MOD06 Cloud Retrievals

optical thickness, particle effective radius, column water path

M. D. King, S. Platnick
M. Gray, E. Moody, J. Li,
G. T. Arnold, S. C. Tsay
et al.

MODIS Science Team meeting
7 June 2000

MOD06

Strategy: top-down

- Use MODAPS processing (global, L3 imagery) to flag gross problems
- Study/analyze a small number of “golden granules” from “golden day(s)”
- Test modifications on *Windhoek* (atmo. machine) and MAS data sets

→ Visualization: L1B, L2, global, ancillary data sets, pixel level QA (processing path)

MOD06

Overview

- Top of the “food chain”, ingesting:
  - individual cloud mask tests to determine processing path (*decision tree*)
  - cloud top properties from MOD06
  - ancillary data sets
    - ecosystem maps → sfc. reflectance
    - NISE → snow/ice ecosystem
    - NCEP → atmospheric correction

MOD06

results of individual cloud mask tests,
cloud mask ecosystem map

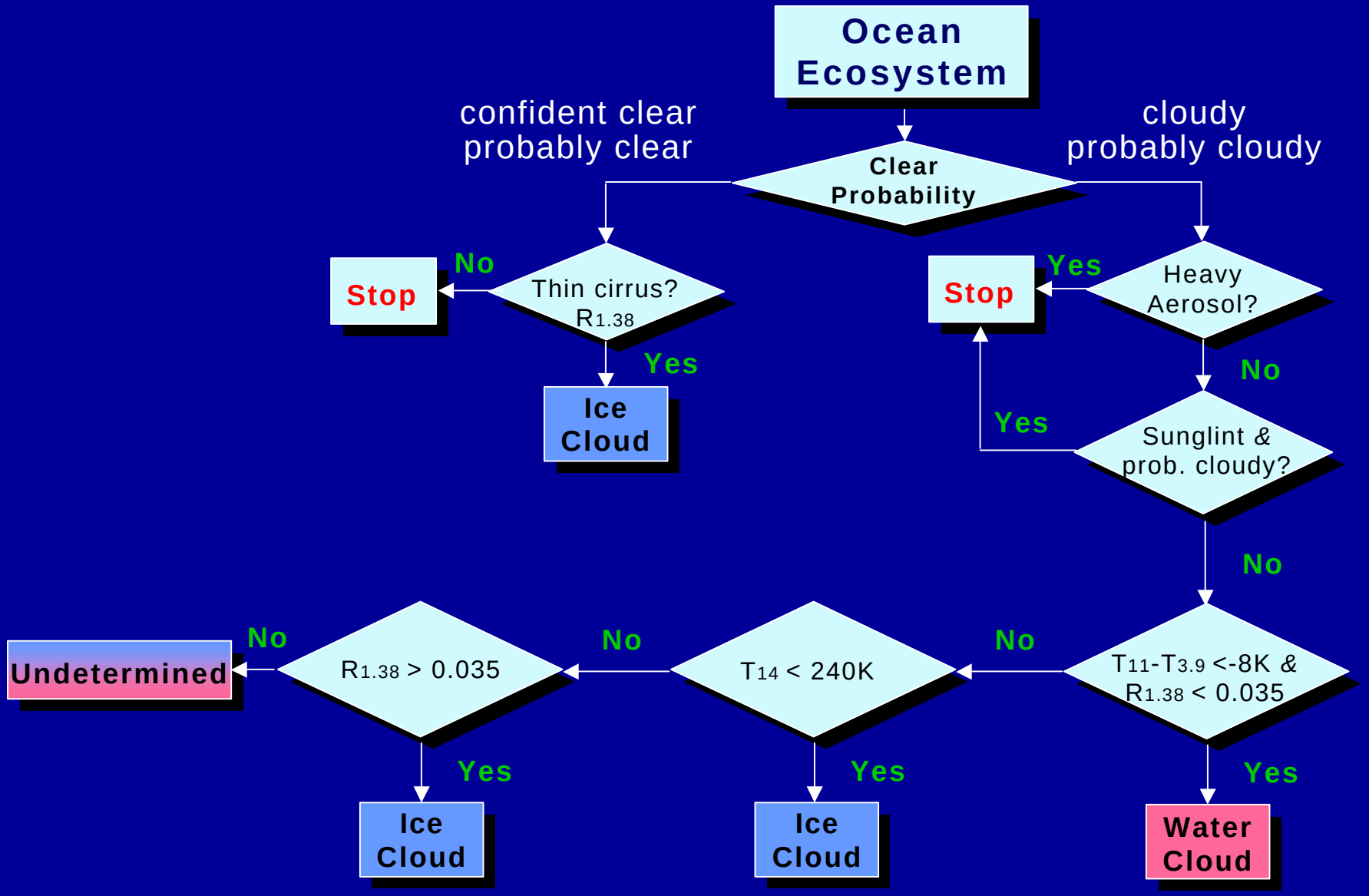
↓

decision tree

↓

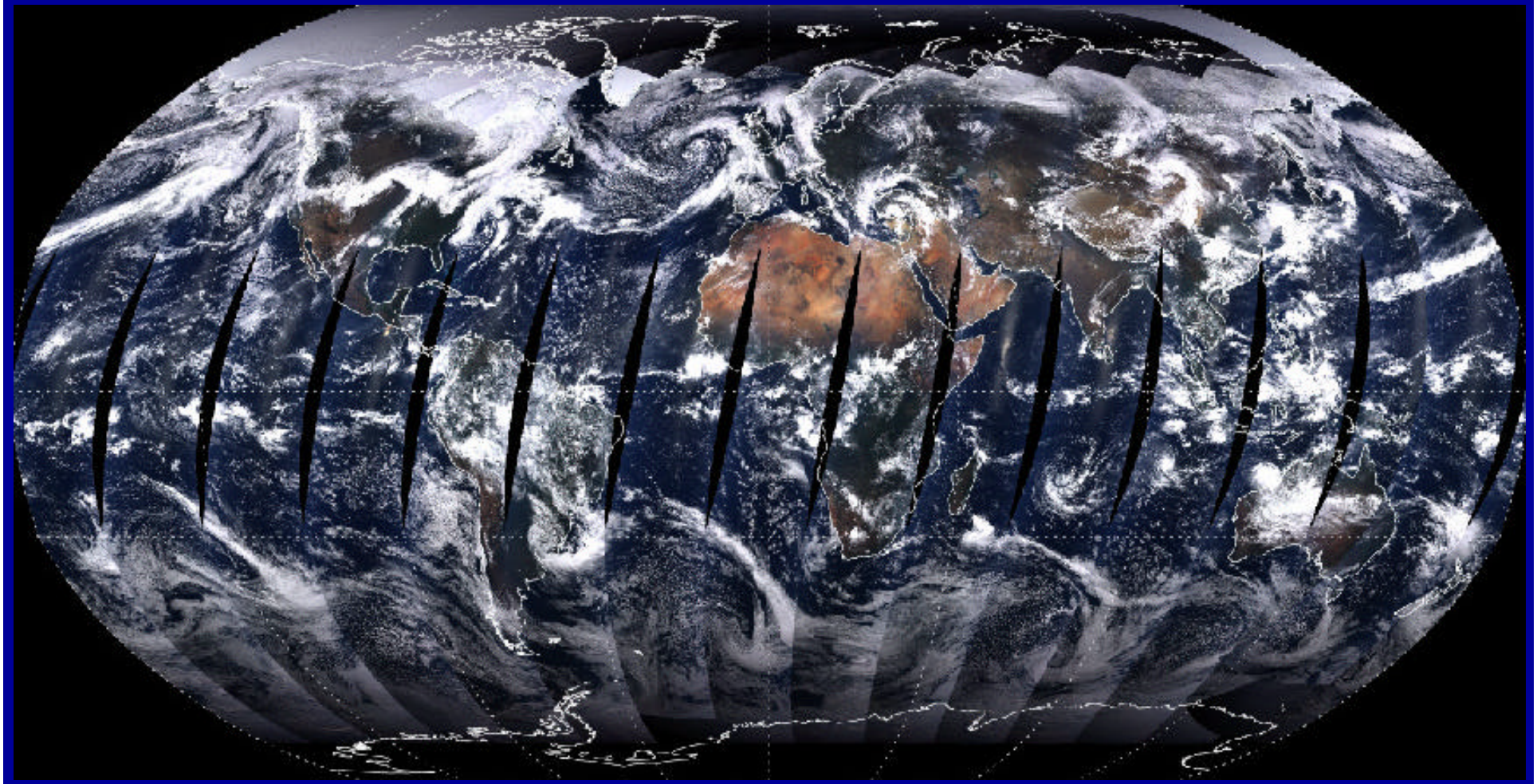
when to retrieve,
estimate of cloud phase

cloud mask decision tree - processing path example



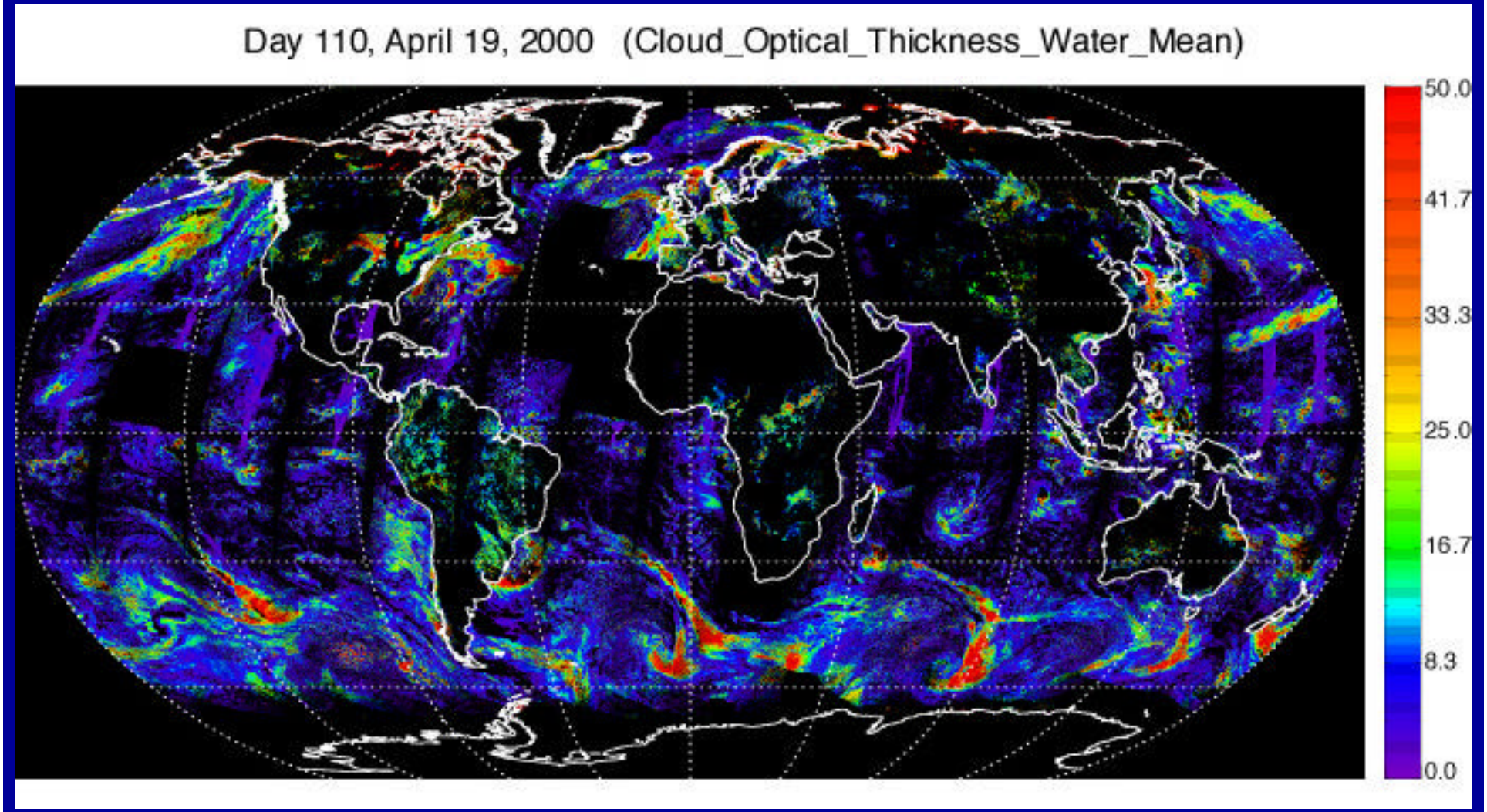
S. Platnick, MST 7 June 2000

MODIS Atmosphere's Global 19 April 2000
L1B True color RGB, Bands 1 4 3



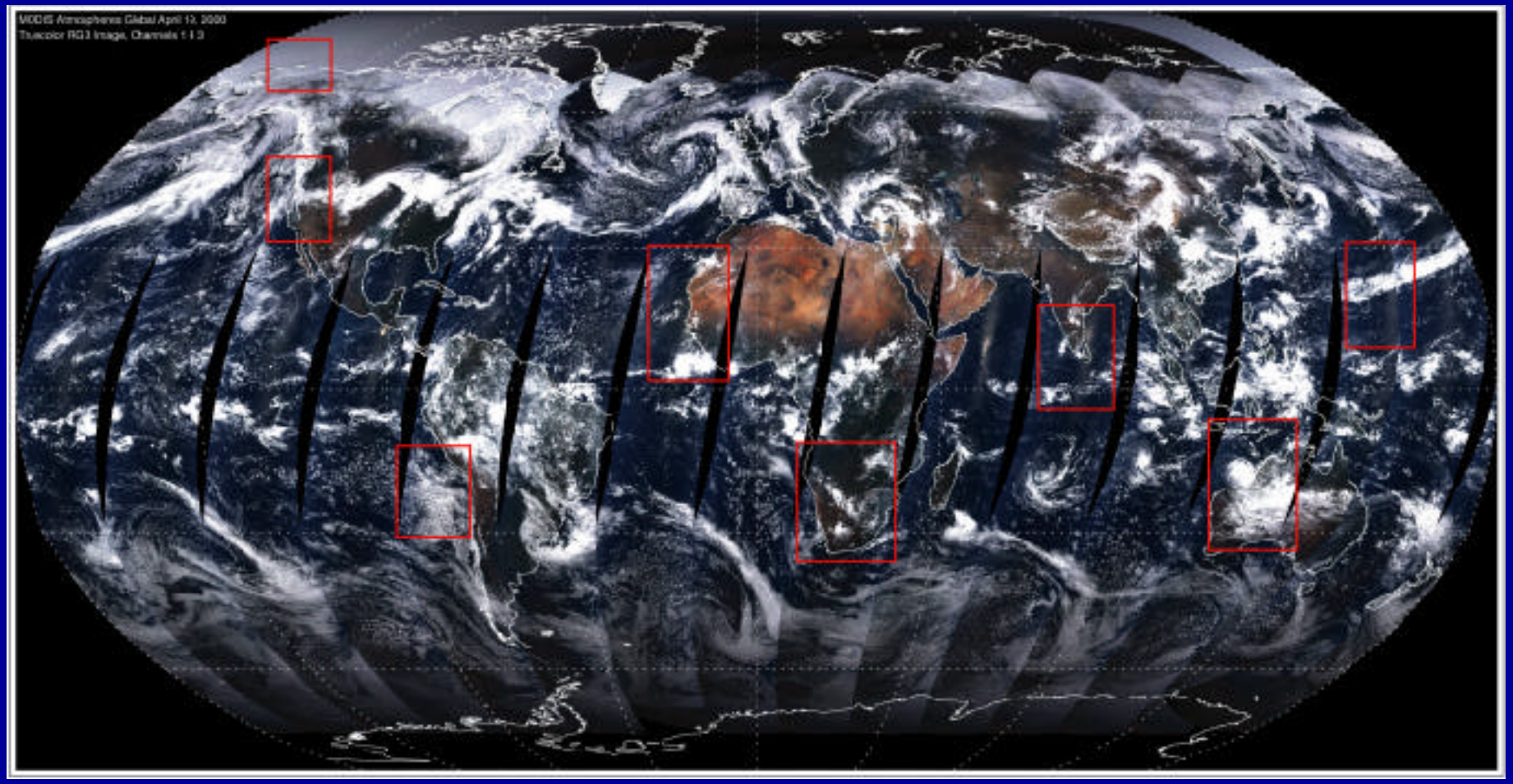
S. Platnick, MST 7 June 2000

MODAPS processing



S. Platnick, MST 7 June 2000

MODIS Atmosphere's Global 19 April 2000 Golden Granules



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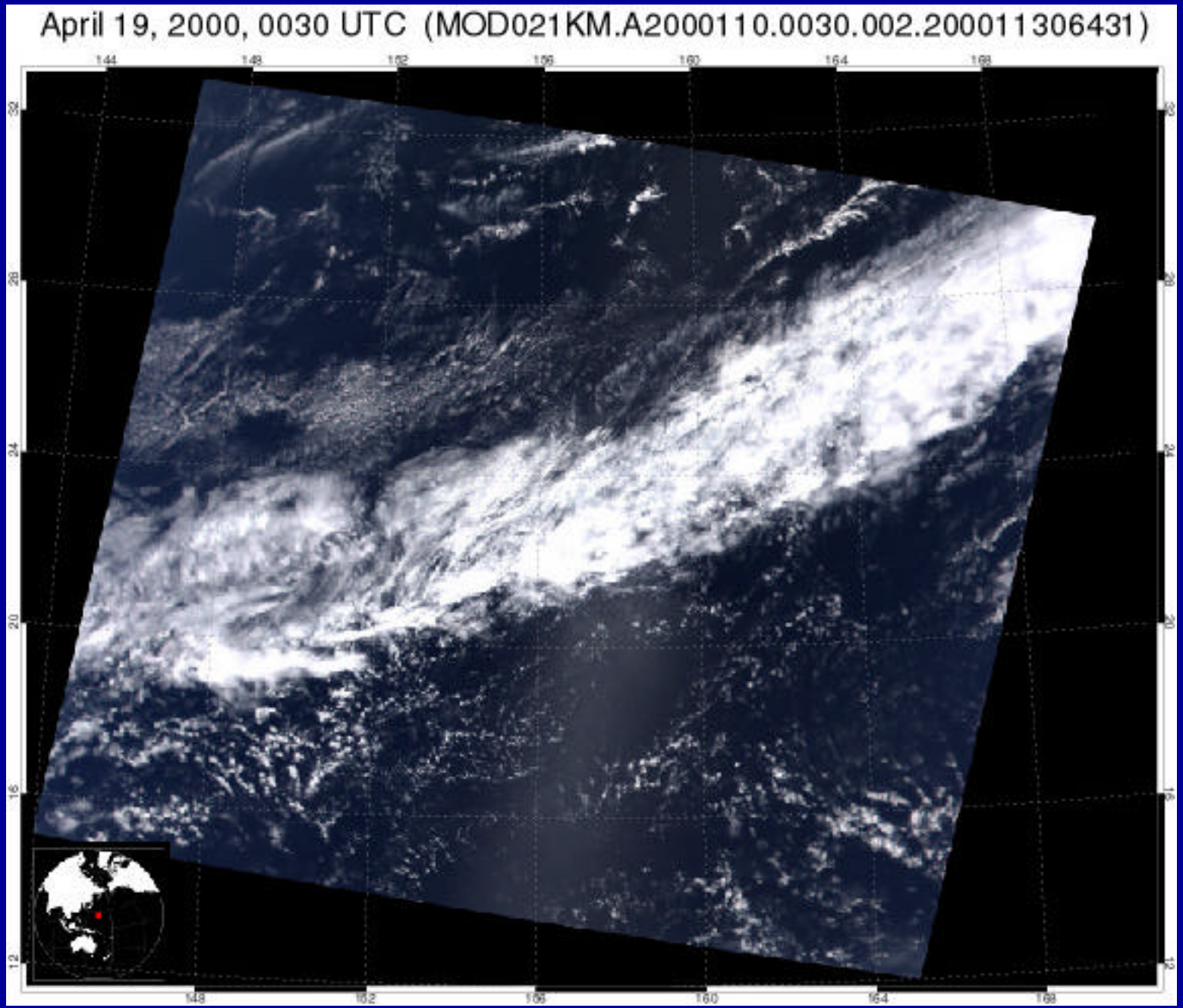
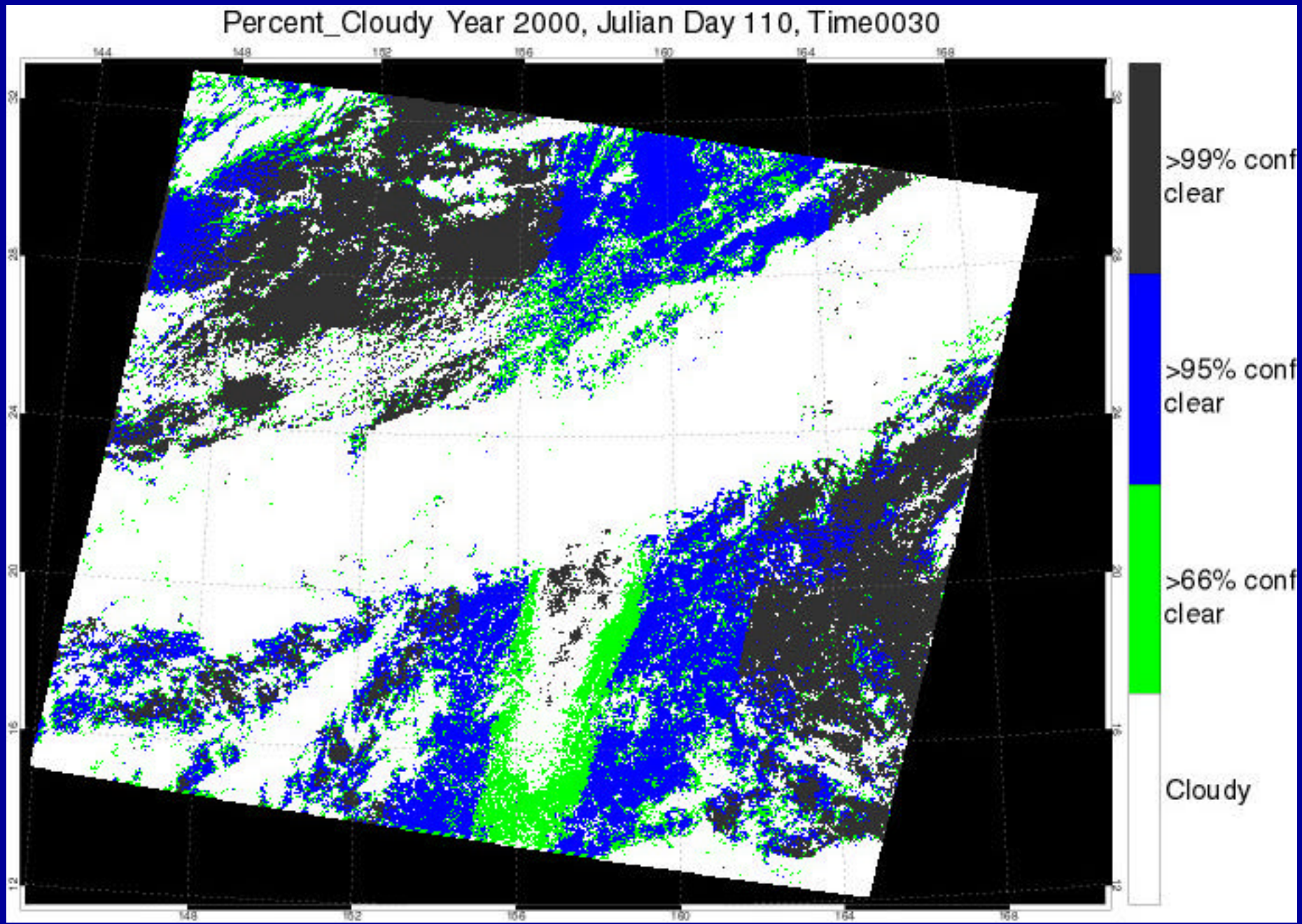
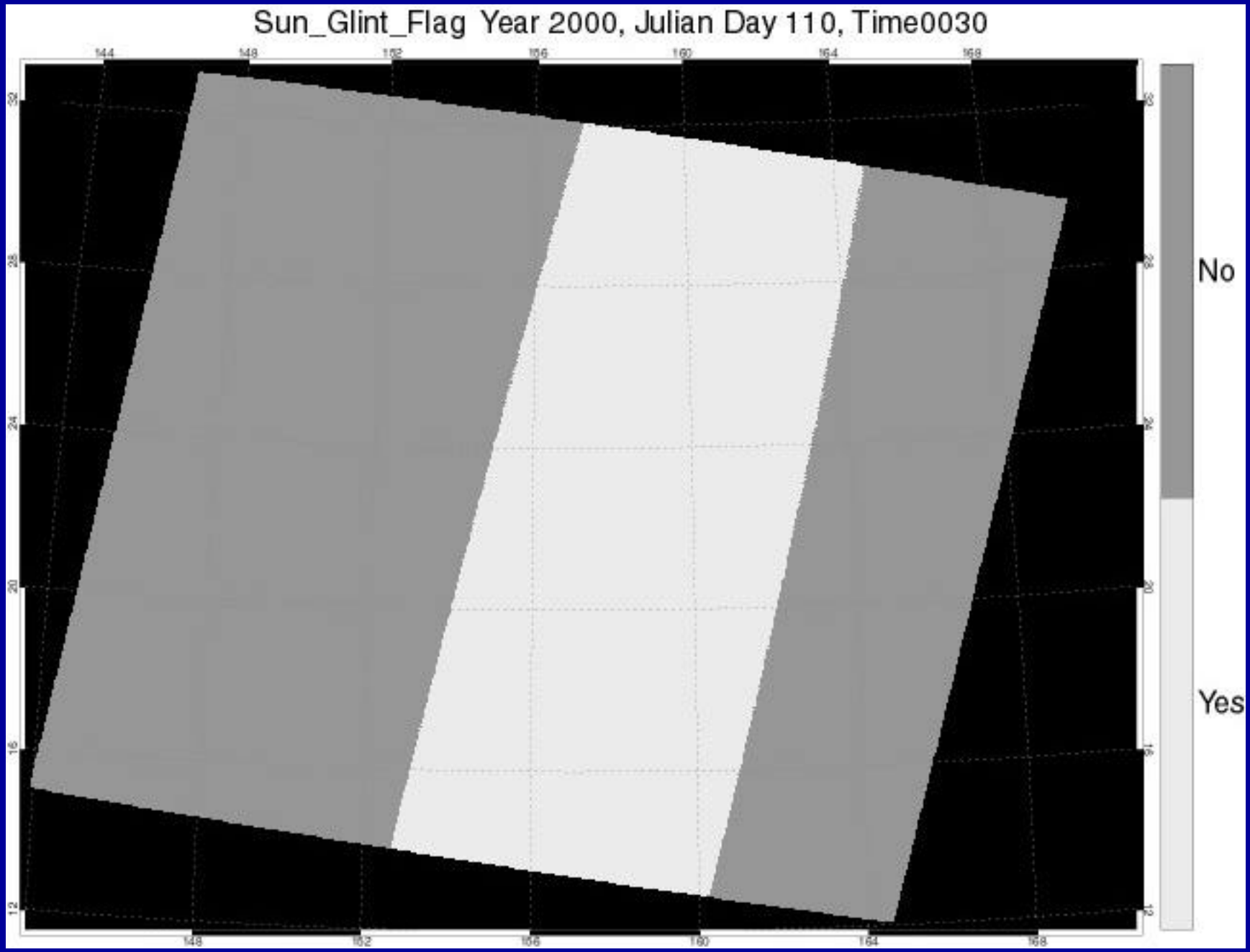
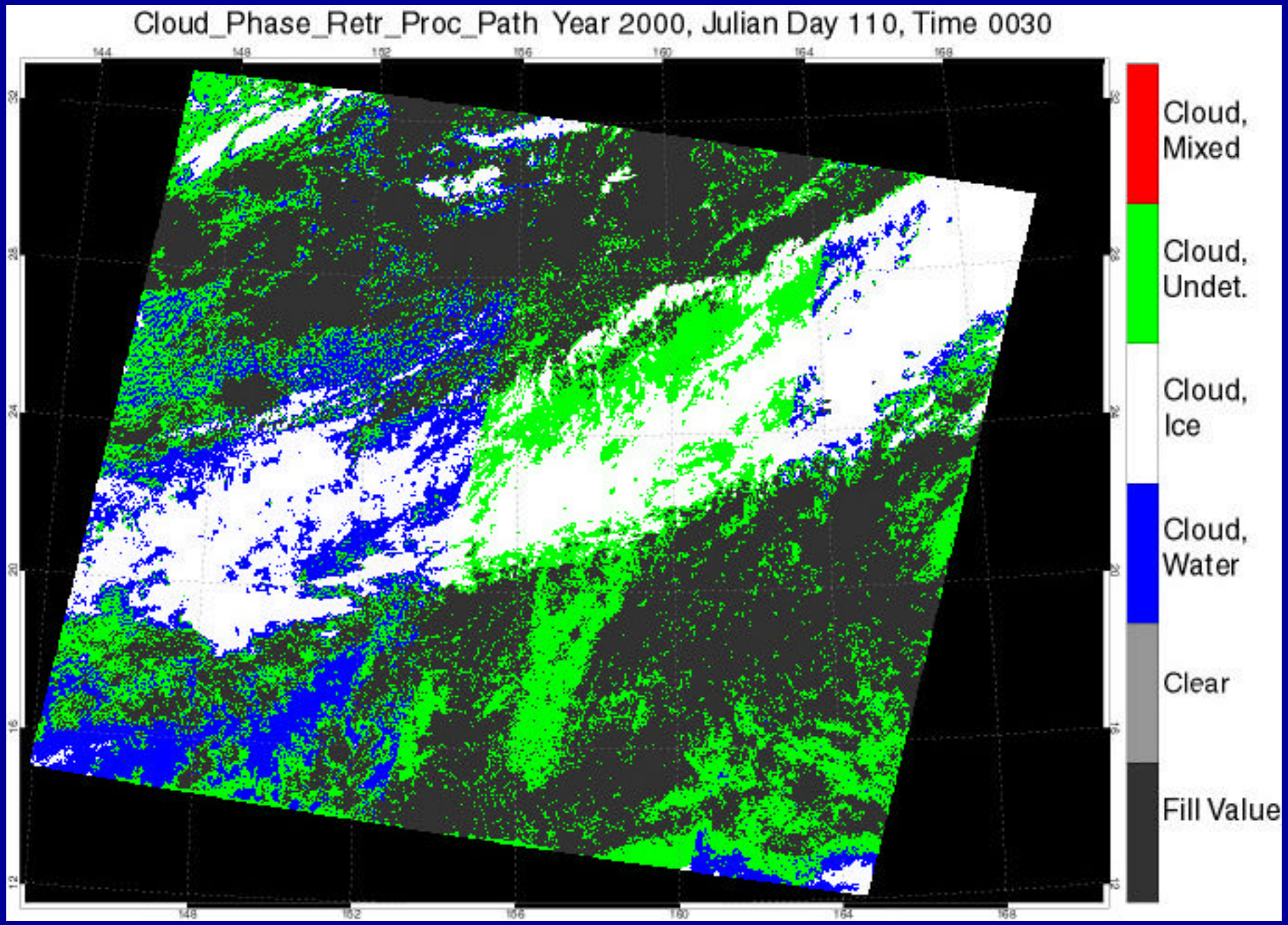
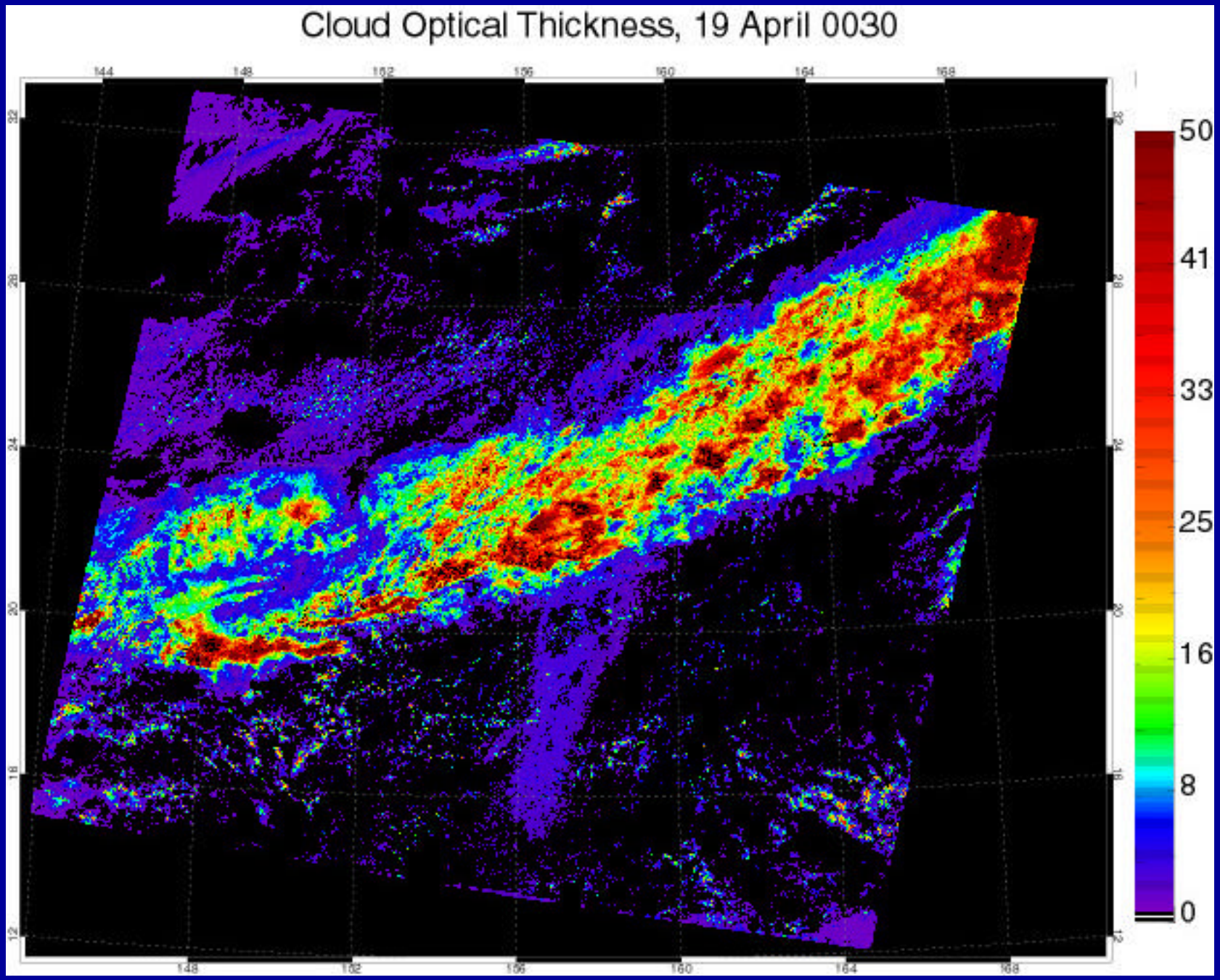
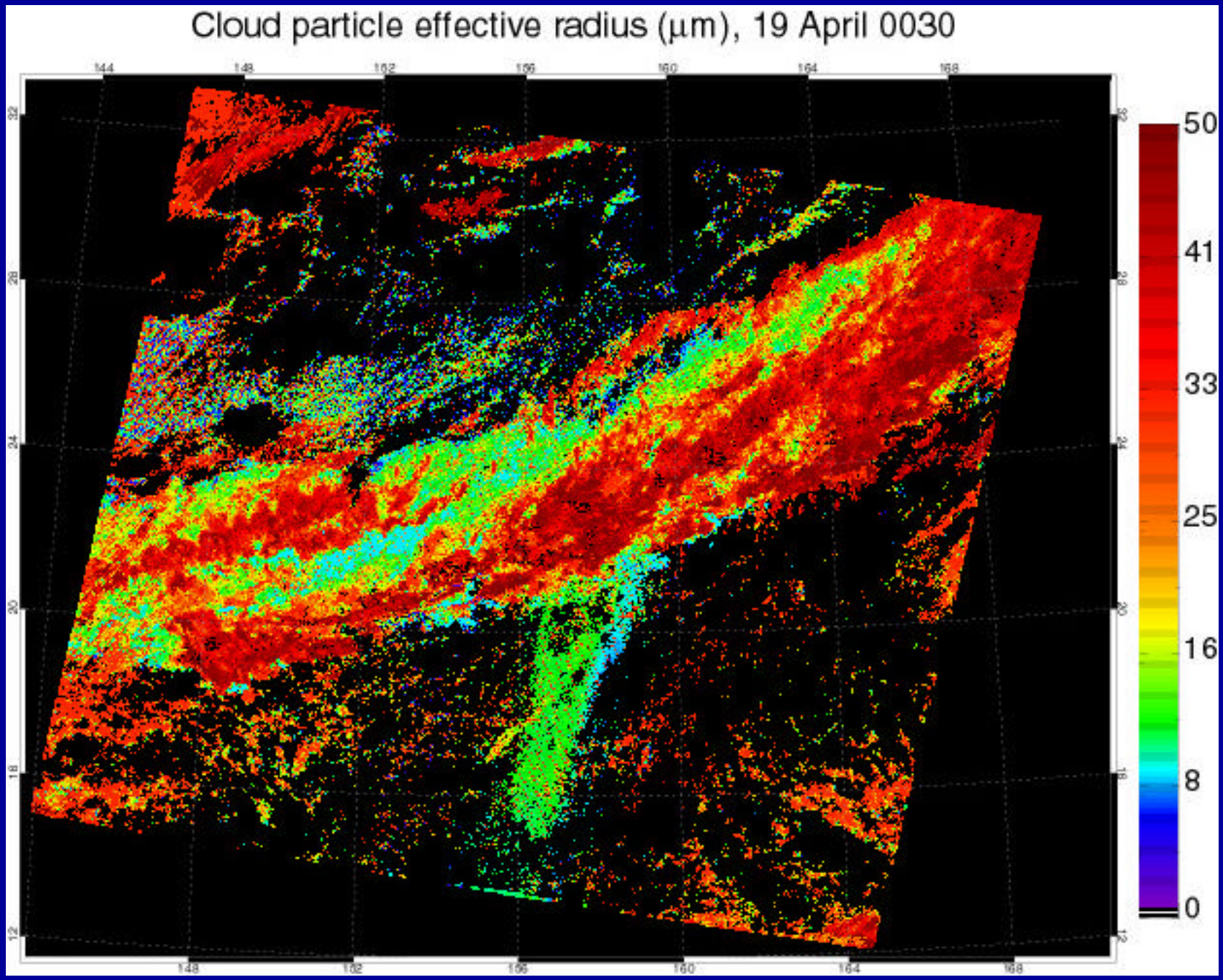

April 19, 2000, 0030 UTC (MOD021KM.A2000110.0030.002.200011306431)
144
148
152
156
160
164
168
28
24
20
16
12

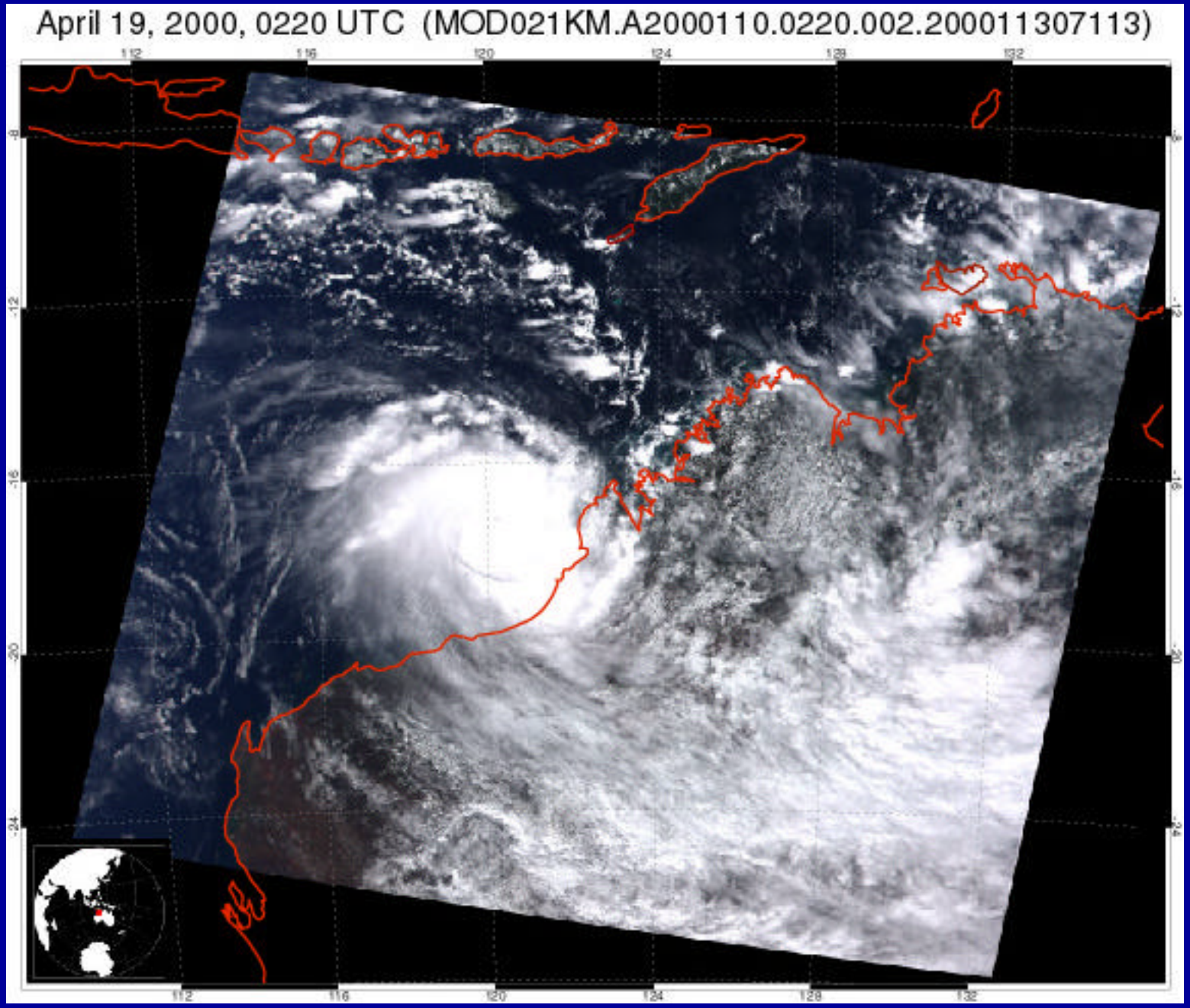

Percent_Cloudy Year 2000, Julian Day 110, Time0030
144
148
152
156
160
164
168
32
28
24
20
16
12
>99% conf clear
>95% conf clear
>66% conf clear
Cloudy

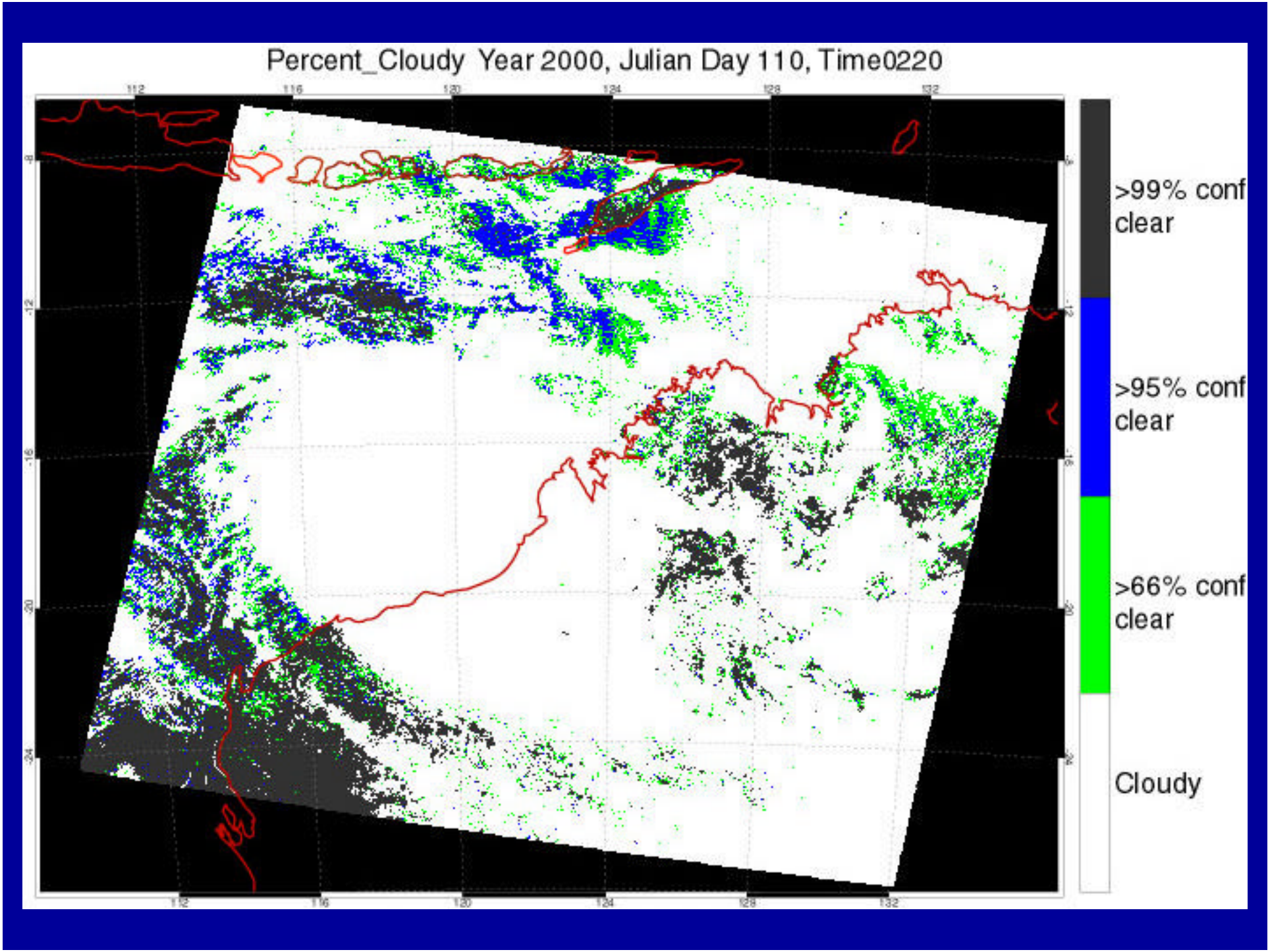

Sun_Glint_Flag Year 2000, Julian Day 110, Time0030
144
148
152
156
160
164
168
32
28
24
20
16
12
No
Yes

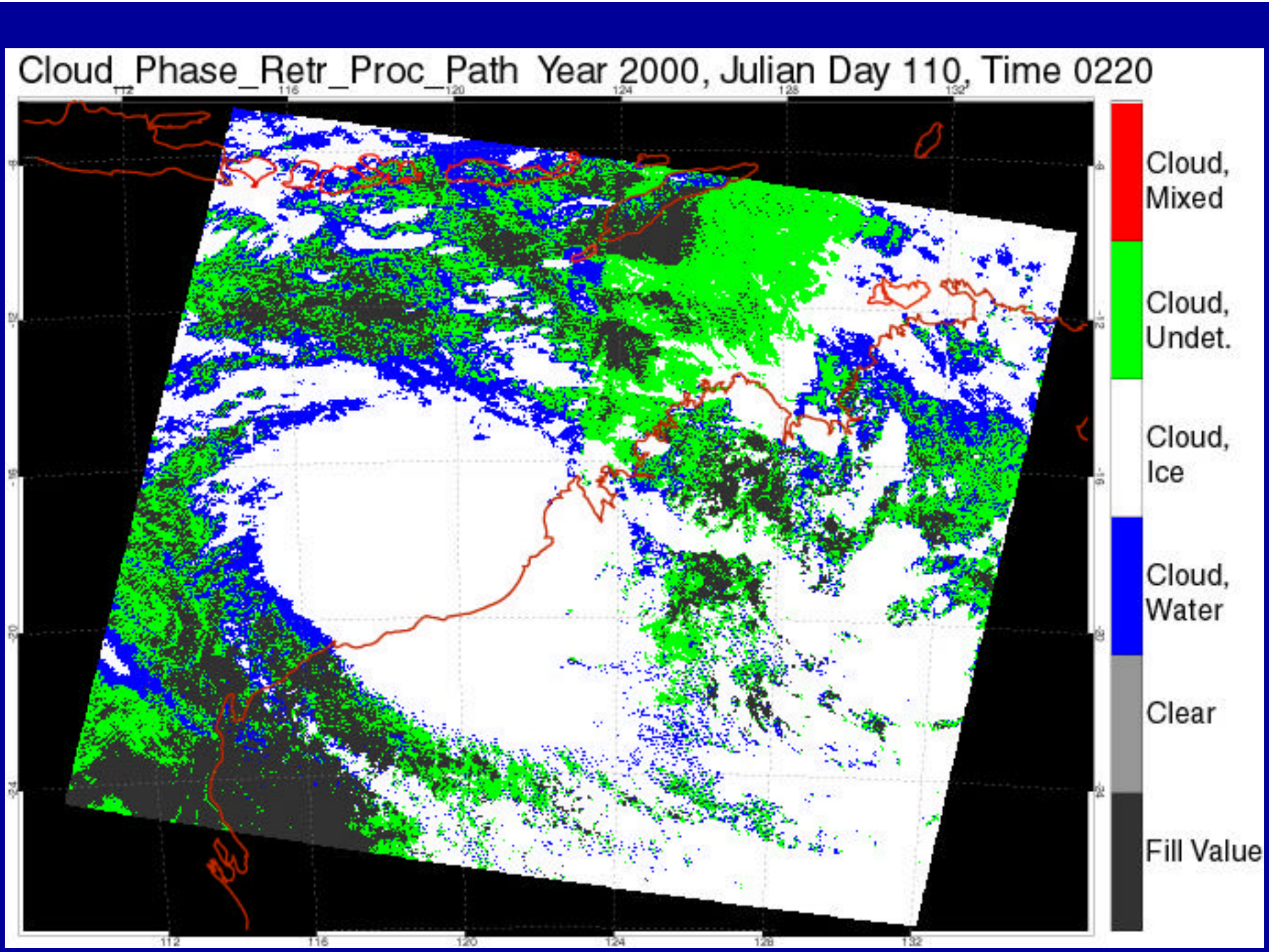

Cloud_Phase_Retr_Proc_Path Year 2000, Julian Day 110, Time 0030
144
148
152
156
160
164
168
32
28
24
20
16
12
Cloud, Mixed
Cloud, Undet.
Cloud, Ice
Cloud, Water
Clear
Fill Value

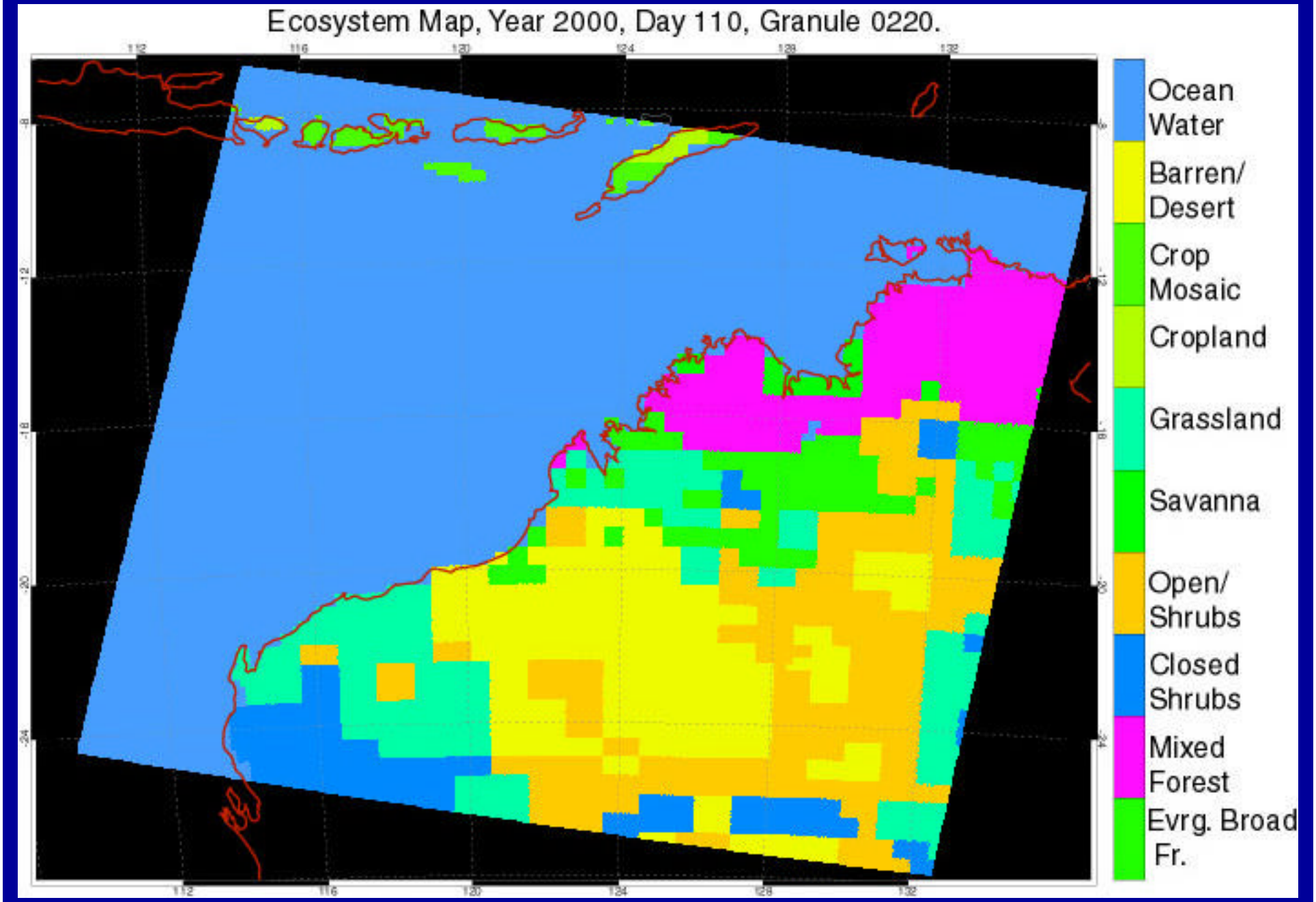

Cloud Optical Thickness, 19 April 0030
144
148
152
156
160
164
168
32
28
24
20
16
12
50
41
33
25
16
8
0

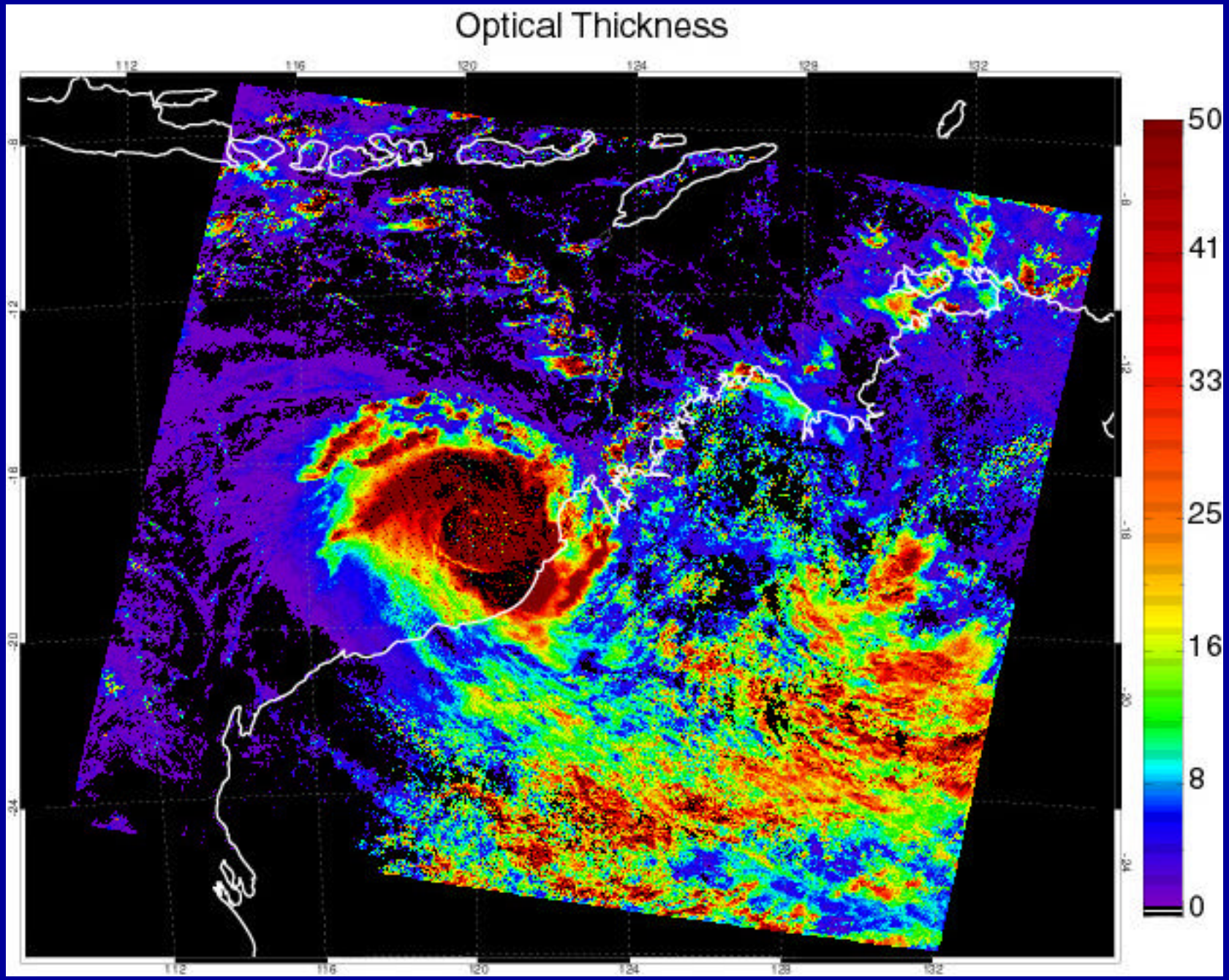

Cloud particle effective radius (μm), 19 April 0030
144
148
152
156
160
164
168
32
28
24
20
18
12
50
41
33
25
16
8
0

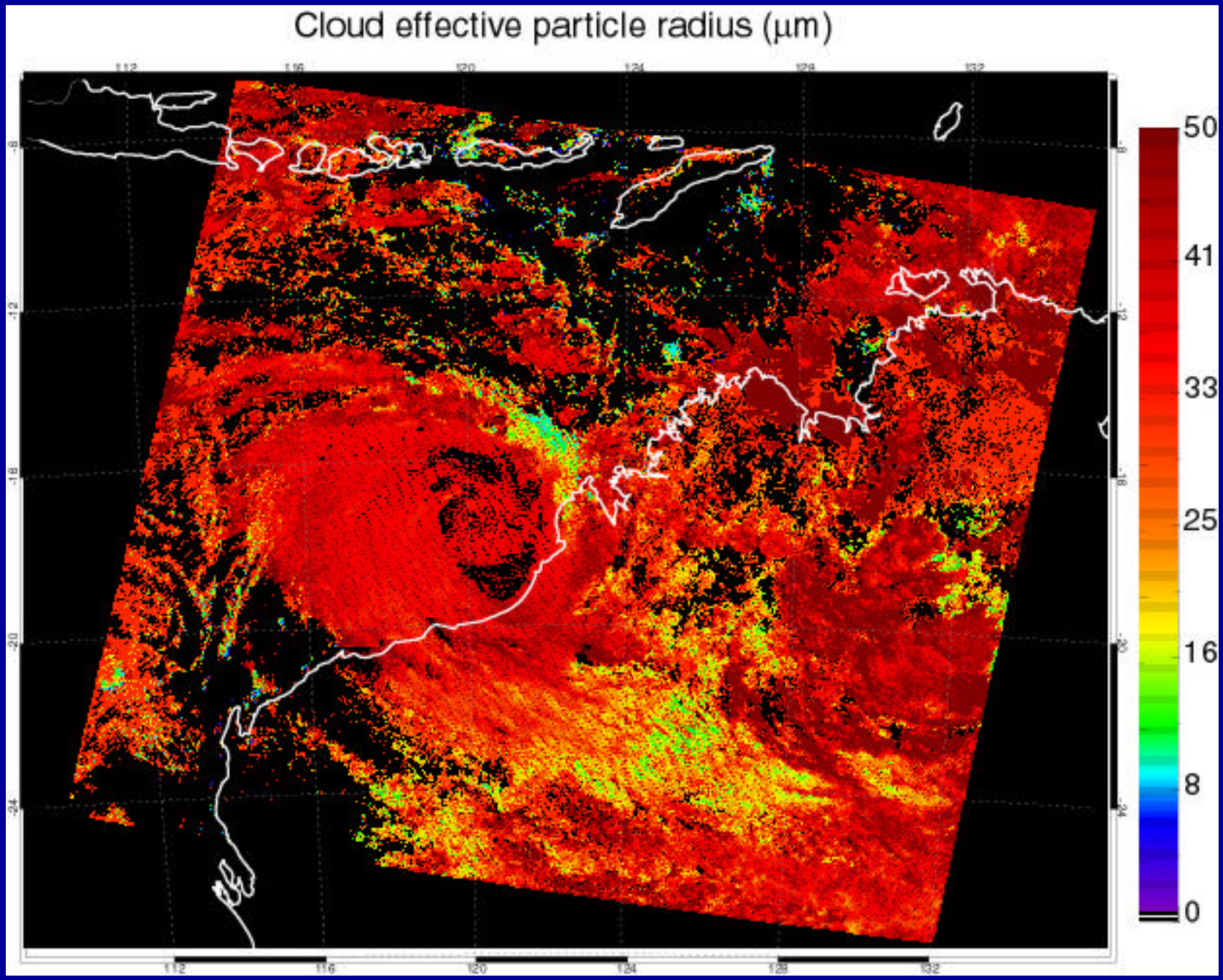

April 19, 2000, 0220 UTC (MOD021KM.A2000110.0220.002.200011307113)
112
116
120
124
128
132
8
12
16
20
24


Percent_Cloudy Year 2000, Julian Day 110, Time0220
>99% conf clear
>95% conf clear
>66% conf clear
Cloudy

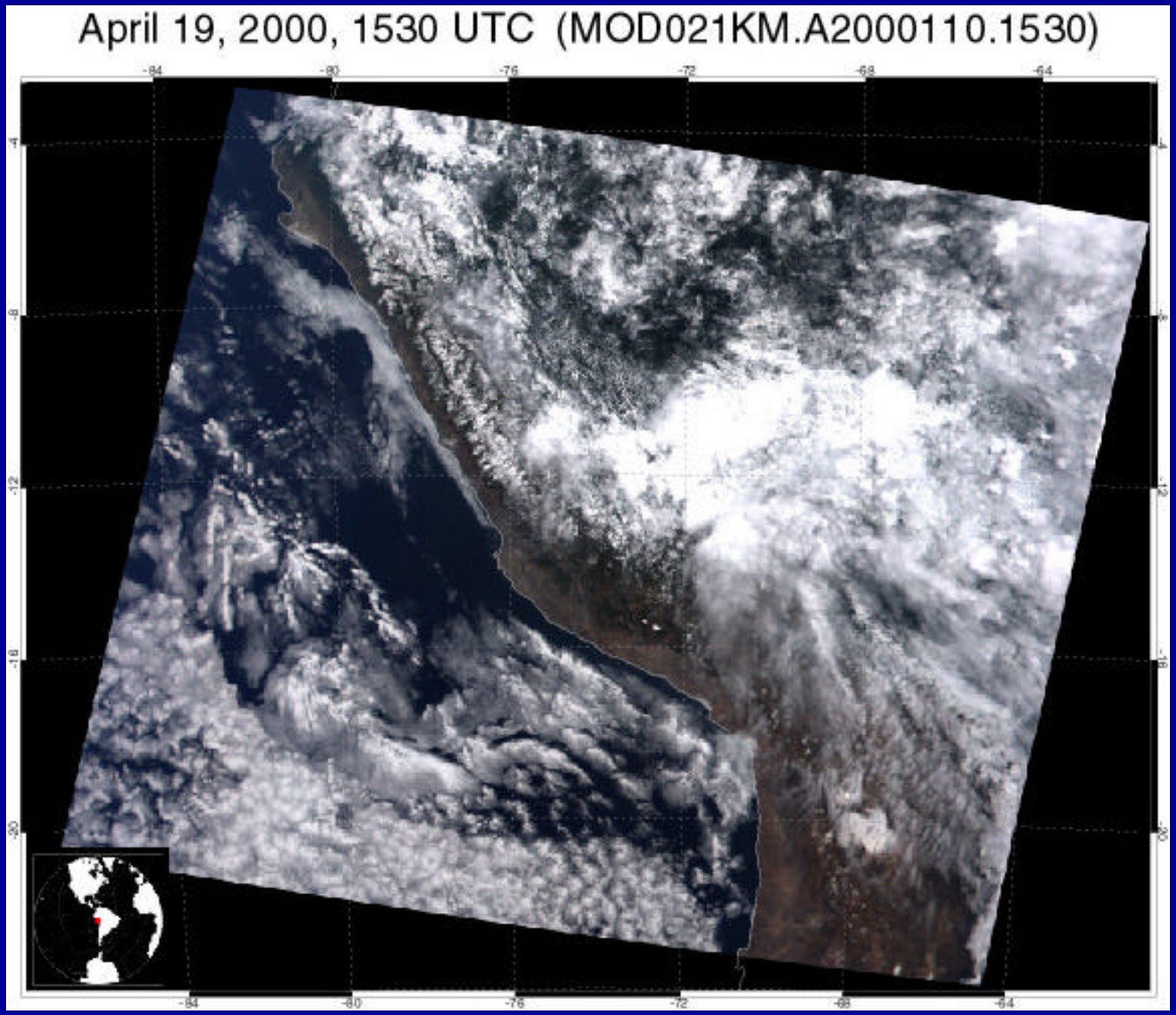

Cloud_Phase_Retr_Proc_Path Year 2000, Julian Day 110, Time 0220
Cloud, Mixed
Cloud, Undet.
Cloud, Ice
Cloud, Water
Clear
Fill Value

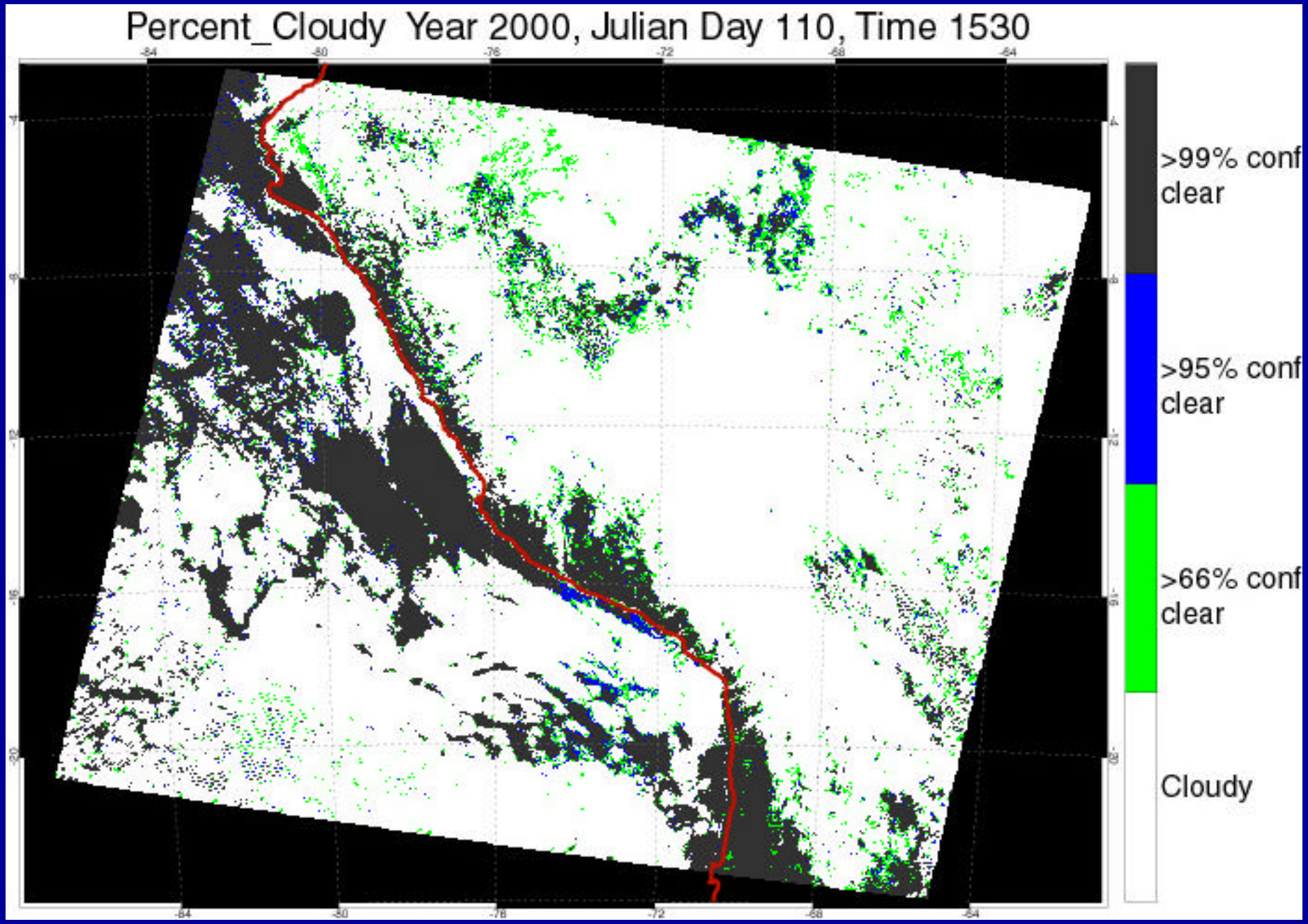

Ecosystem Map, Year 2000, Day 110, Granule 0220.
112
116
120
124
128
132
-8
-12
-16
-20
-24
Ocean Water
Barren/ Desert
Crop Mosaic
Cropland
Grassland
Savanna
Open/ Shrubs
Closed Shrubs
Mixed Forest
Evrg. Broad Fr.

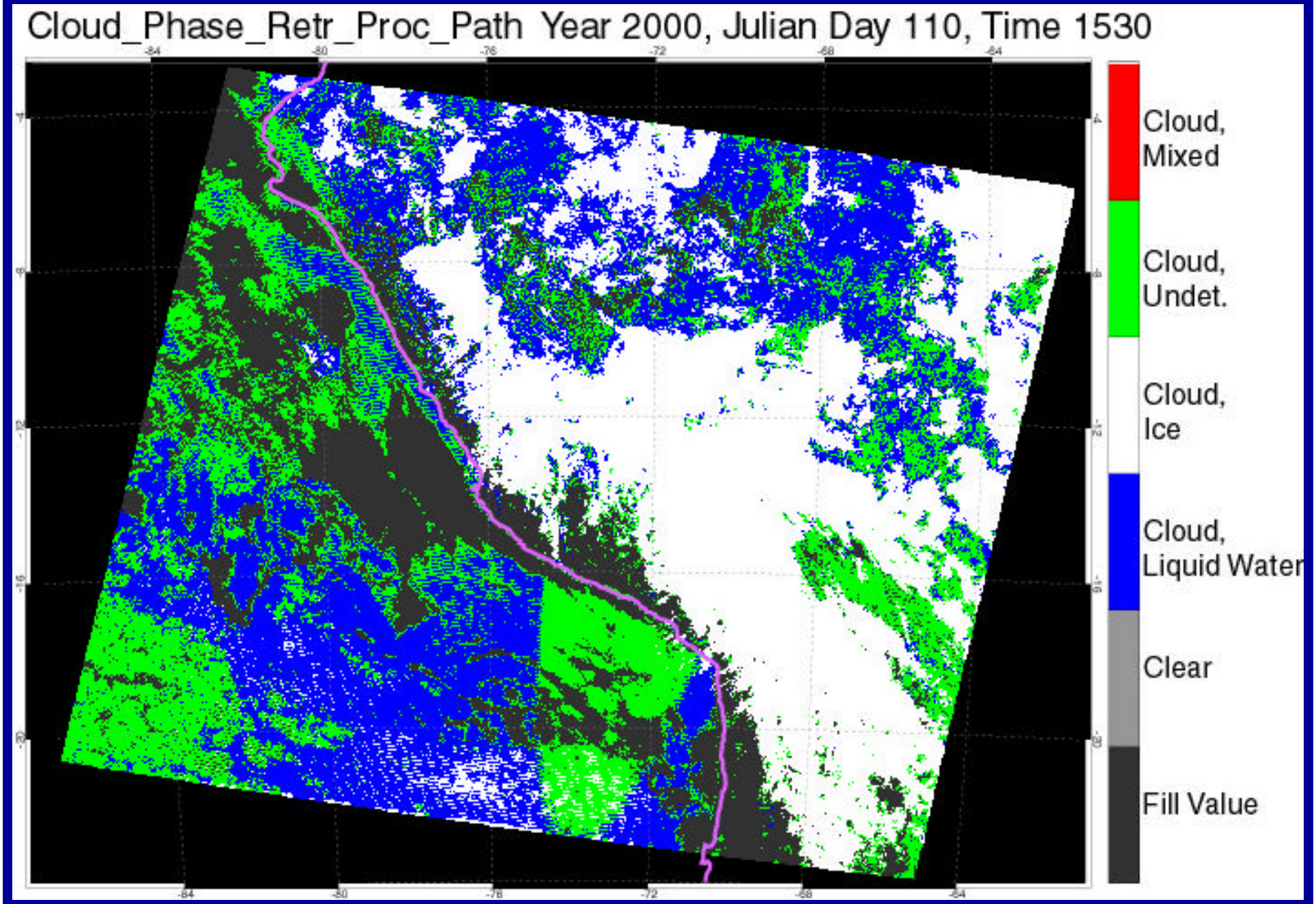

Optical Thickness
112
116
120
124
128
132
-8
-12
-16
-20
-24
50
41
33
25
16
8
0

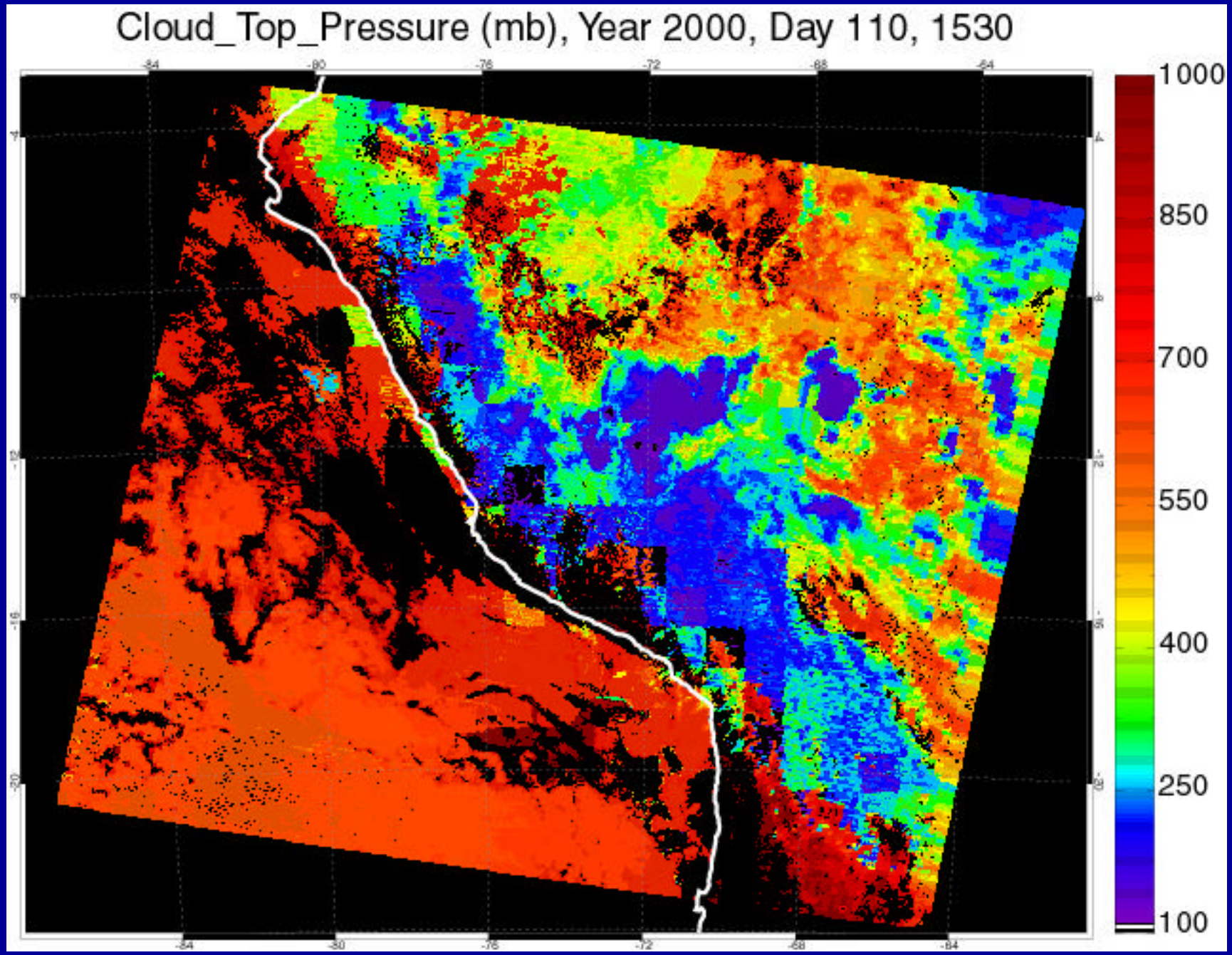

Cloud effective particle radius (μm)
112
116
120
124
128
132
-8
-12
-16
-20
-24
50
41
33
25
16
8
0

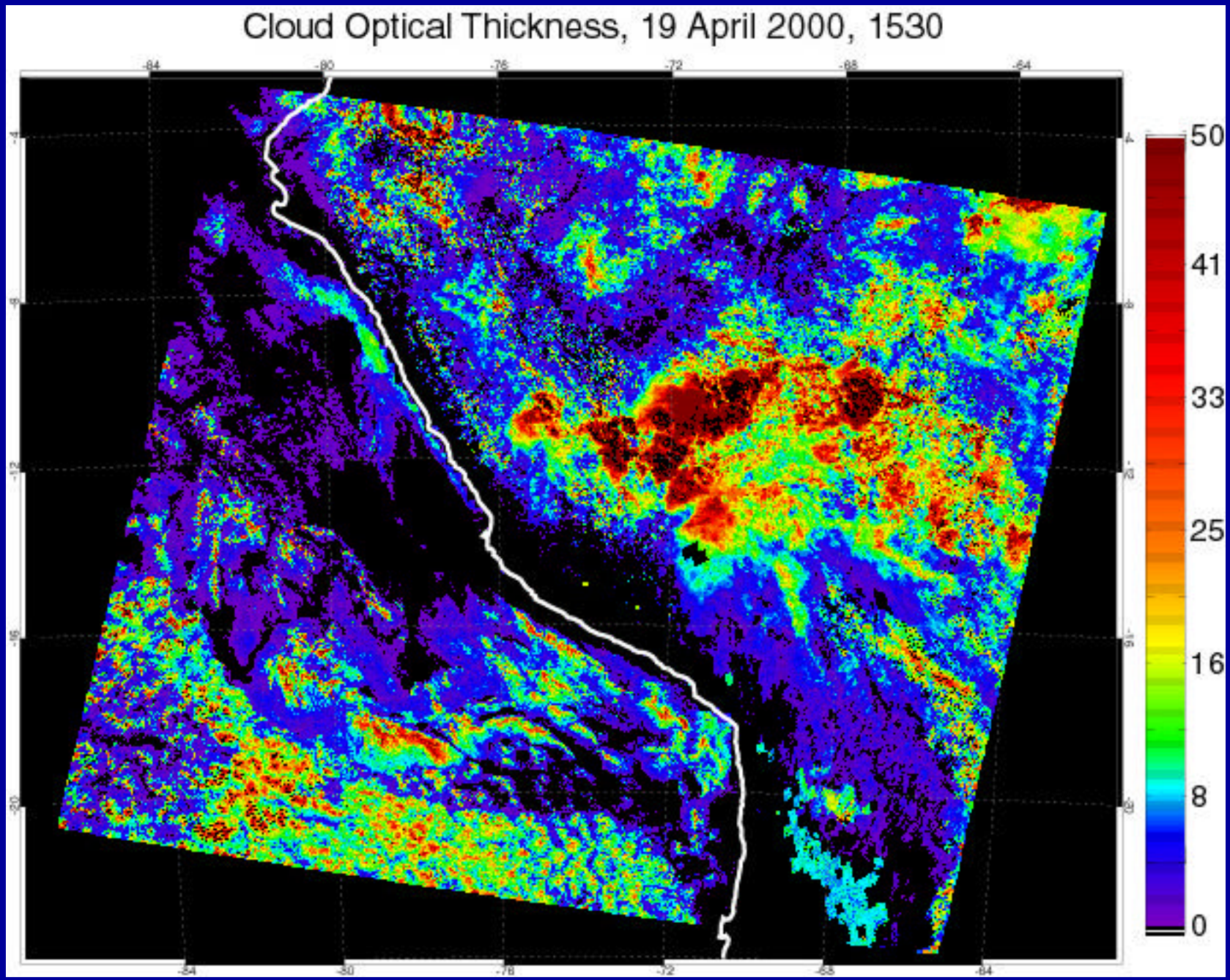
April 19, 2000, 1530 UTC (MOD021KM.A2000110.1530)

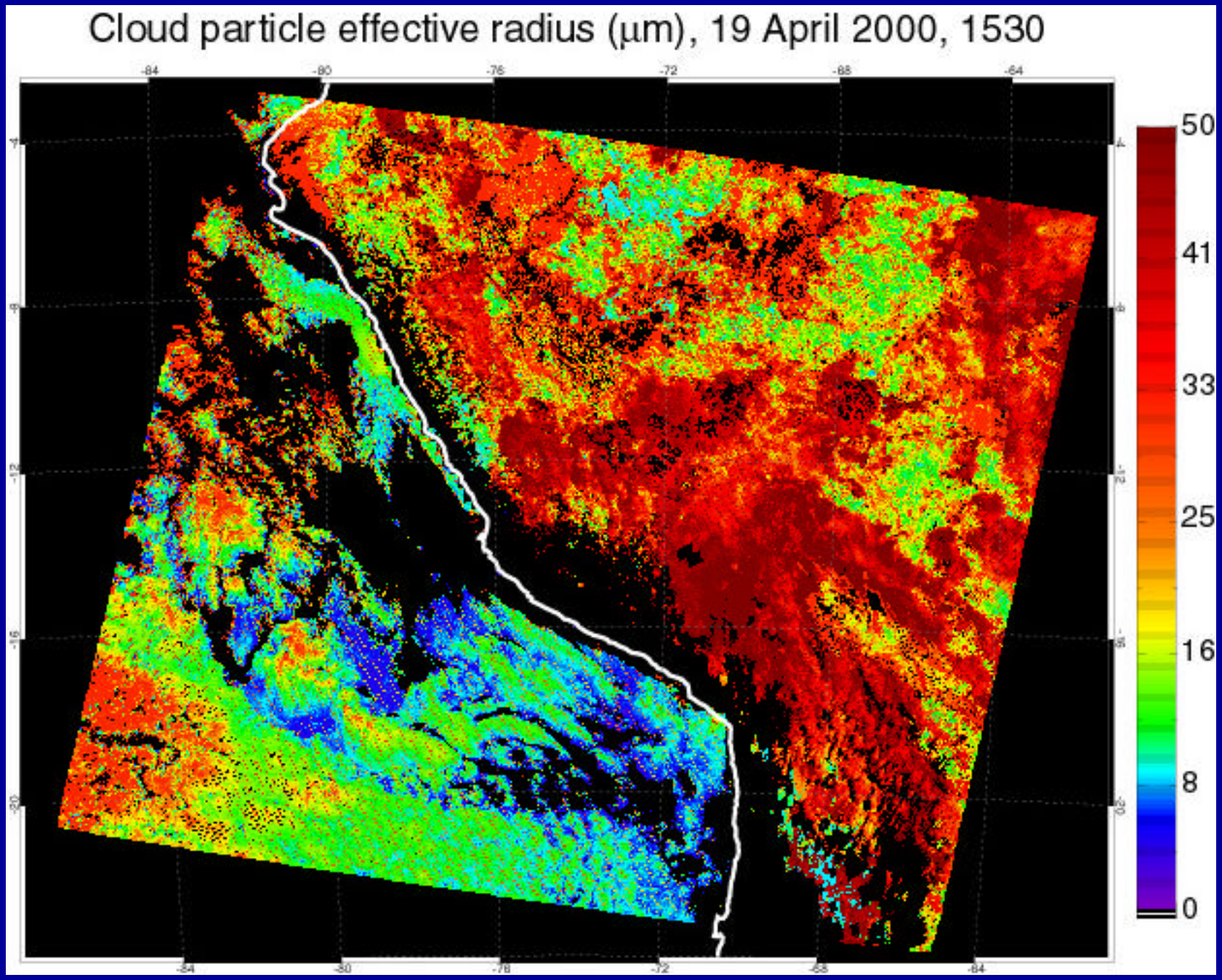



Percent_Cloudy Year 2000, Julian Day 110, Time 1530
>99% conf clear
>95% conf clear
>66% conf clear
Cloudy


Cloud_Phase_Retr_Proc_Path Year 2000, Julian Day 110, Time 1530
Cloud, Mixed
Cloud, Undet.
Cloud, Ice
Cloud, Liquid Water
Clear
Fill Value

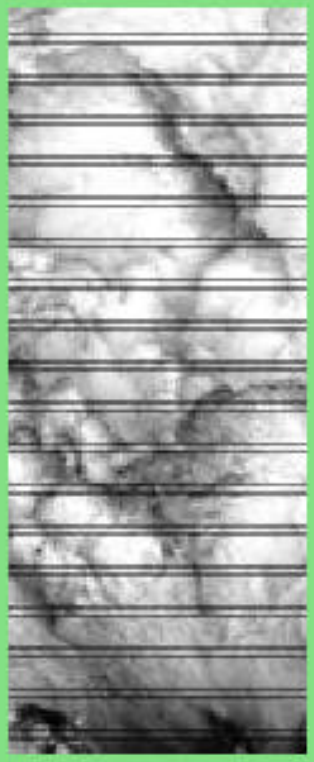

Cloud_Top_Pressure (mb), Year 2000, Day 110, 1530
1000
850
700
550
400
250
100


Cloud Optical Thickness, 19 April 2000, 1530
50
41
33
25
16
8
0


Cloud particle effective radius (μm), 19 April 2000, 1530
-84
-80
-76
-72
-68
-64
-4
-8
-12
-16
-20
50
41
33
25
16
8
0

L1B

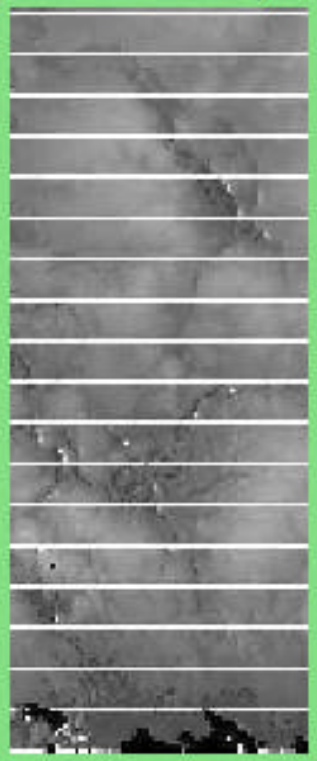
Channel 6 (1.6μm)



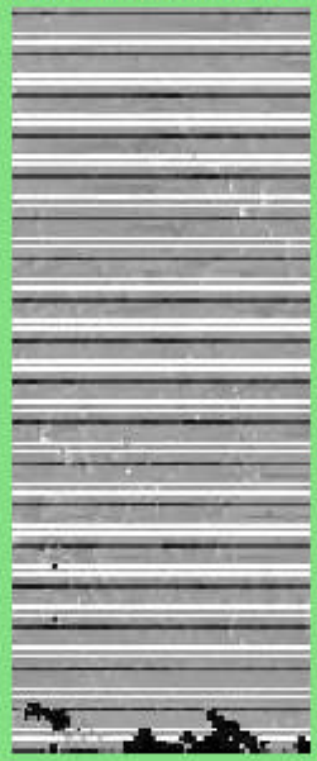
Channel 7 (2.1μm)

L2 effective radius retrievals

Effective radius (r_e) retrieval w/2.1 μm



1.6 μm - 2.1 μm retrieval difference



3.7μm - 2.1μm retrieval difference

MODIS Atmosphere
Day 110 (April 19, 2000) 1535 UTC
gray@climate.gsfc.nasa.gov

MOD06

Some early lessons learned

- Global imagery useful for sorting out major processing problems
- *Windhoek* processing critical
- Visualization efforts were time consuming but crucial
- Pixel level QA (processing path, cloud mask) very useful