

MODIS Atmosphere Validation
Some Current Efforts

**S. Platnick, L. Remer, C. Moeller,
et al.**

MODIS Science Team Meeting
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MODIS Atmosphere Products, a reminder

Cloud mask

- for determining “clear-sky” scenes

Cloudy skies

- cloud properties
optical, microphysical (τ_c, r_e), cloud top (T_c, p_c, ϵ_c)

Clear skies

- aerosol optical, microphysical properties (τ_a , land/ocean; + size information over ocean)
- atmospheric state (moisture, temperature, total precipitable water), column ozone

scale: molecules to ice particles, vertical & horizontal
no single validation approach suitable for all products

Comments on Atmosphere Validation (*a personal view*)

“Validated product” ?

Validation especially difficult for some algorithms (e.g., clouds)

- lack of accepted metrics, accurate alternate measurement techniques (in situ, remote), spatial sampling difficulties, etc.
- may often be consistent retrievals but no single correct retrieval

An on-going, long-term effort

- climate studies based on consistent algorithms

Validation Approaches

Comparison with existing satellite instruments and algorithms, or other MODIS products

- e.g., GOES, HIRS, AMSU (temperature, moisture, TPW, cloud top properties)
- **thermal band radiometric validation**

Fixed sites

- **AERONET** (sunphotometers); ARM, FARS (radar, lidar); radiosondes

Field campaigns

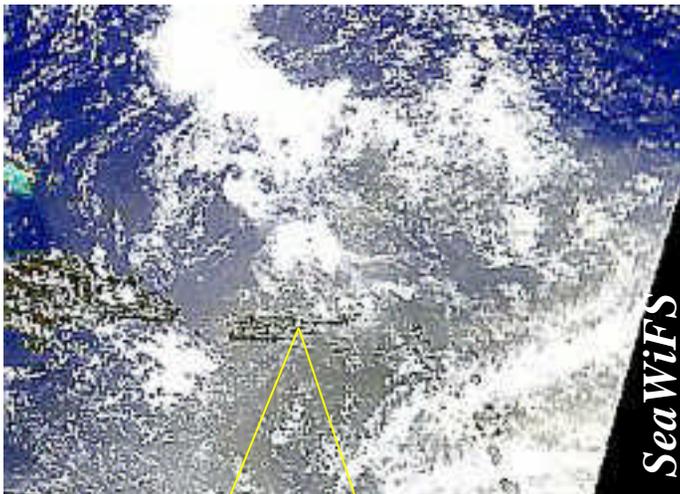
- typically dedicated to a class of algorithms (clear sky, aerosol, clouds)
- recently completed **PRIDE**, **SAFARI 2000**

details in Atmosphere Validation Plan (updated 8 August 2000)

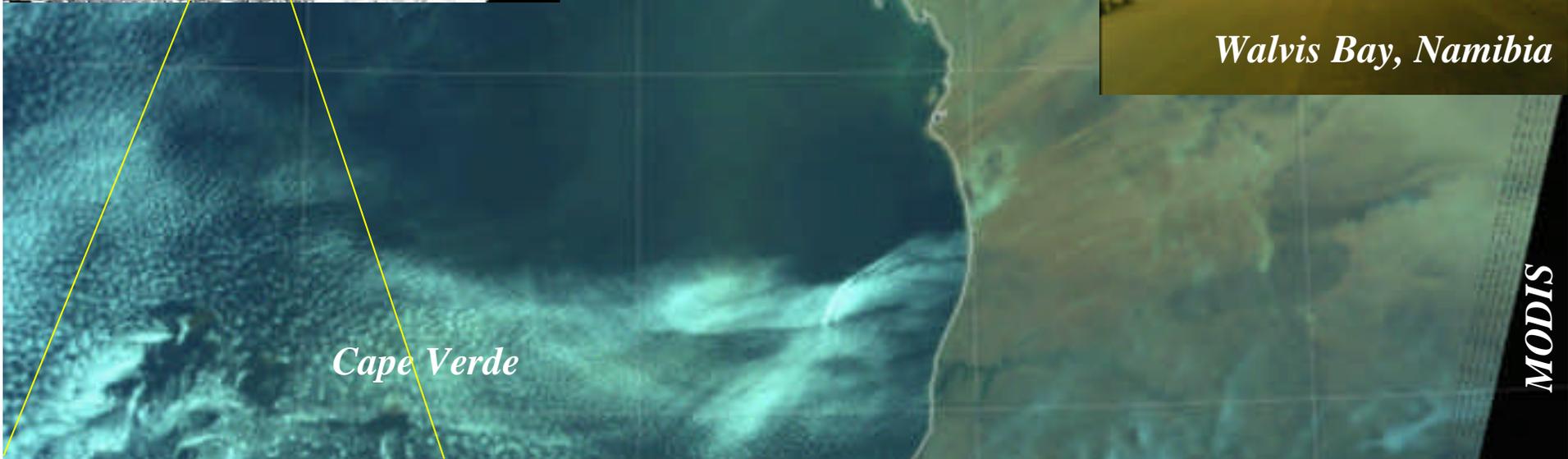
<http://modis-atmos.gsfc.nasa.gov>

PRIDE

June 27- July 24, 2000

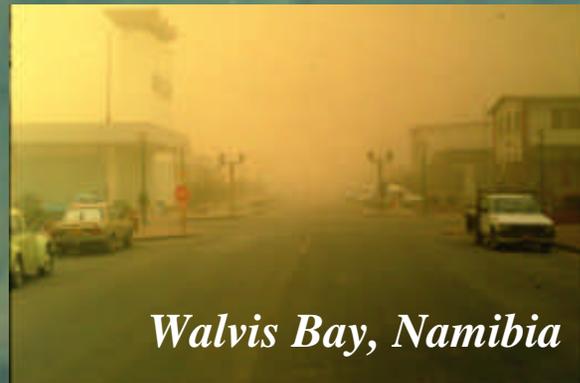


SeaWiFS



Cape Verde

MODIS



Walvis Bay, Namibia



Puerto Rico



NASA/SMART



UPR/Chapman



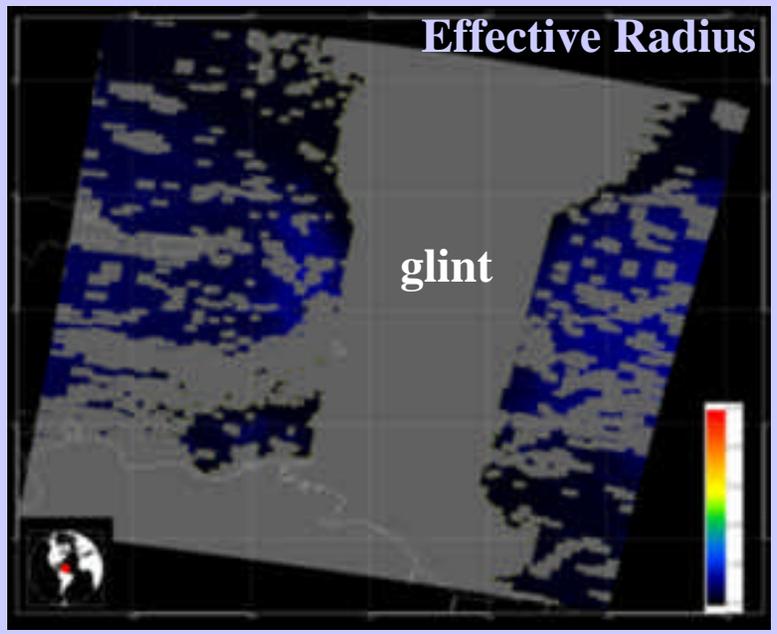
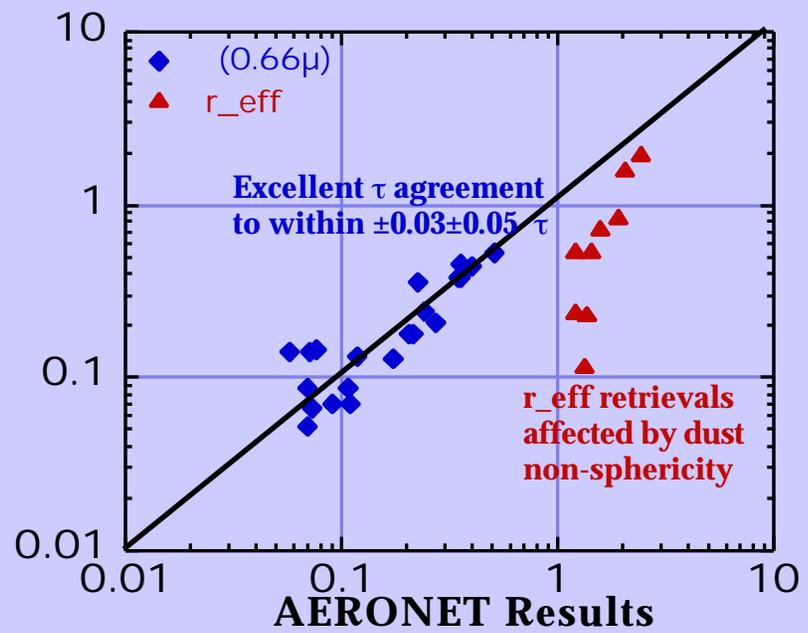
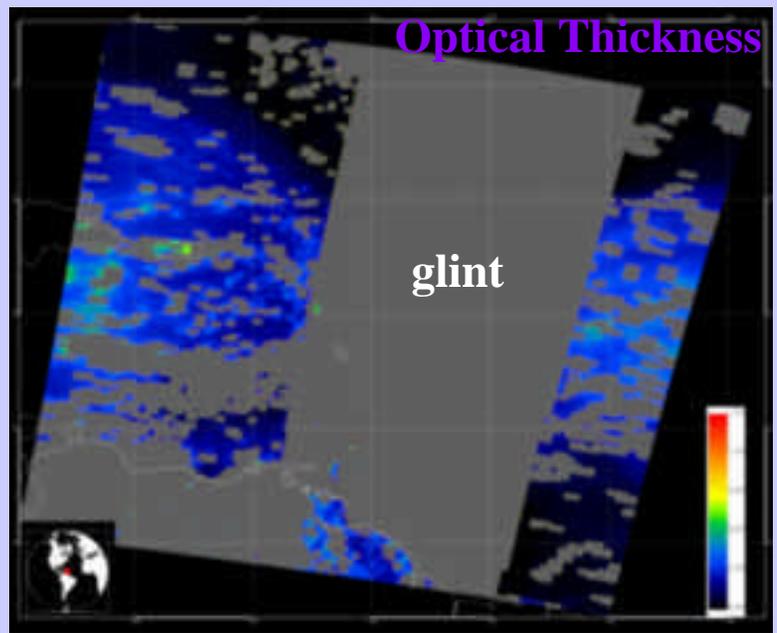
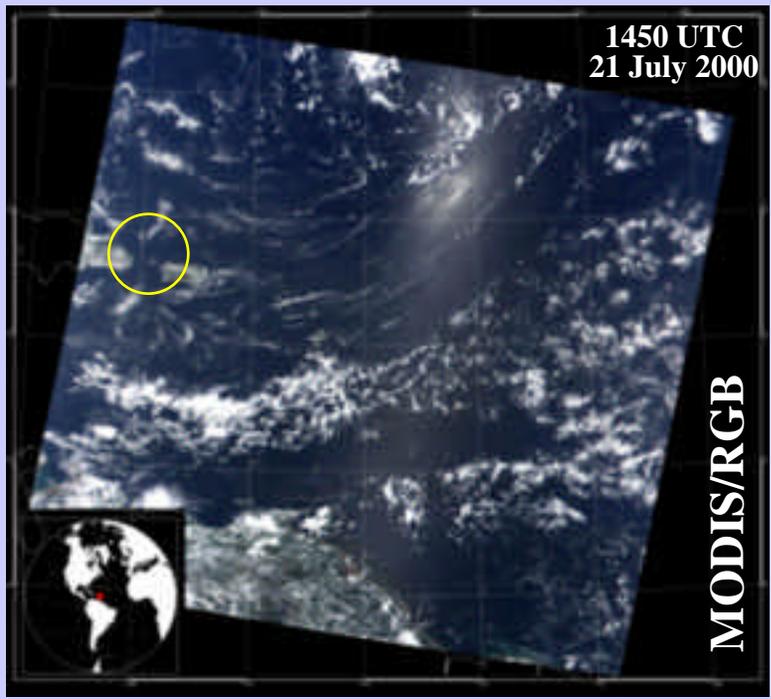
ONR/Navajo

Yesterday, Lorraine showed aerosol over ocean validation by comparing MODIS retrievals with co-located AERONET observations. These data are extracted from AERONET's automatic, operational, global data set, as described by Charles Ichoku.

There were only 1 or 2 points in that automatic data set that we can identify as dust aerosol.

In PRiDE an array of ground-based, ship-based and airborne sunphotometers was deployed in order to increase our opportunity to validate aerosol in a well-known dust environment.

MODIS Aerosol Retrieval



Southern African Regional Science Initiative 2000

SAFARI 2K

Aug-Sept. 1999 (dry) , Feb.-March 2000 (wet),
Aug.-Sept. 2000 (dry)

- Integrate remote sensing, computational modeling, airborne sampling and ground-based studies to study biological, physical and chemical components of the regional ecosystems
- **EOS validation** (ground-based, aircraft)
 - primarily clear sky aerosol/fires campaign
 - last 10 days aircraft focused on marine stratocumulus off coastal Namibia and clouds in interior South Africa

in situ aerosol, cloud probes (**FSSP**, **PCASP**, **PVM**, **PMS 1-D**, **2-D** ; **CCN** counter for cloud work)
chemistry, optical characterization
radiometers: **CAR**, **SSFR** (spectral flux), **AATS** (tracking sun photometer)



University of Washington CV-580



South African Weather Bureau Aerocommander JR-A(B)

JR-A: aerosol probes, chemistry
JR-B: cloud probes, CCN counter

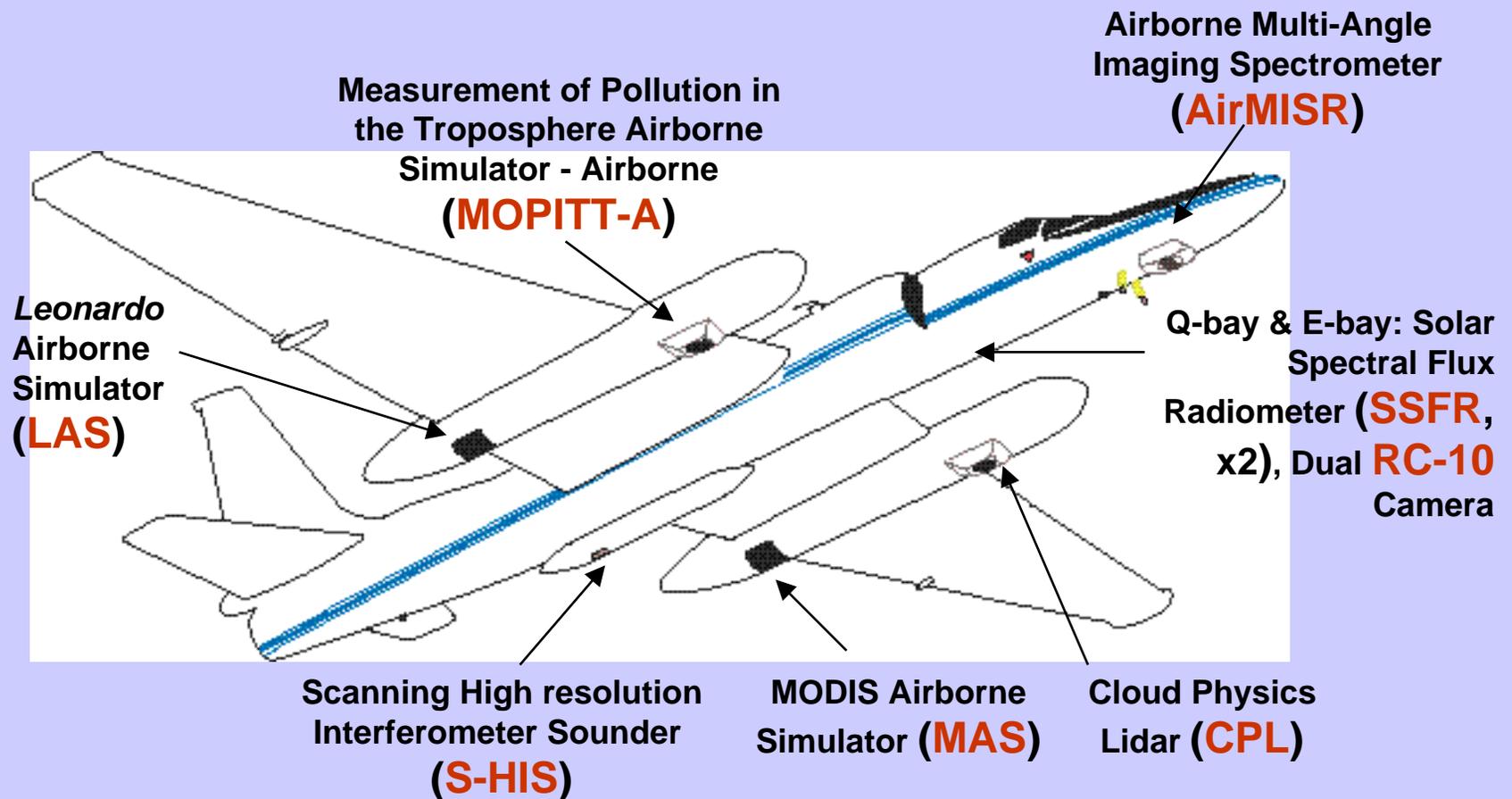


NASA ER-2

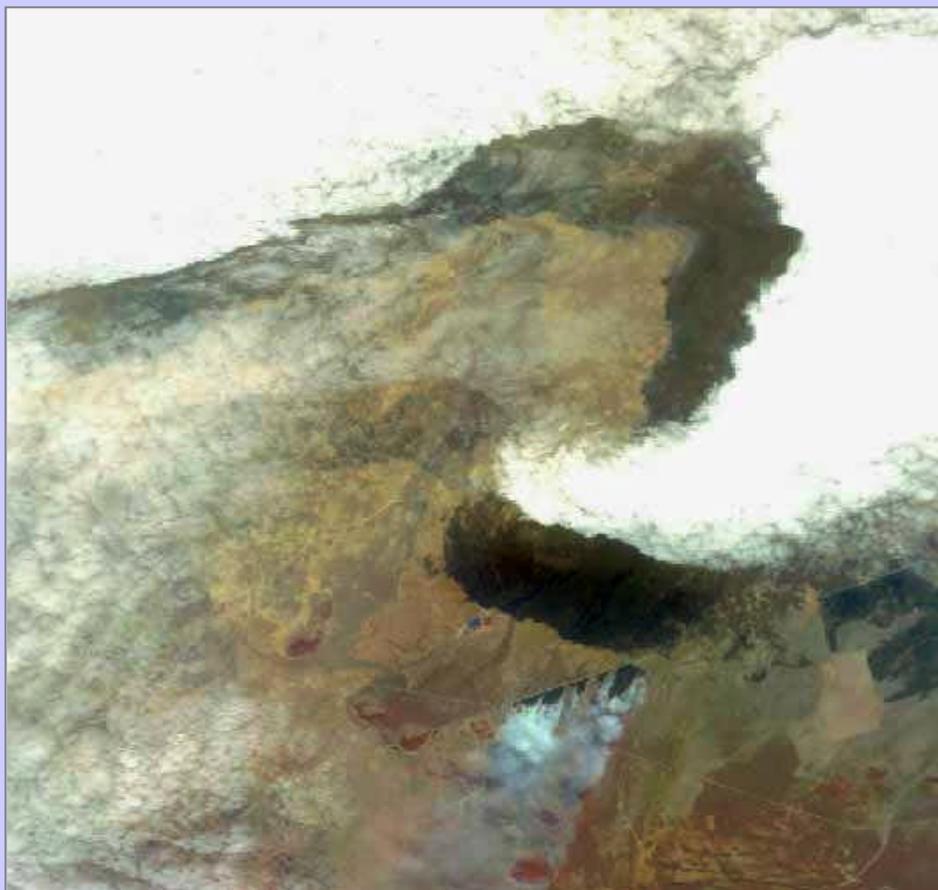


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SAFARI 2000 ER-2 Instrument Configuration



RGB: natural color



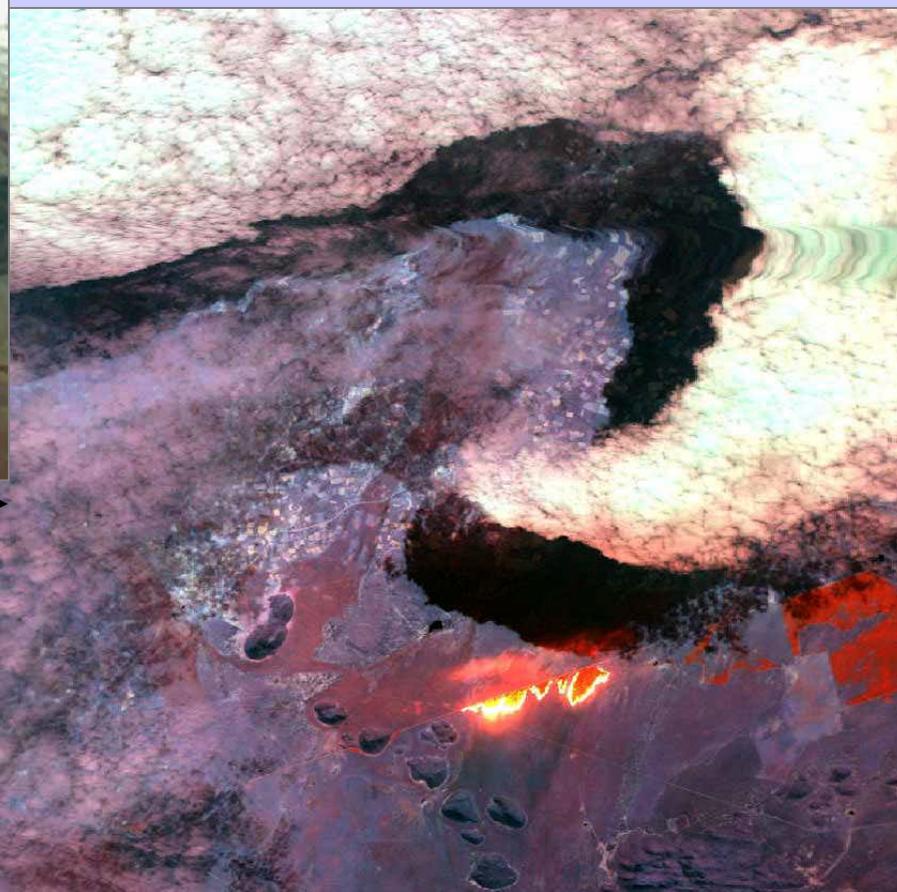
36 km

6.5°
Flight Direction

MAS

fire example, 20 Aug 2000
(Madikwe game reserve, RSA)

RGB: 3.7, 2.2, 1.6 μm

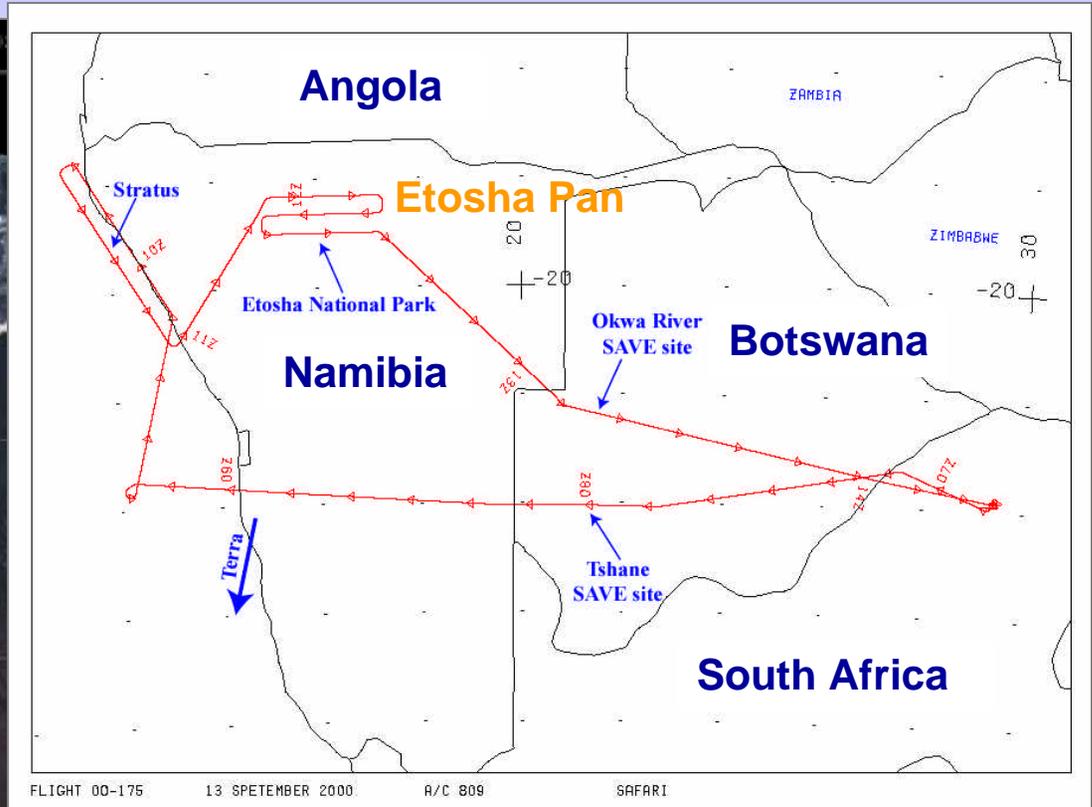
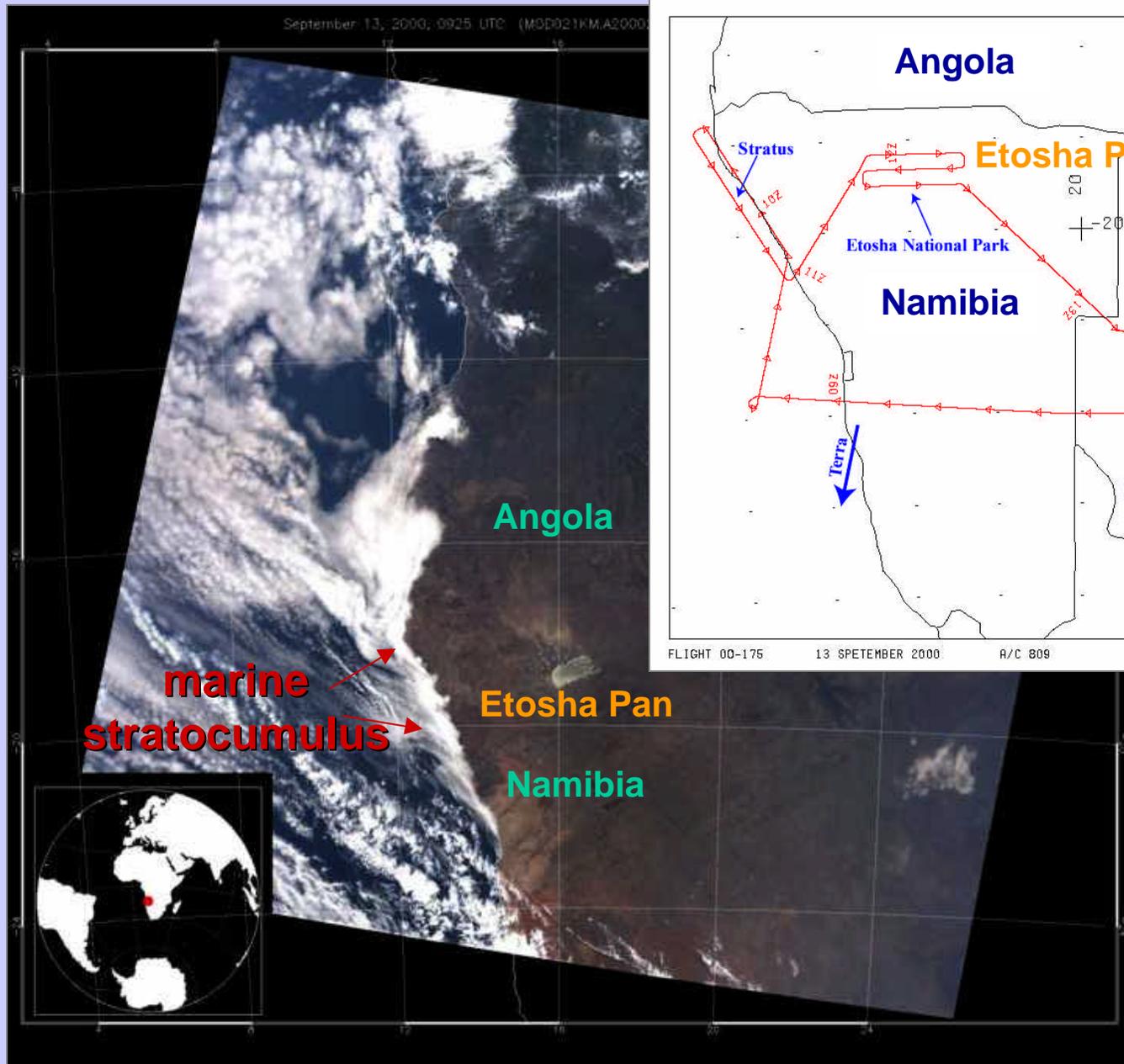




**Fire in vicinity of
Pietersburg, RSA**
21 Sept 2000
(JR-B)

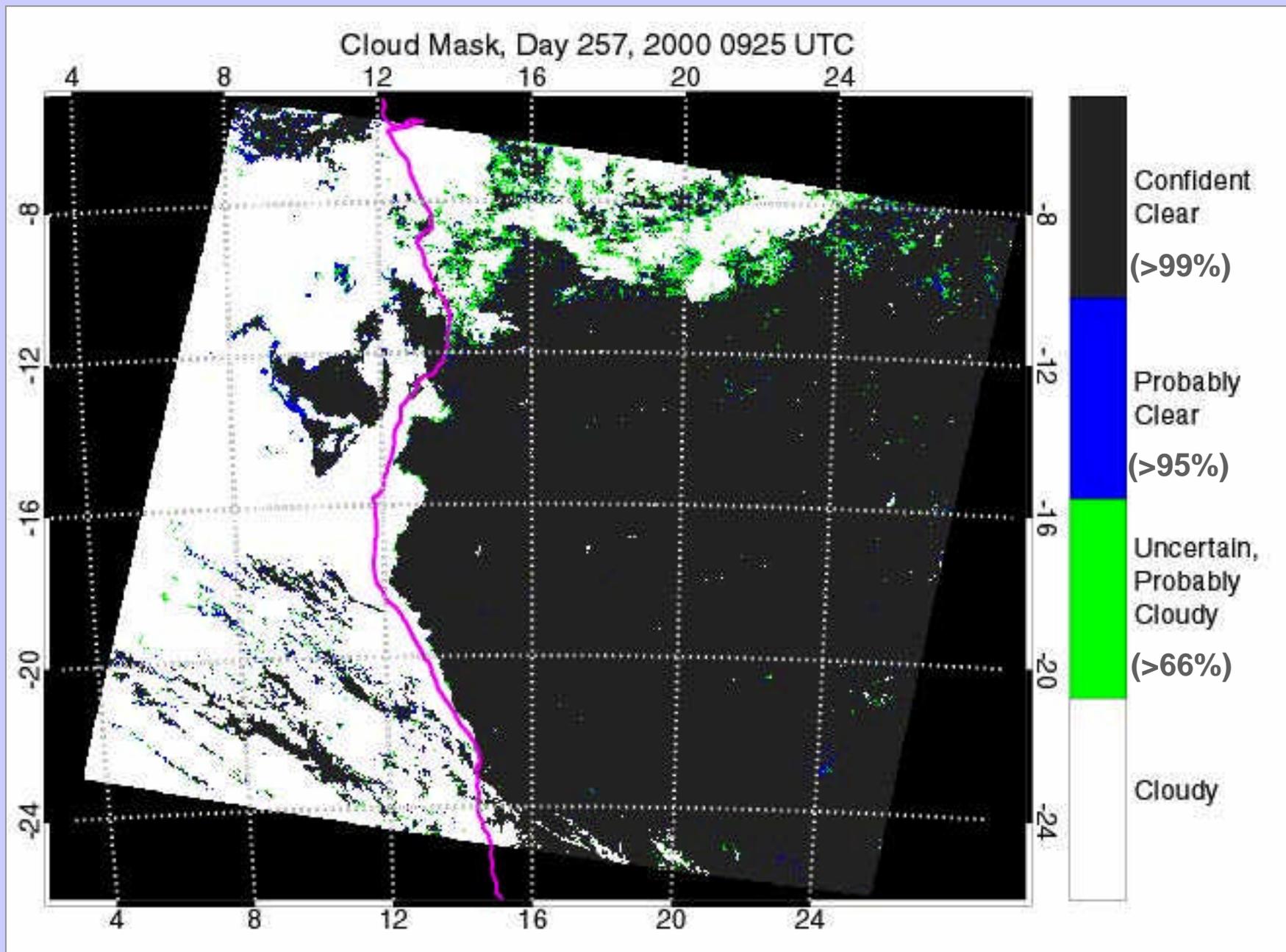


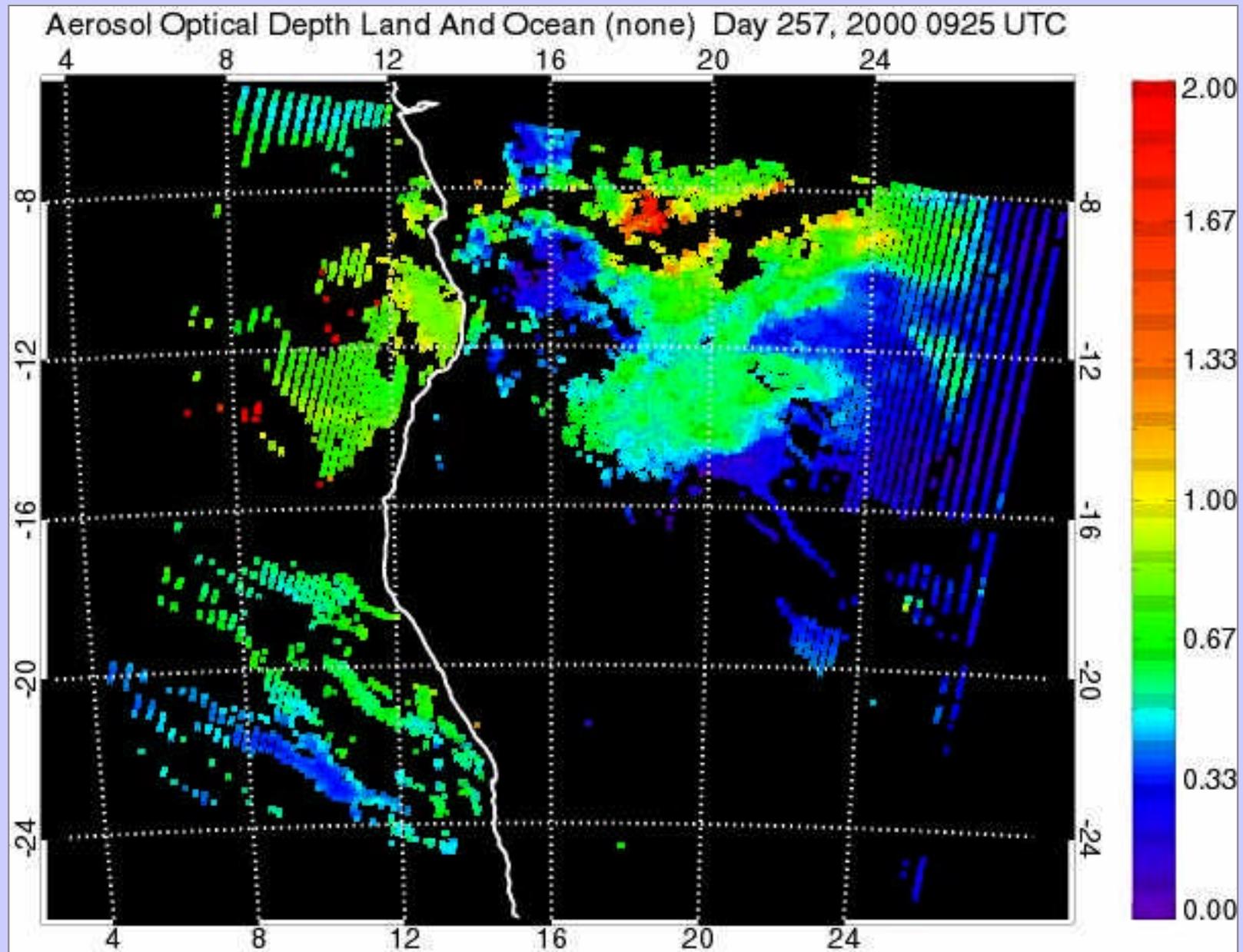
MODIS SAFARI granule: 13 September 2000, 0925 UTC

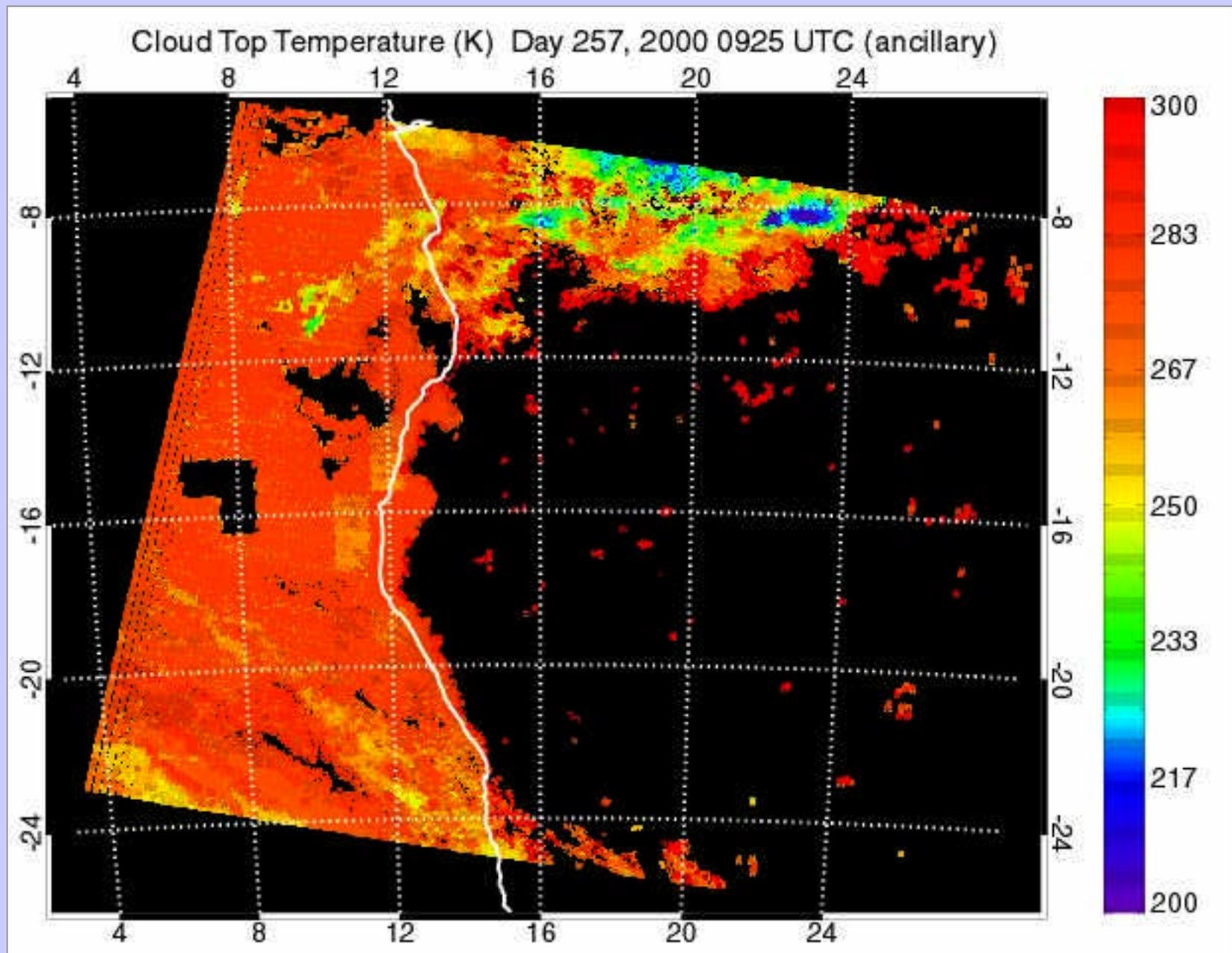


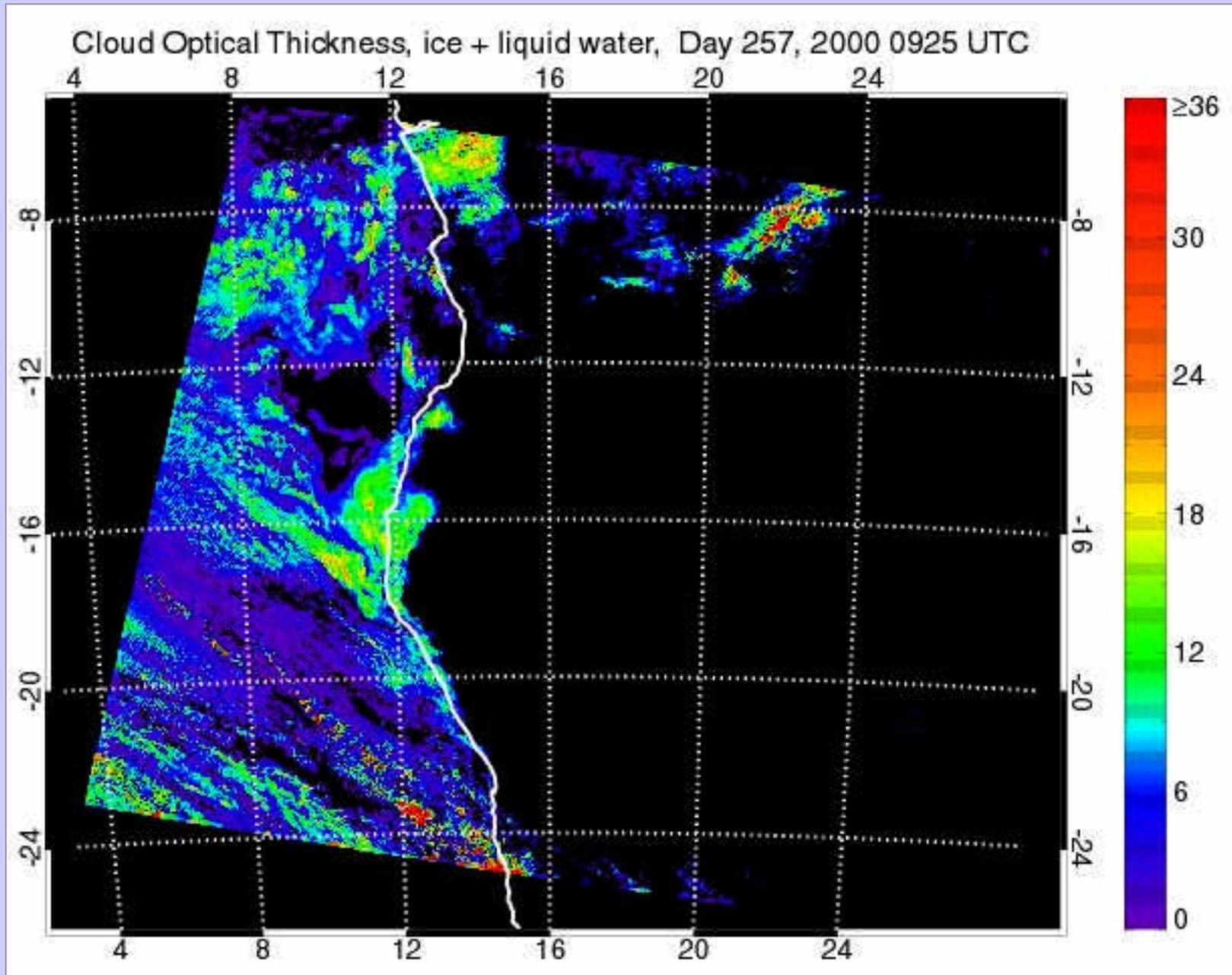
ER-2 ground track

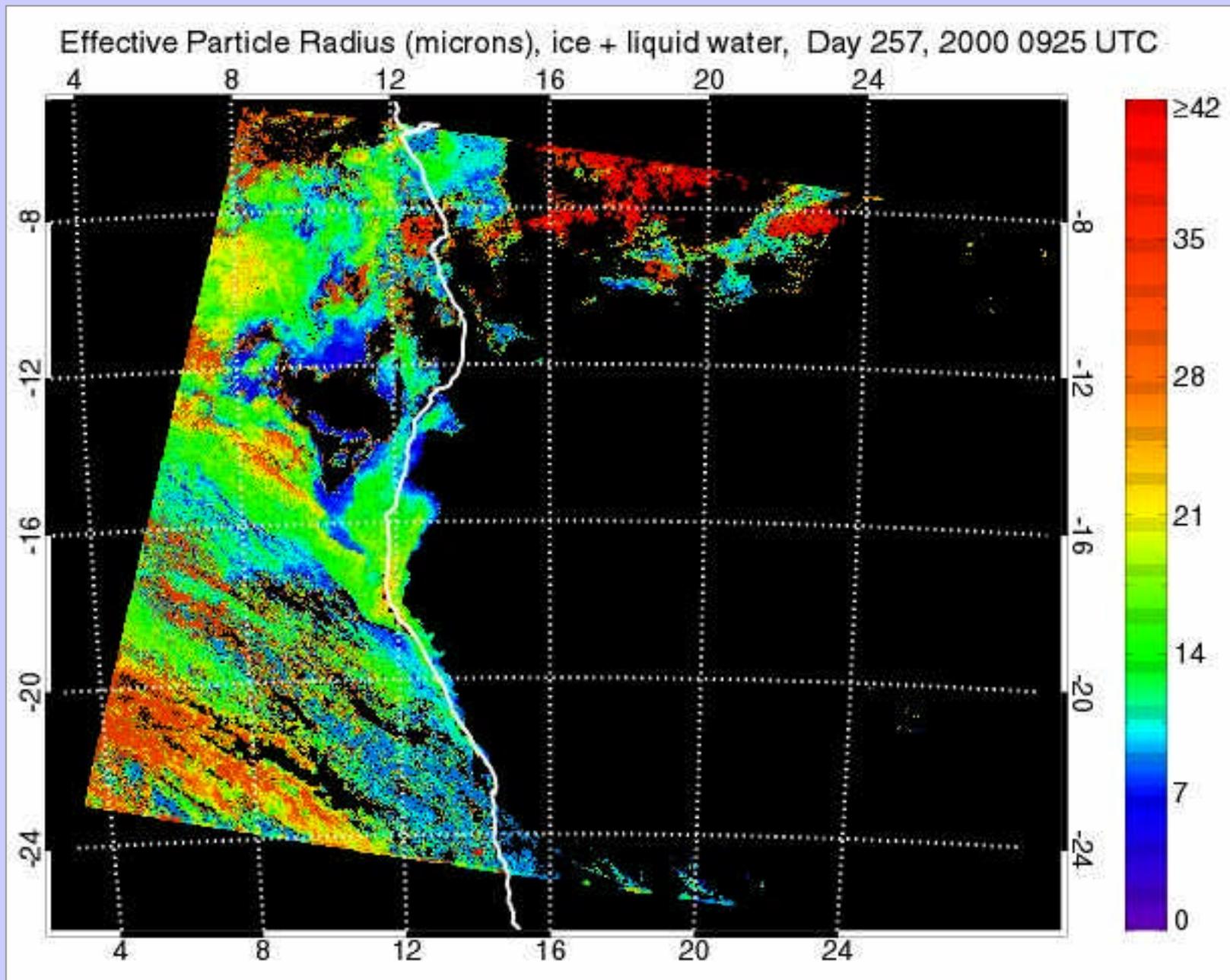
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