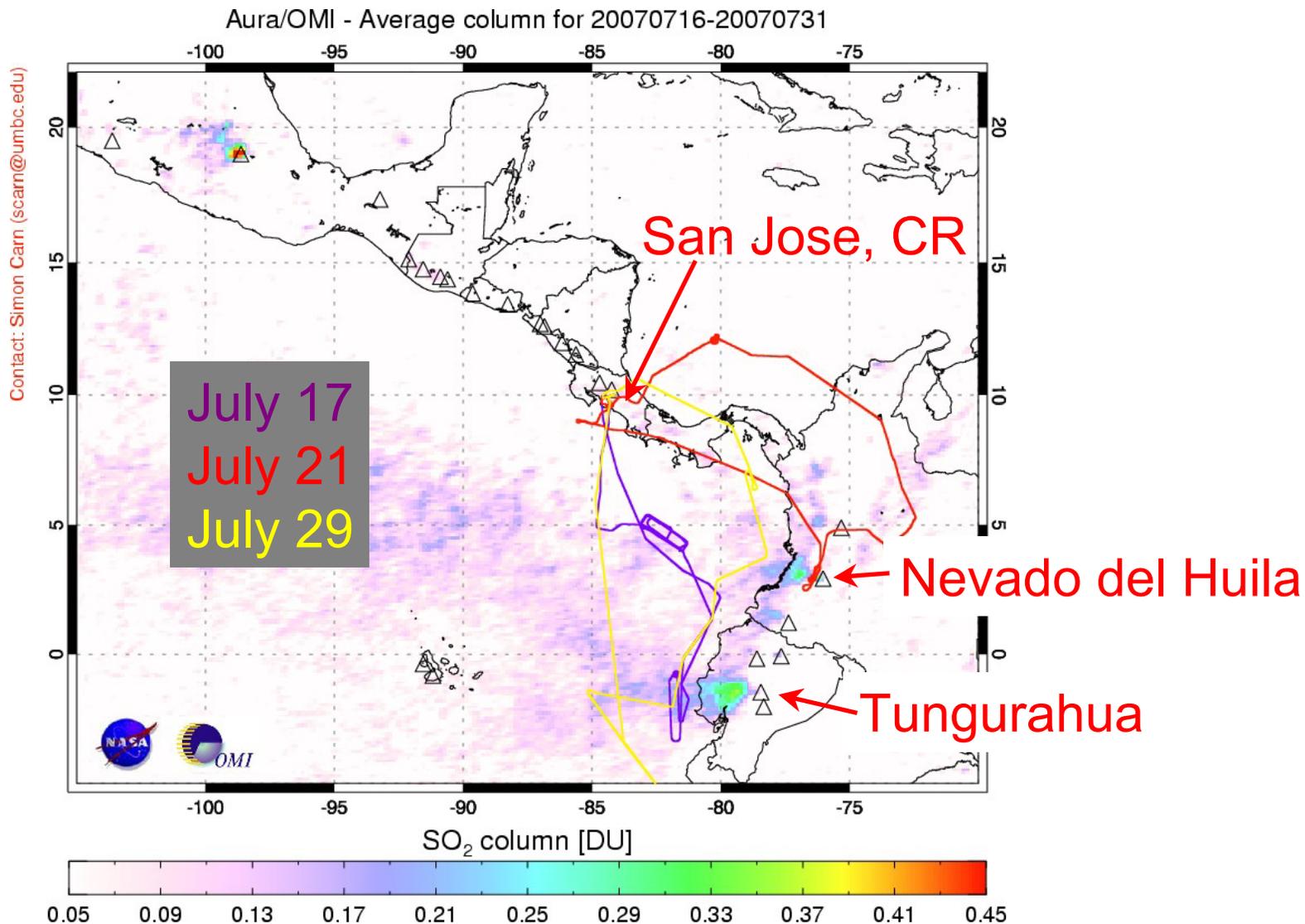
Overview

- TC⁴ campaign (16 July - 8 August, 2007) based in San Jose, Costa Rica
- NASA DC-8 science flights to hunt volcanic plumes in Ecuador and Colombia
- Goal to collect validation data for operational OMI SO₂ product
- SO₂, SO₄, Aerosol, CO, CO₂ measurements
- Flight planning supported by near real-time OMI SO₂ maps of TC⁴ region
- Direct sampling of volcanic plumes is rare

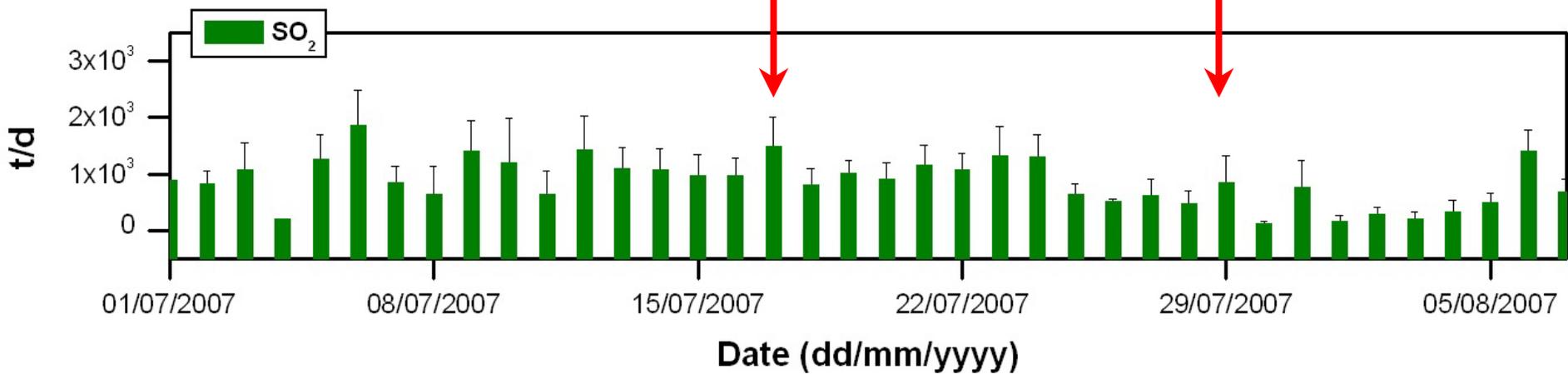
TC⁴ location



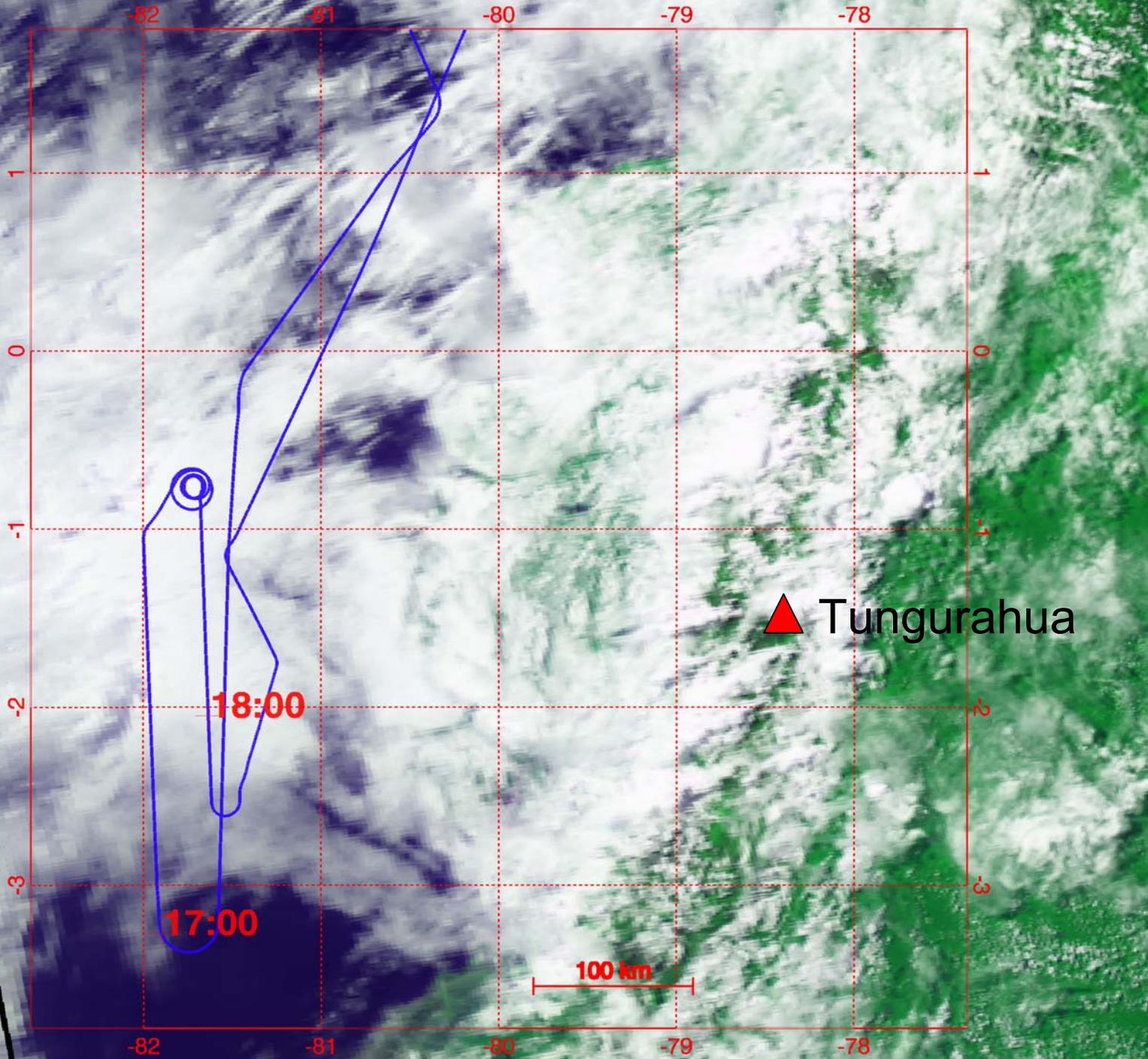
DC-8 flight tracks during TC4



Tungurahua (Ecuador) - July 2007



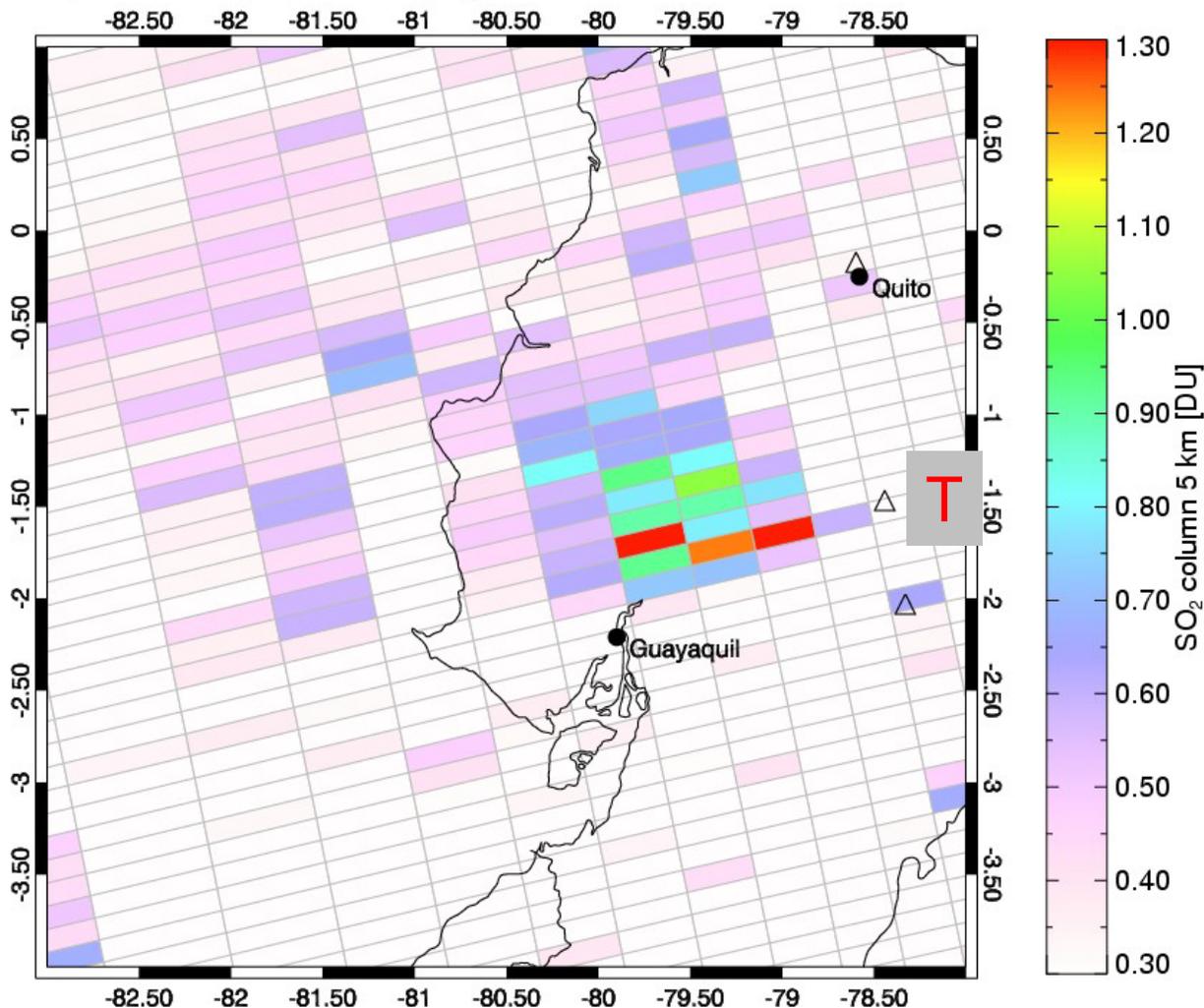
Aqua
MODIS
1825UT
July 17



OMI SO₂ column - July 17

Aura/OMI - 07/17/2007 18:43-18:44 UT - Orbit 15982

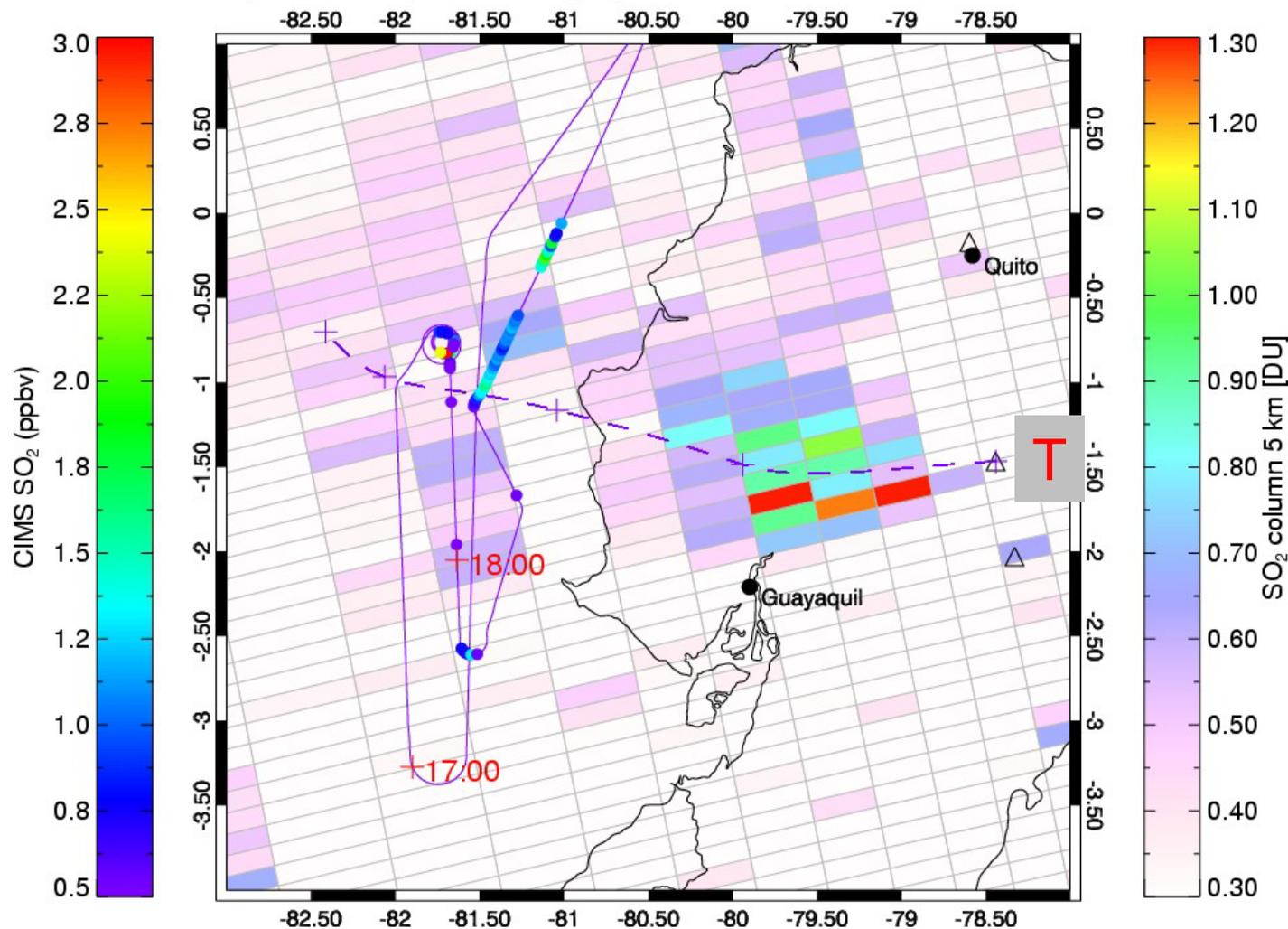
SO₂ mass: 0.046 kt; Area: 1351 km²; SO₂ max: 1.35 DU at lon: -78.99 lat: -1.63



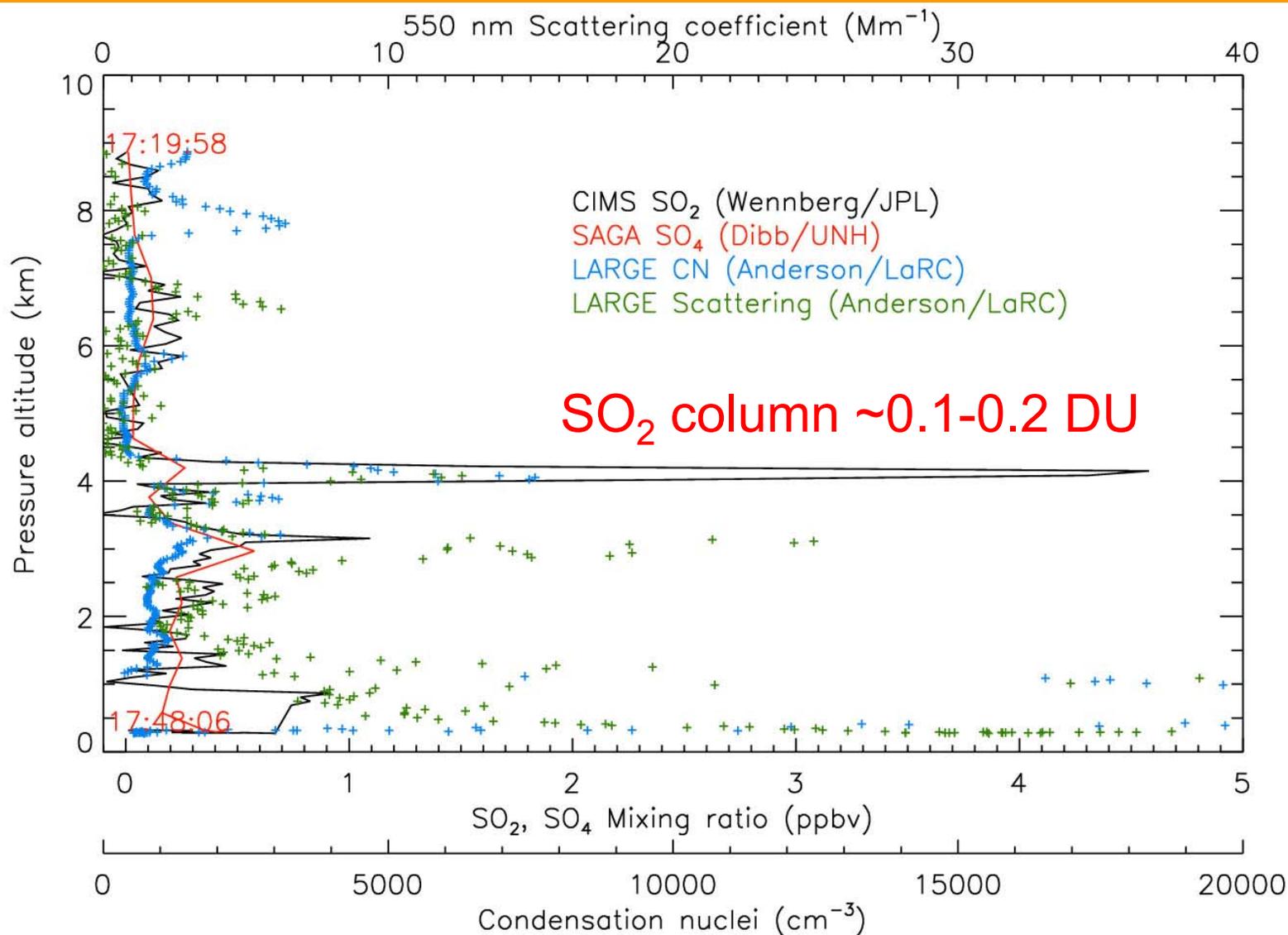
OMI SO₂ column and CIMS SO₂ from DC-8

Aura/OMI - 07/17/2007 18:43-18:44 UT - Orbit 15982

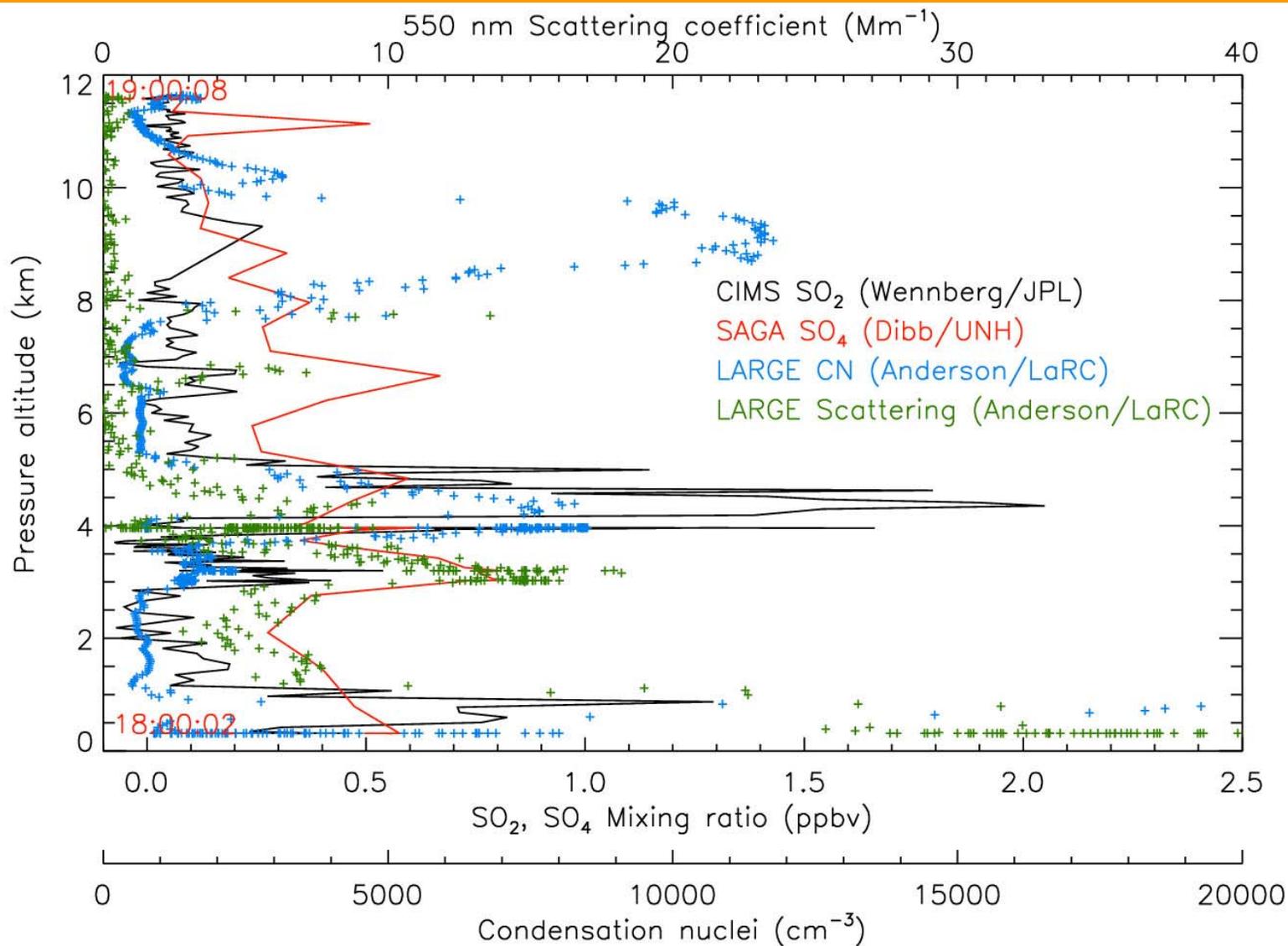
SO₂ mass: 0.046 kt; Area: 1351 km²; SO₂ max: 1.35 DU at lon: -78.99 lat: -1.63



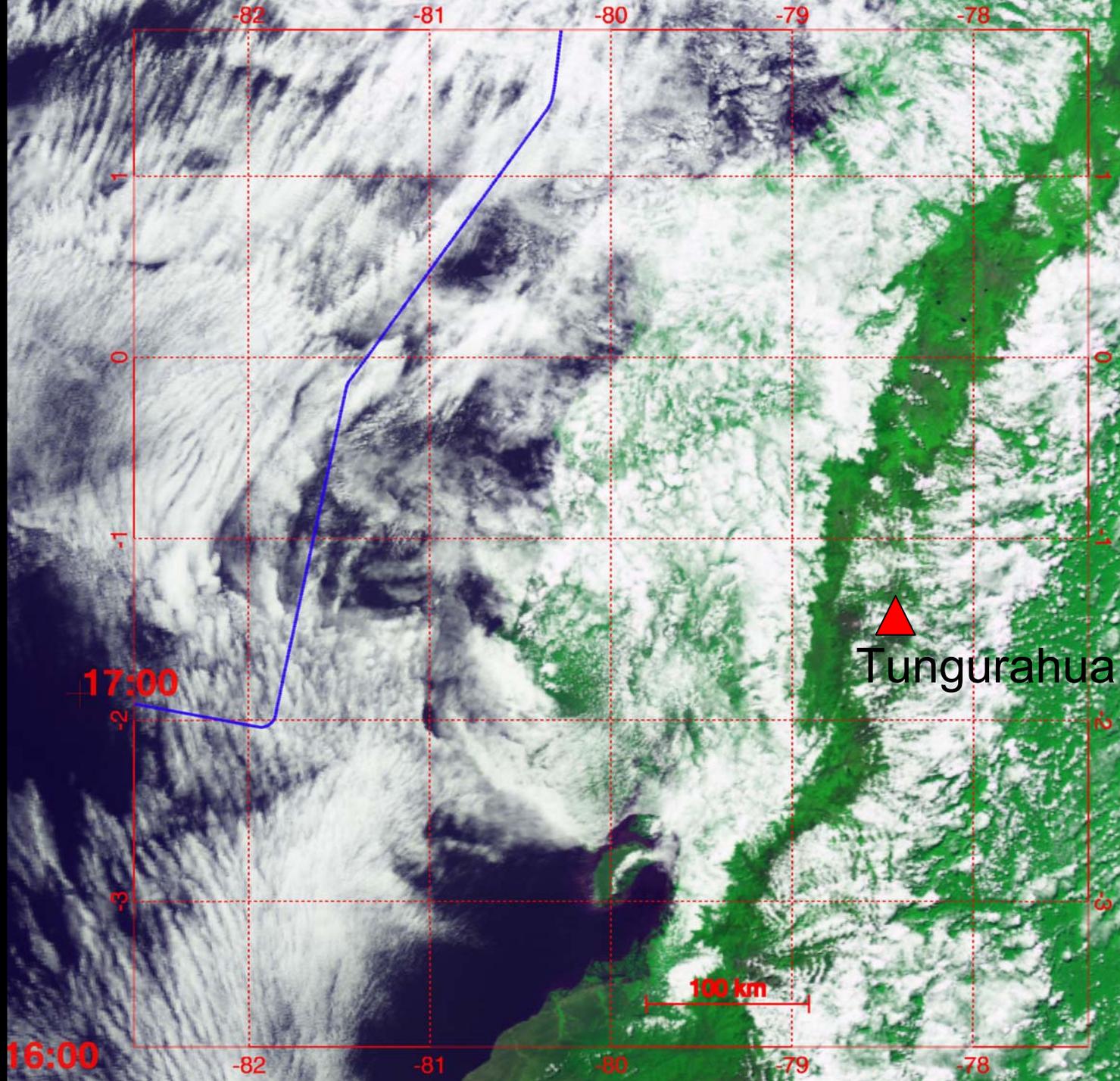
DC-8 profile (descent) off Ecuadorian coast on July 17



DC-8 profile (ascent) off Ecuadorian coast on July 17



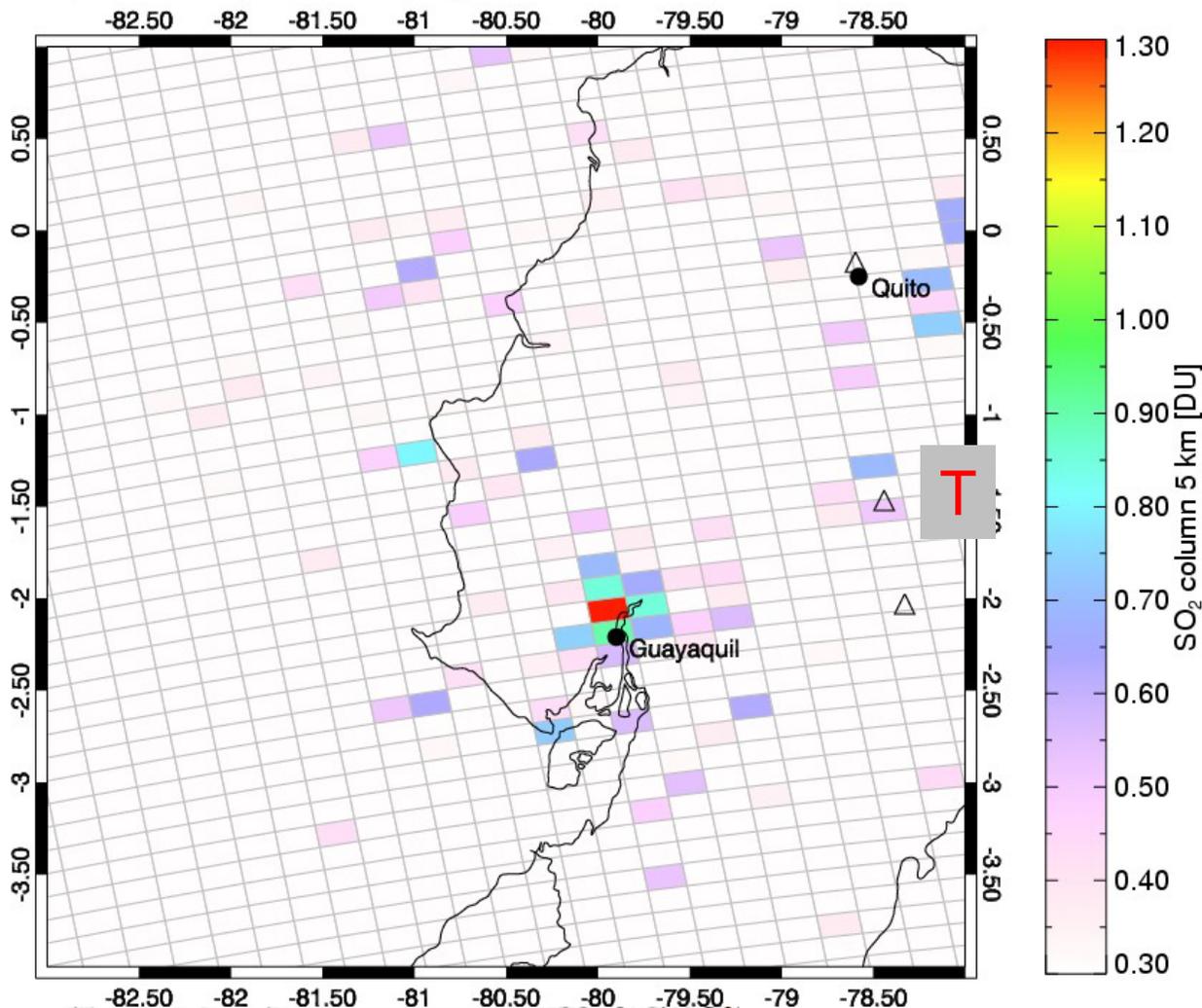
Aqua
MODIS
1850UT
July 29



OMI SO₂ column - July 29

Aura/OMI - 07/29/2007 19:07-19:09 UT - Orbit 16157

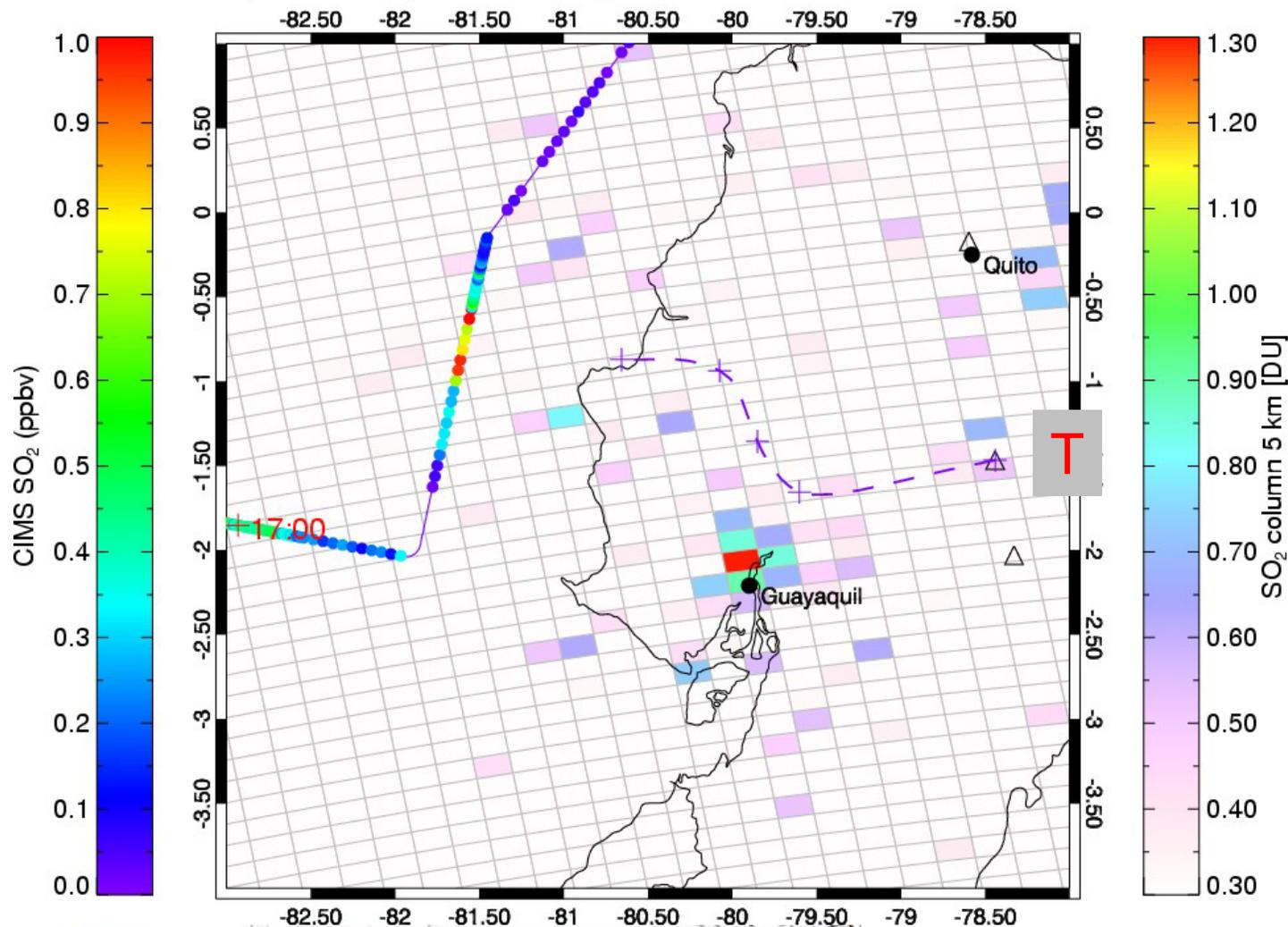
SO₂ mass: 0.017 kt; Area: 506 km²; SO₂ max: 1.48 DU at lon: -79.94 lat: -2.06



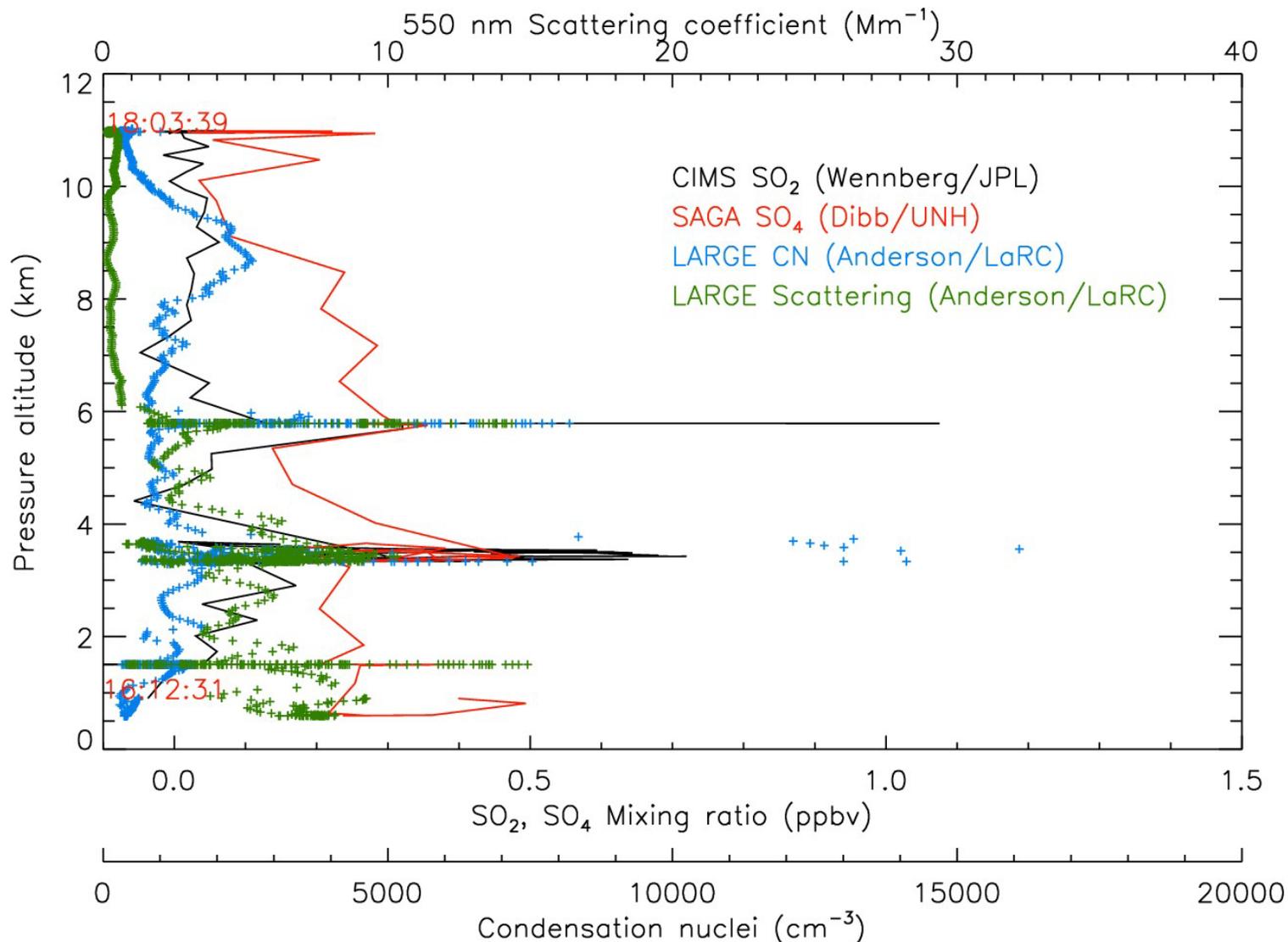
OMI SO₂ column and CIMS SO₂ from DC-8

Aura/OMI - 07/29/2007 19:07-19:09 UT - Orbit 16157

SO₂ mass: 0.017 kt; Area: 506 km²; SO₂ max: 1.48 DU at lon: -79.94 lat: -2.06



DC-8 profile (ascent) off Ecuadorian coast on July 29



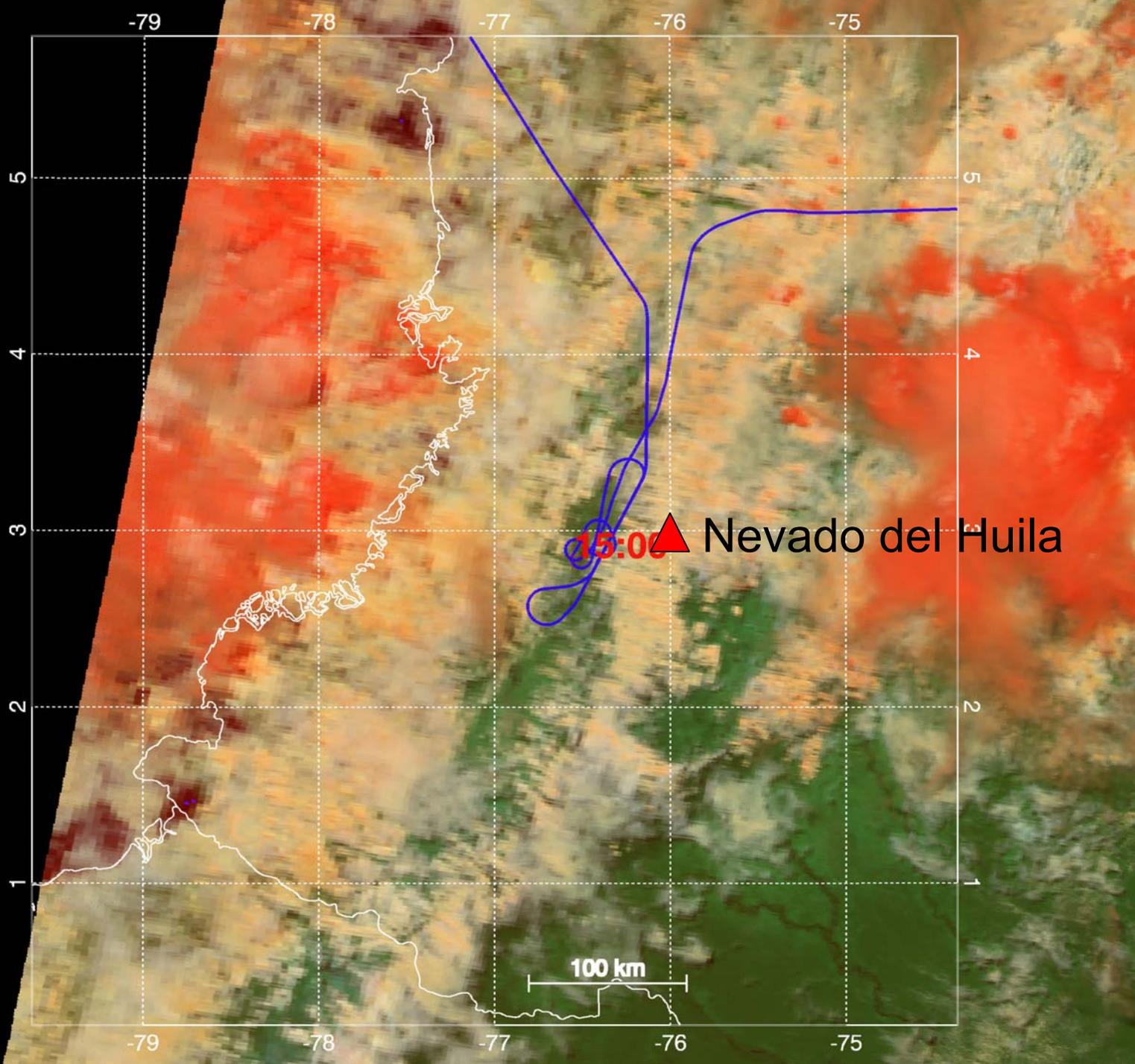
Nevado del Huila (Colombia)



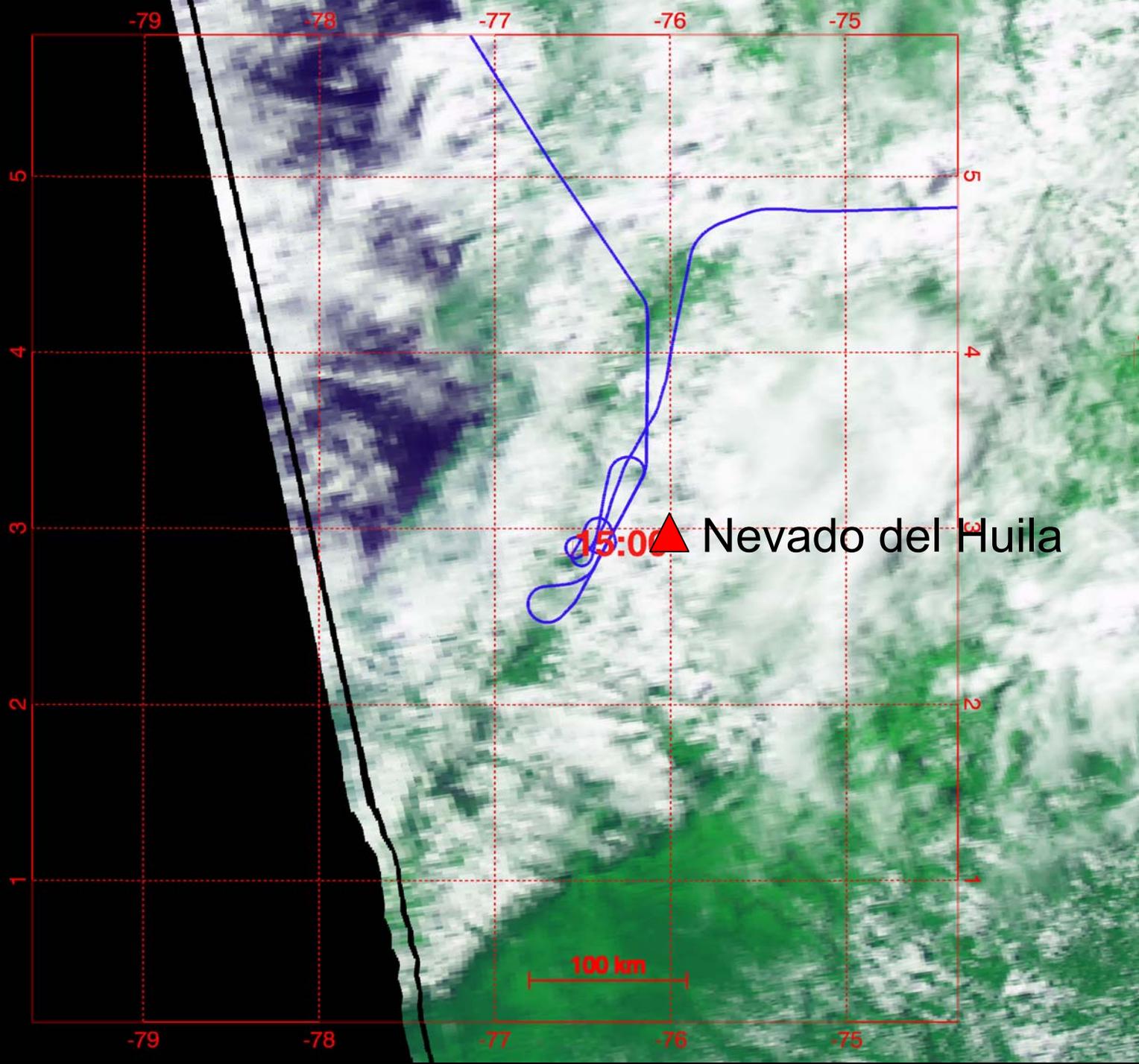
5365 m



Terra
MODIS
1500UT
July 21



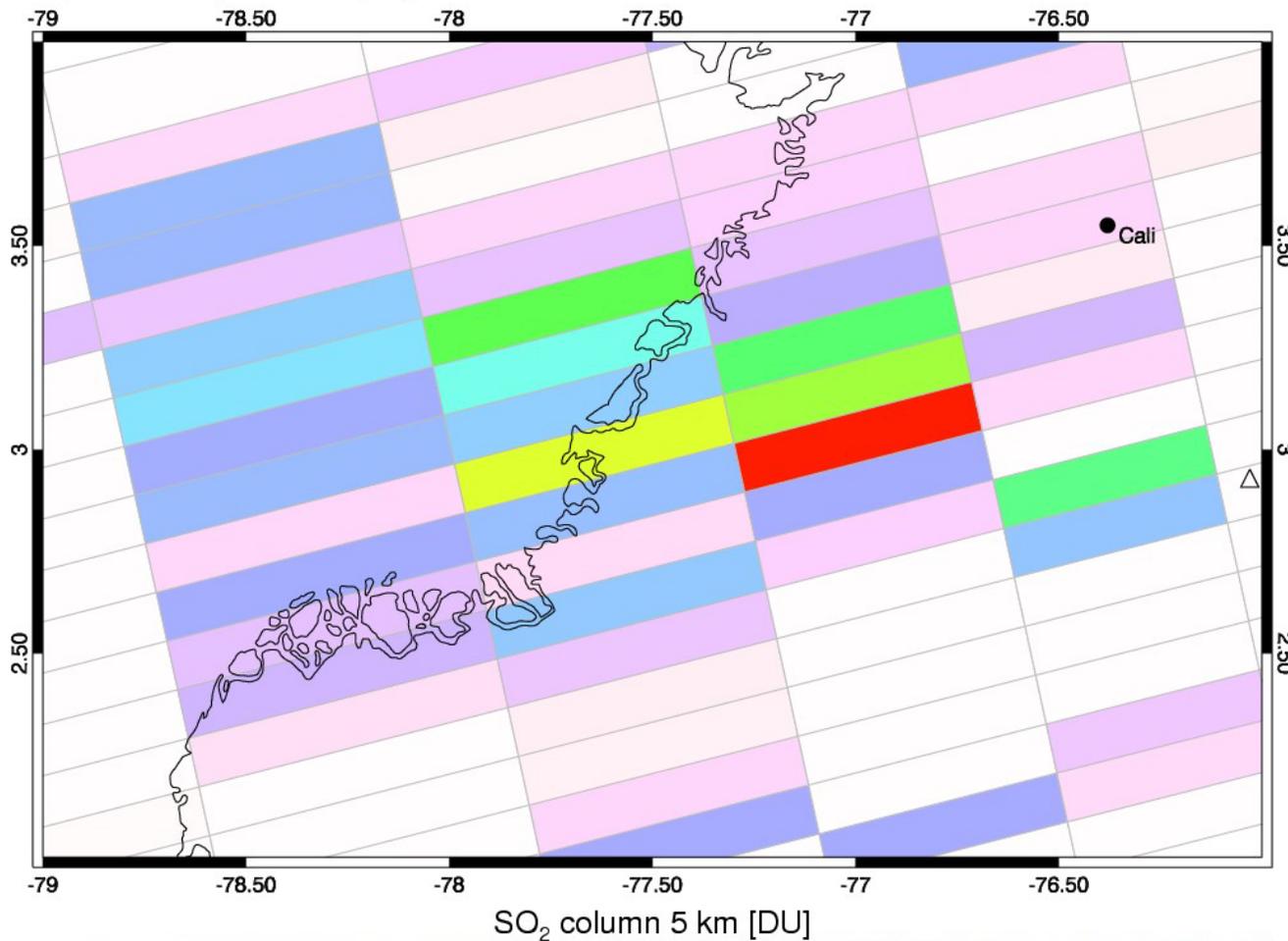
Aqua
MODIS
1800UT
July 21



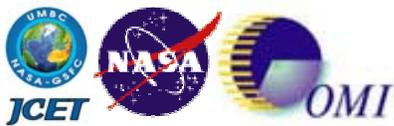
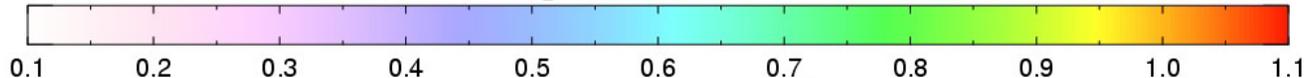
OMI SO₂ column - July 21

Aura/OMI - 07/21/2007 18:20-18:21 UT - Orbit 16040

SO₂ mass: 0.015 kt; Area: 506 km²; SO₂ max: 1.12 DU at lon: -76.98 lat: 3.06



Huila



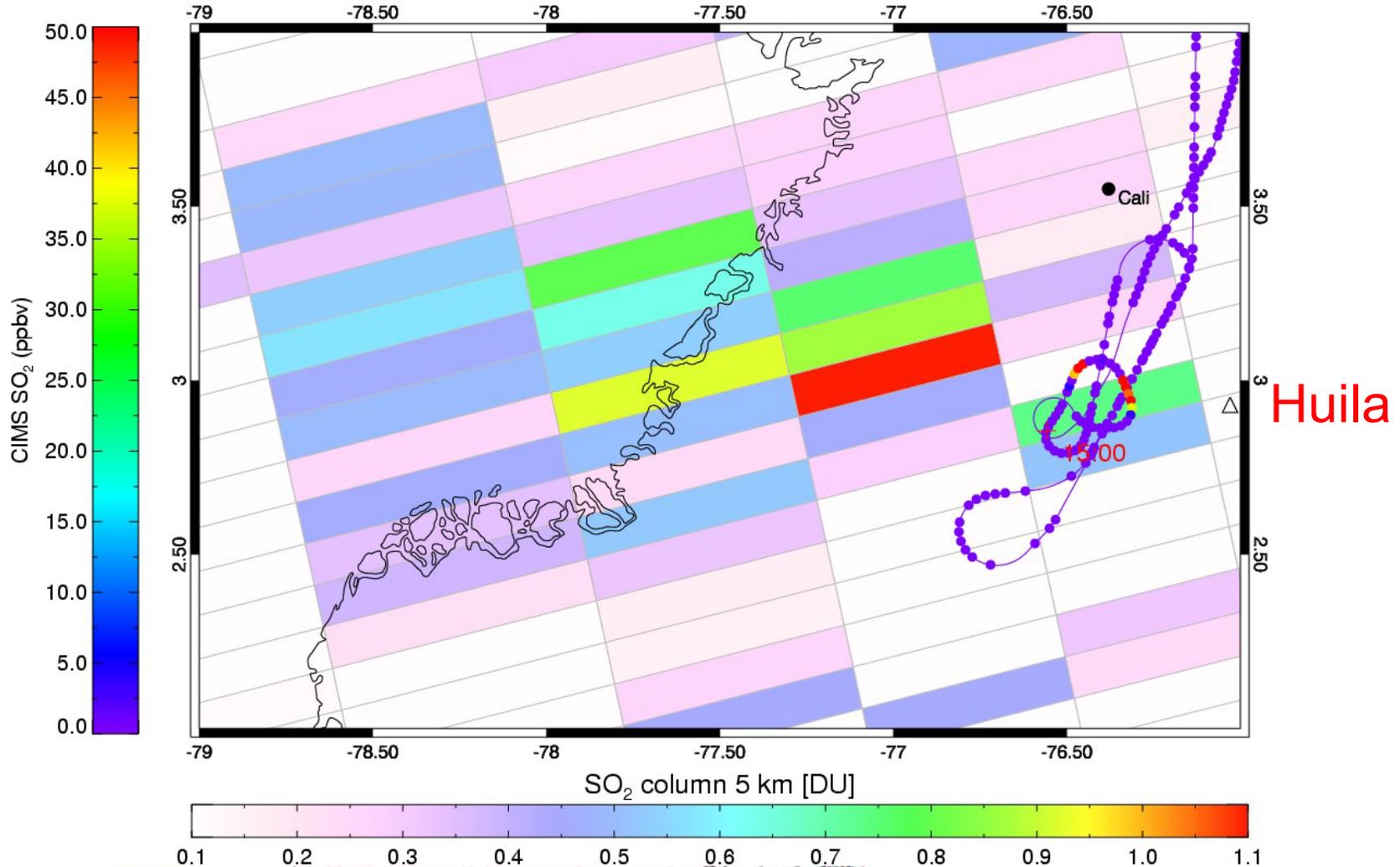
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OMI SO₂ column and CIMS SO₂ from DC-8

Aura/OMI - 07/21/2007 18:20-18:21 UT - Orbit 16040

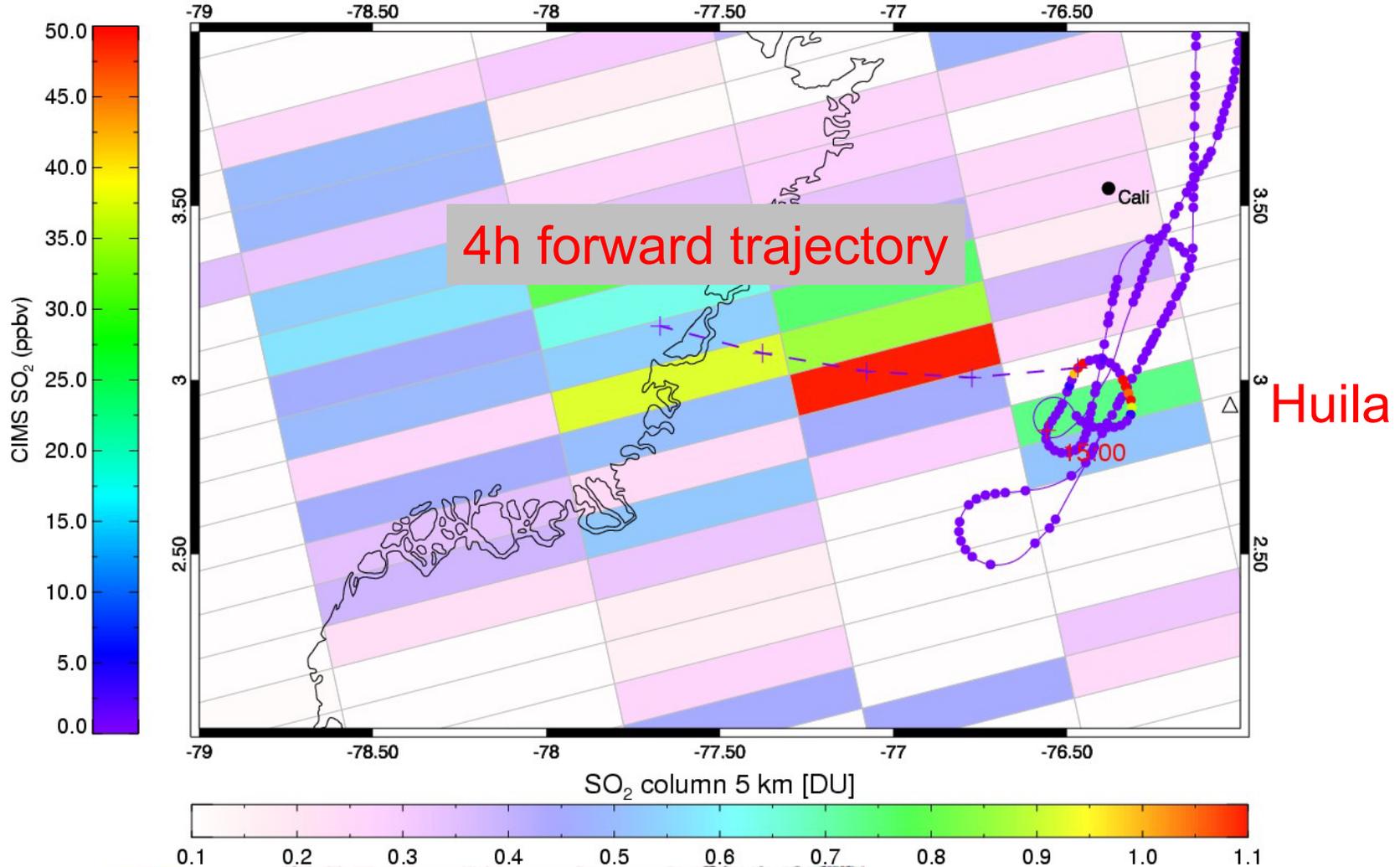
SO₂ mass: 0.015 kt; Area: 506 km²; SO₂ max: 1.12 DU at lon: -76.98 lat: 3.06



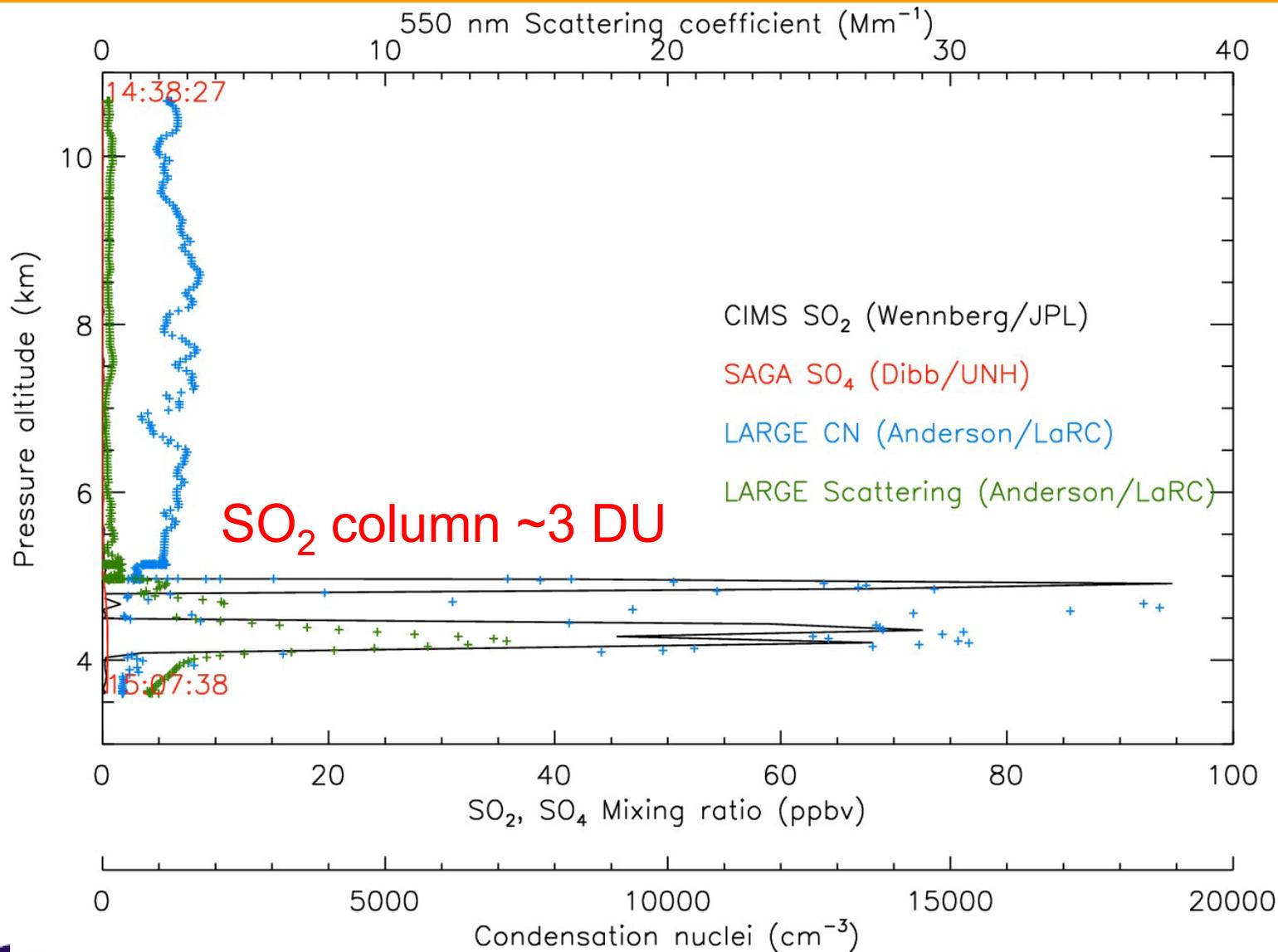
OMI SO₂ column and CIMS SO₂ from DC-8

Aura/OMI - 07/21/2007 18:20-18:21 UT - Orbit 16040

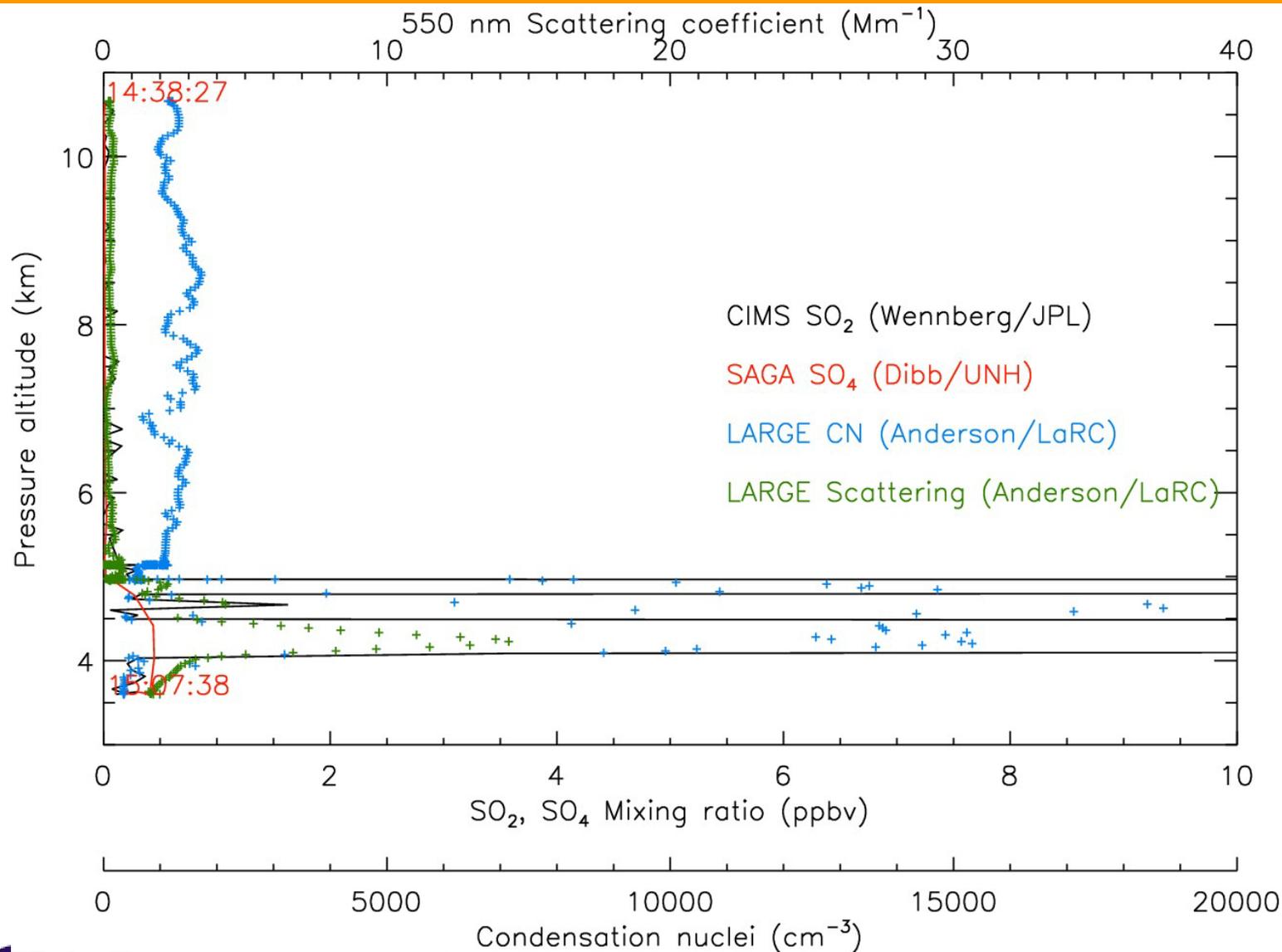
SO₂ mass: 0.015 kt; Area: 506 km²; SO₂ max: 1.12 DU at lon: -76.98 lat: 3.06



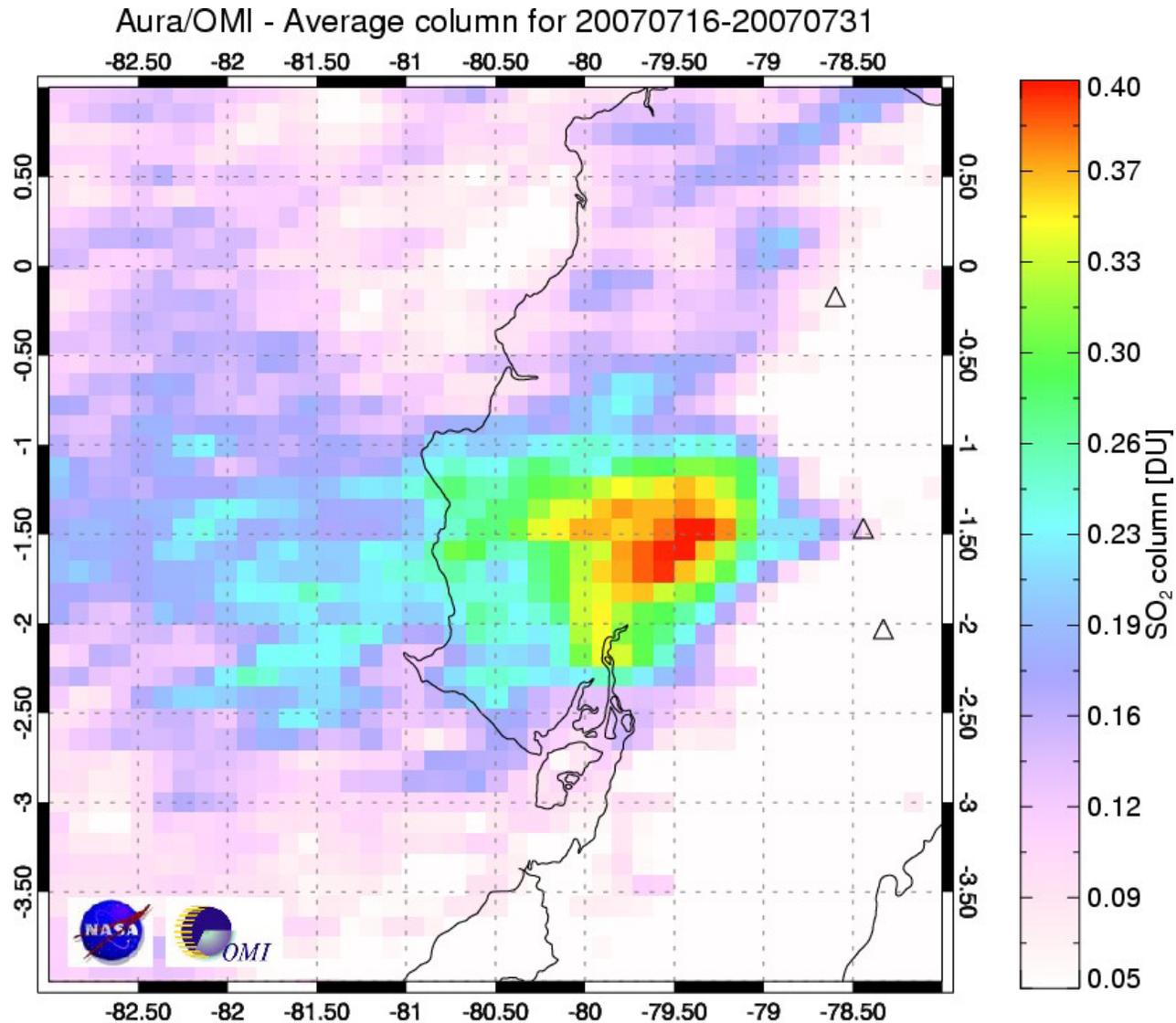
DC-8 profile west of Nevado del Huila on July 21



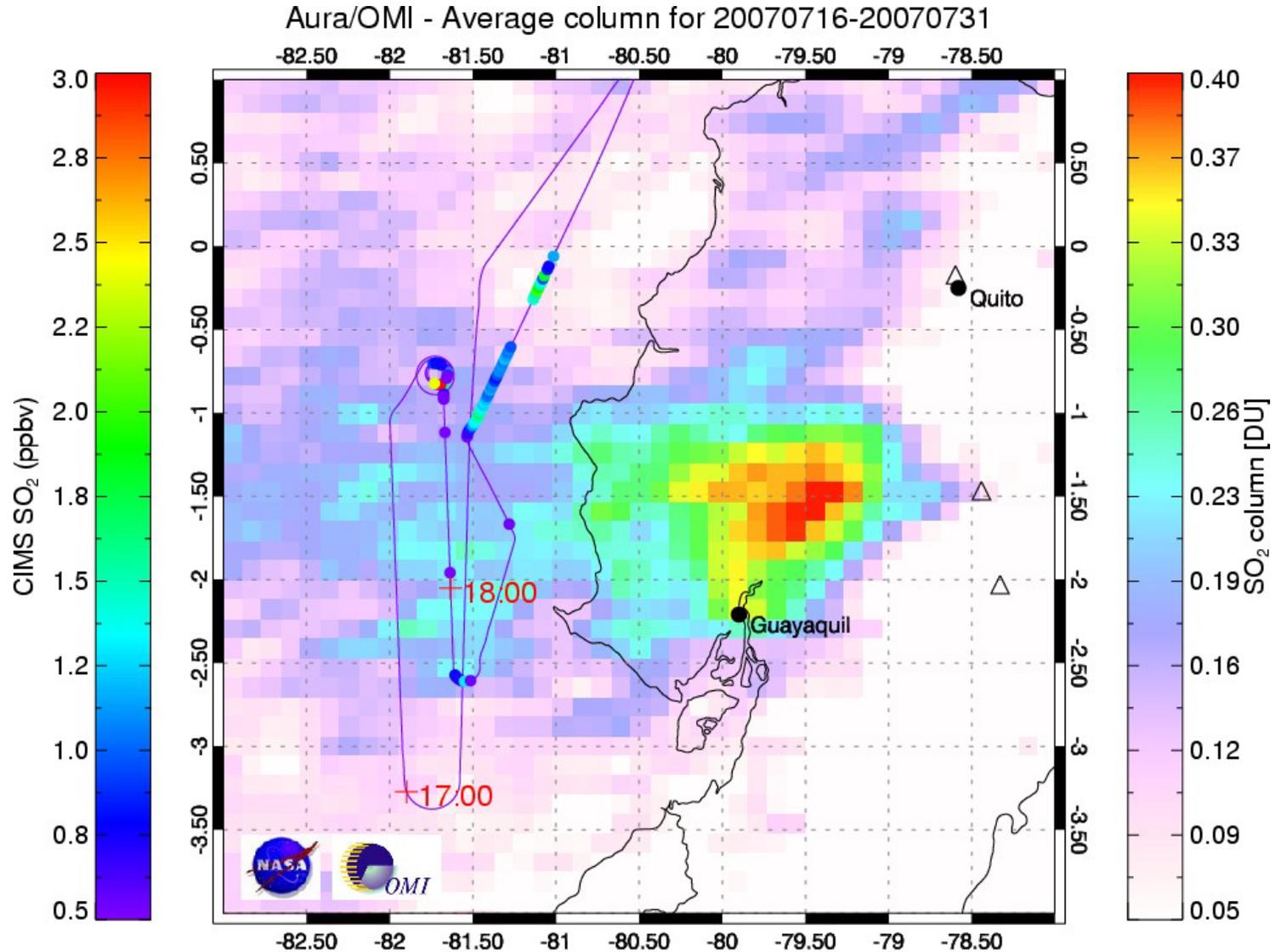
DC-8 profile west of Nevado del Huila on July 21



Average OMI SO₂ column for 16-31 July



Average OMI SO₂ column and CIMS SO₂ on July 17



Summary

- NASA DC-8 collected some valuable in-situ data from volcanic plumes in Ecuador and Colombia during TC⁴
- SO₂ amounts encountered west of Ecuador appear too low for validation of current operational OMI SO₂ retrievals in individual FOVs
- However, the in-situ data are consistent with average SO₂ columns measured by OMI in the volcanic outflow region
- Much higher SO₂ amounts were measured at Huila (Colombia), though not coincident with the OMI overpass
- A next step will be to calculate AMFs using the DC-8 SO₂ profiles and apply them to OMI spectral fit SO₂ retrievals
- Much more data to explore (aerosols, CO, CO₂)



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