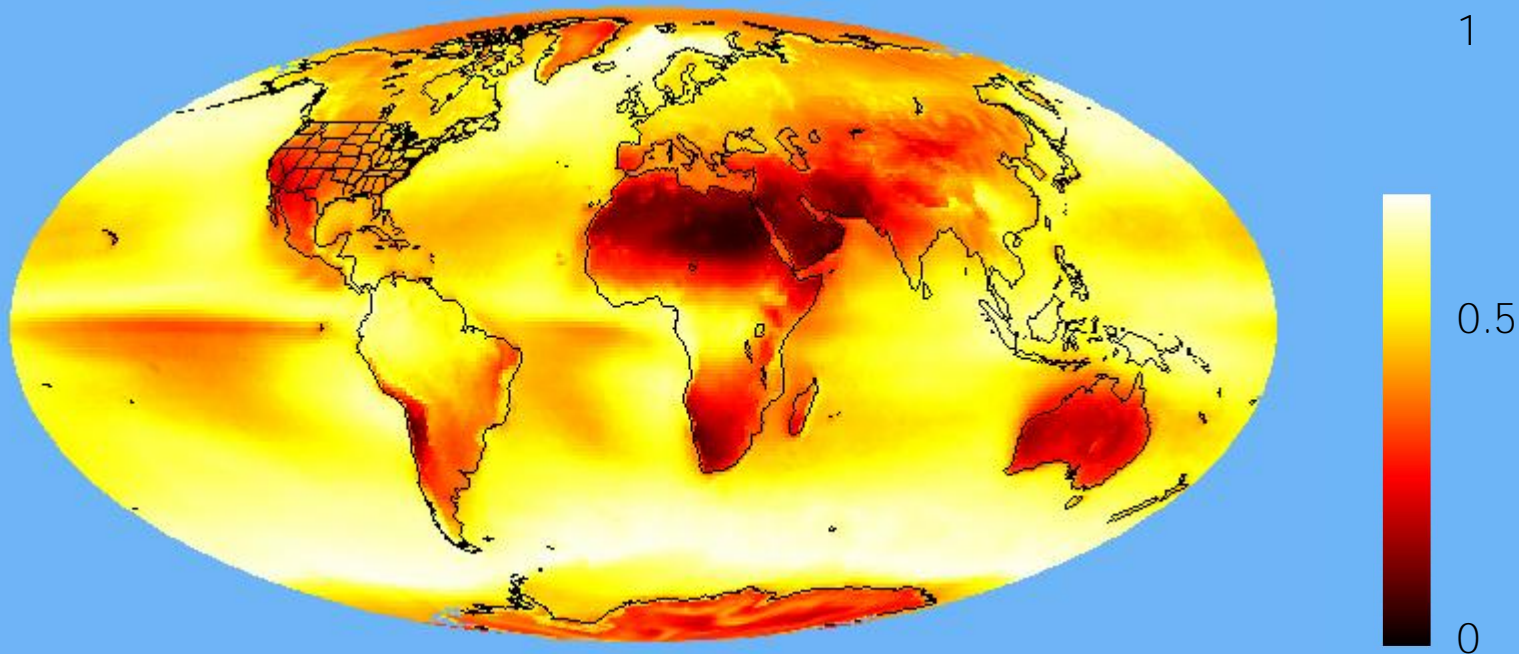


MODIS Level 3: Future Issues and Considerations

Brent Maddux



2001-2004 Cloud Fraction Mean



How do the MODIS L3 products look:

- . Do they represent known physical phenomenon well?

Going from information to knowledge:

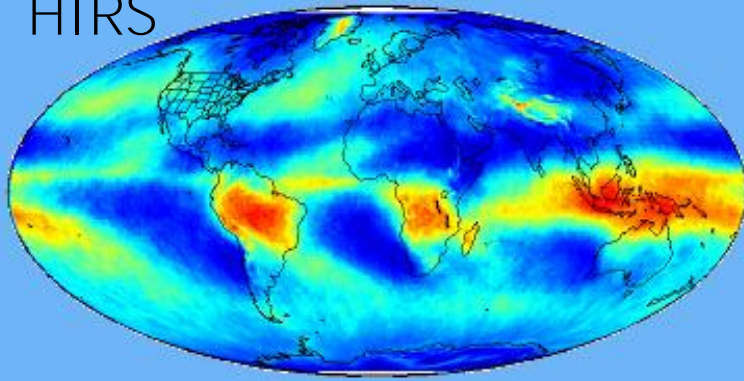
- . What is L3 saying?
 - ? Some limitations of L3 SDSs
 - ?4 How do we interpret the data effectively?

Next steps:

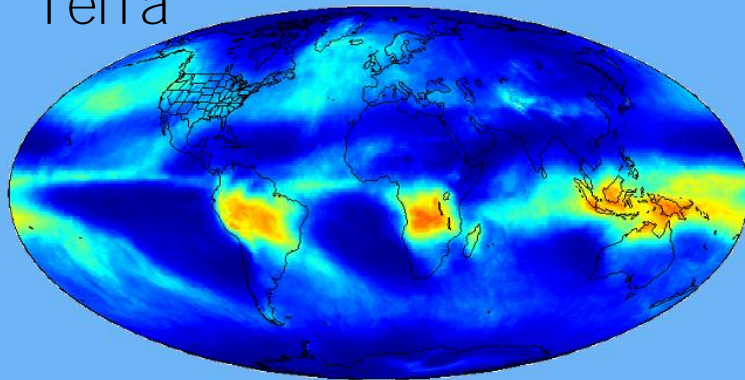
- . decrease the limitations
- . improve physical meaning and interpretation

DJF High Cloud

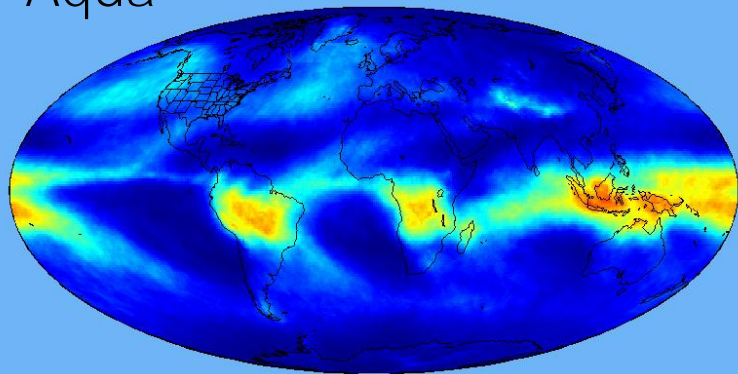
HIRS



Terra



Aqua



1.0

0.8

0.6

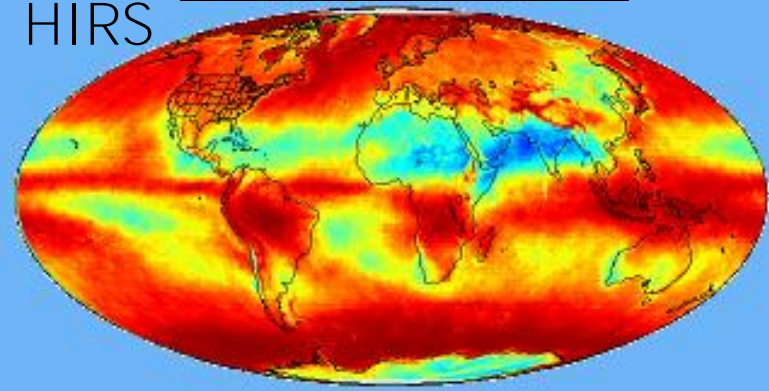
0.4

0.2

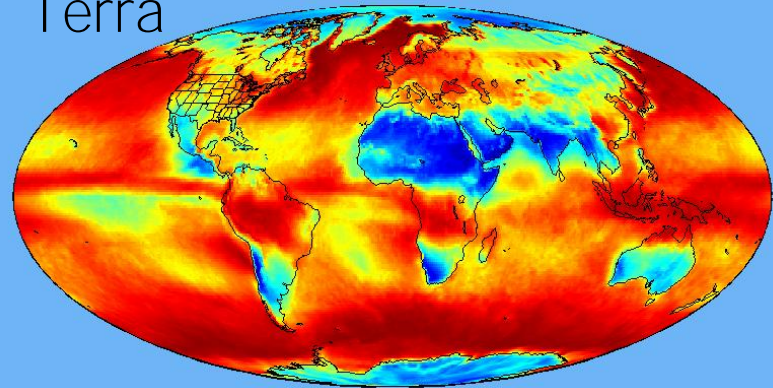
0.0

DJF All Cloud

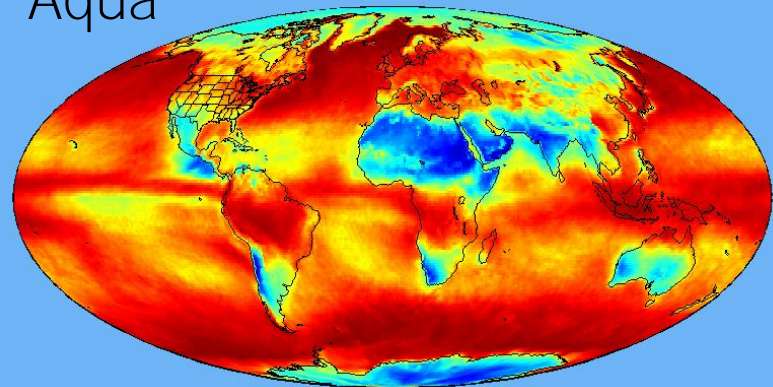
HIRS



Terra



Aqua



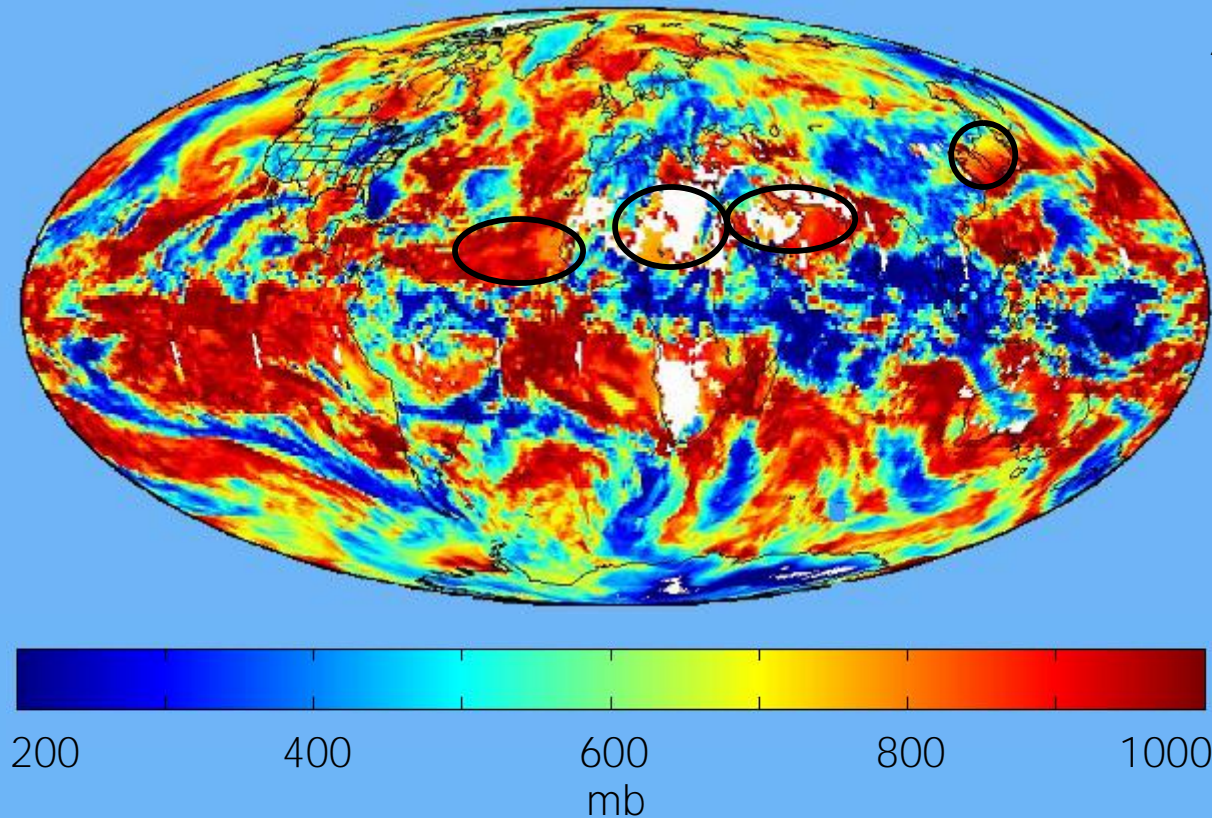
Cloud Top Pressure May 1st, 2003

Dust or high aerosol events

?ú 750-900 mb

? Few if any visible clouds

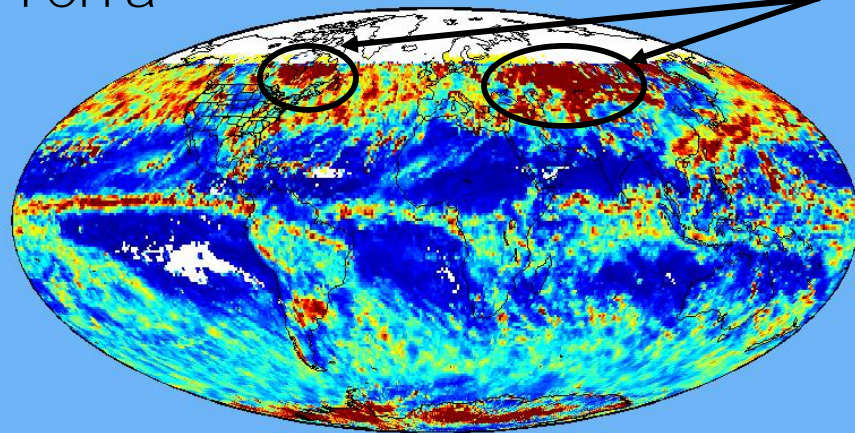
?á Events last several days



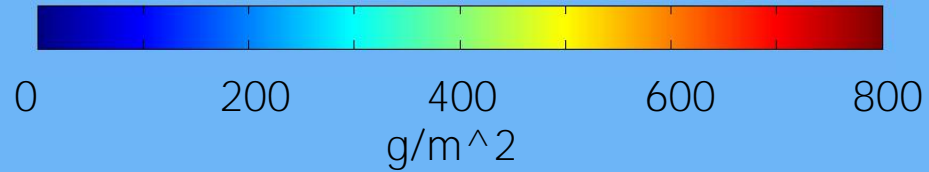
?á For daily data this can be accounted for, but not weekly or monthly.

Cloud Ice Water Path December 2002

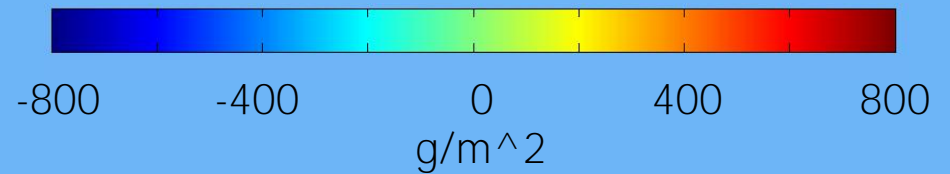
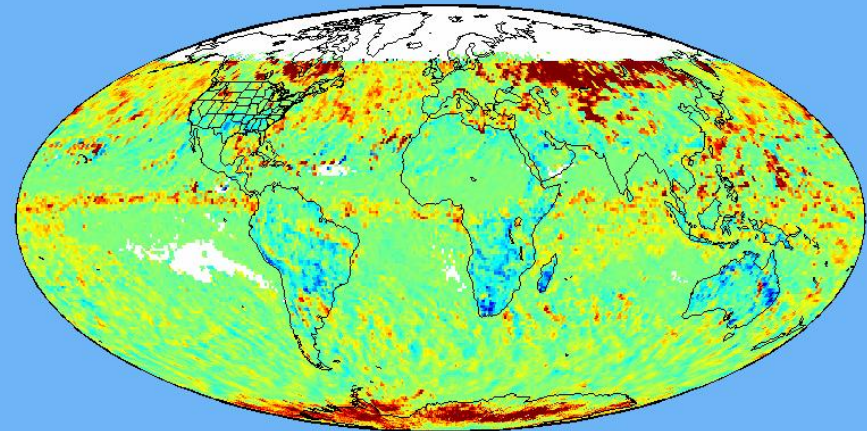
Terra



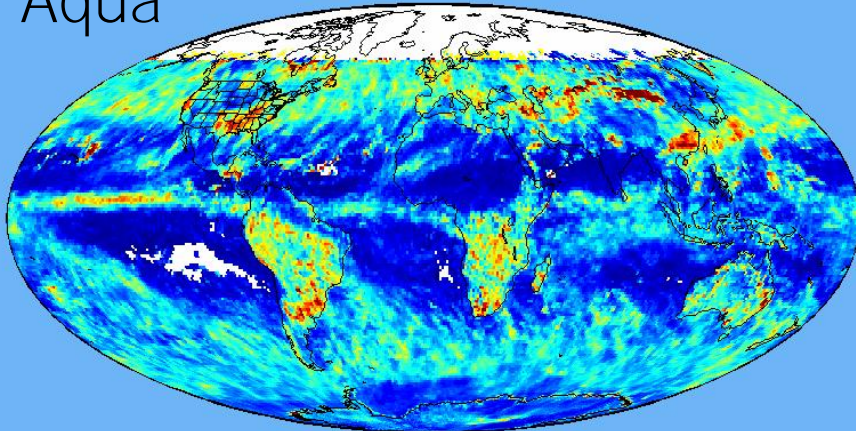
Major ice cloud events?



Difference

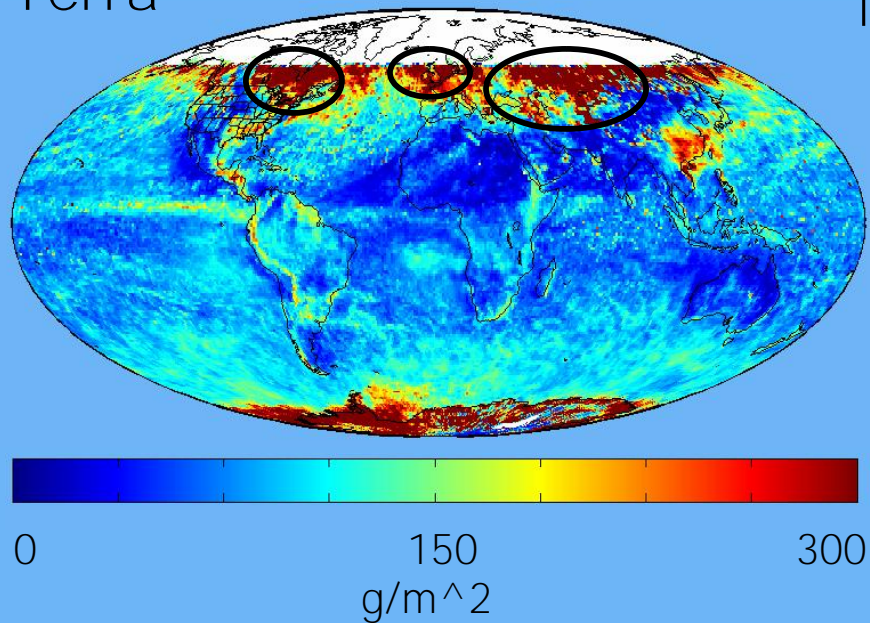


Aqua



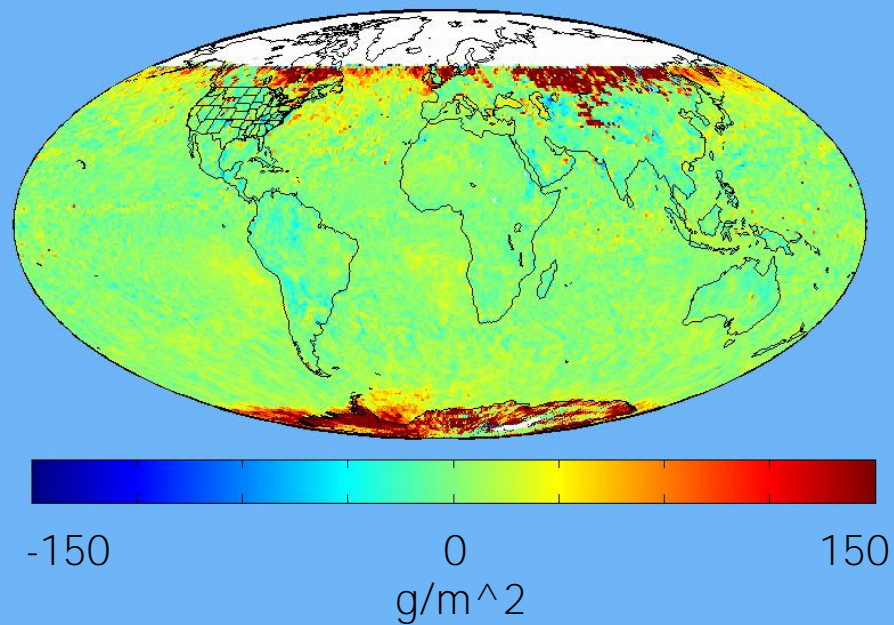
Cloud Liquid Water Path December 2002

Terra

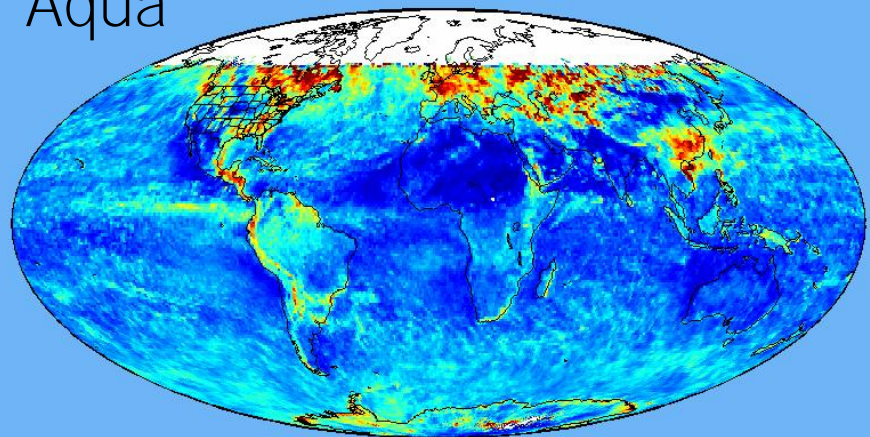


Major liquid cloud events?

Difference



Aqua



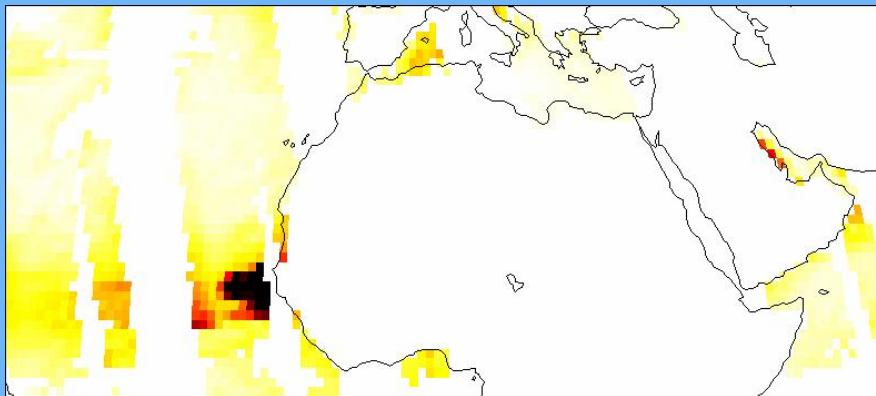
Possible Solutions:

?U Conduct secondary data processing

?TM Remove questionable data

?Y Create uncertainty products

Ocean Mass Concentration



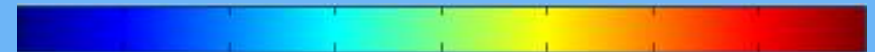
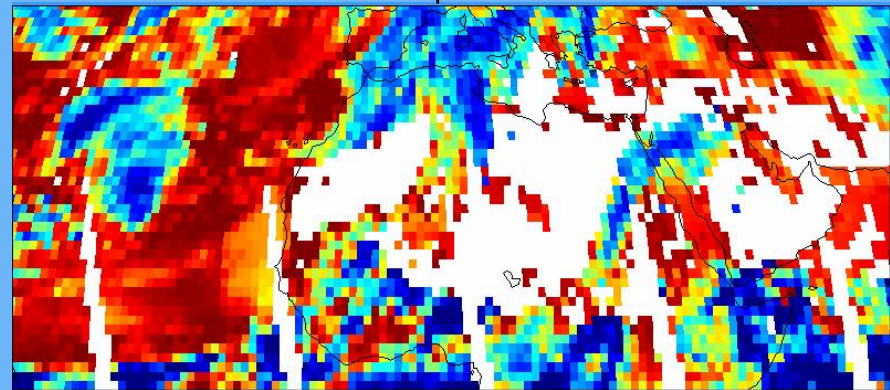
0

15

30

$1 \times 10^{-6} \text{ g/m}^2$

Cloud Top Pressure



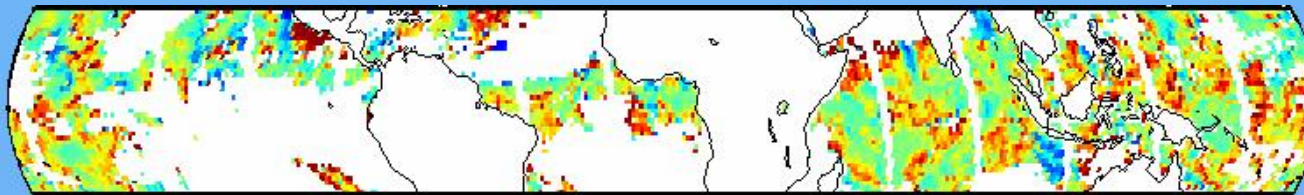
0

500

1000

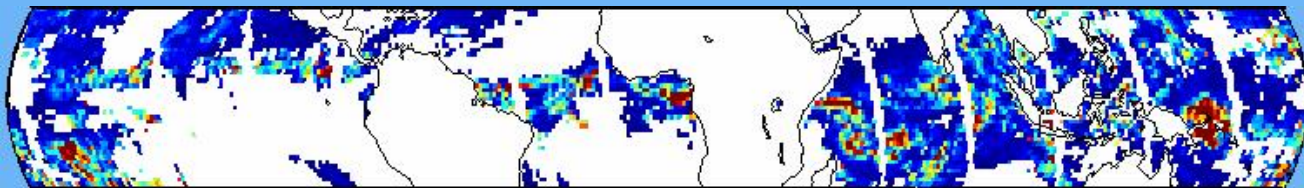
mb

Ice Particle Size and Tropical Deep Convection Evolution



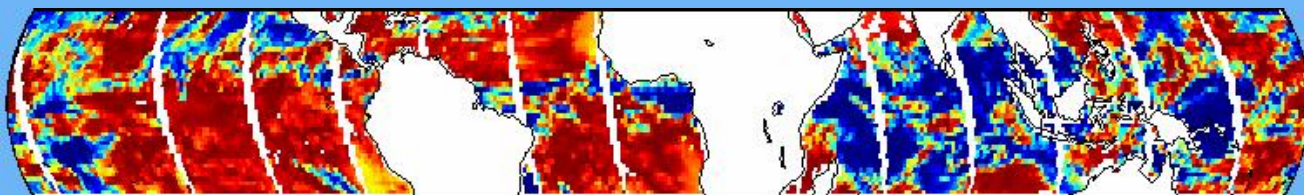
Ice Particle Radius 0 15 30 45 60 μm

-Uniform re ice over cores



Ice Water Path 0 200 400 600 800 g/m^2

-Isolated deep convection



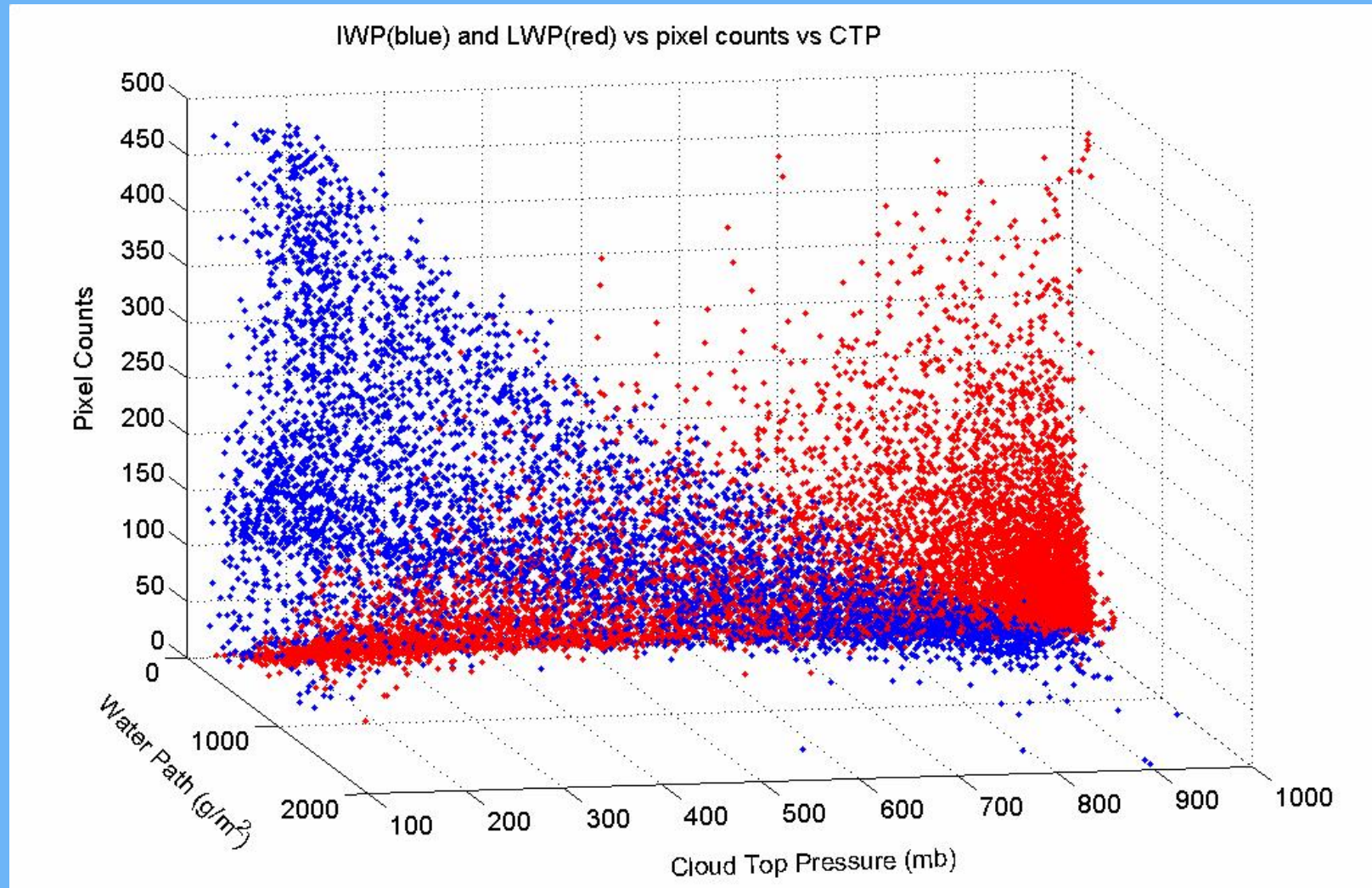
Cloud Top Pressure 0 250 500 750 1000 mb

-Evident cirrus shields

?á Ice particle size increase away from deep convection

?á What would scatter plots show?

Mean SDS Comparisons



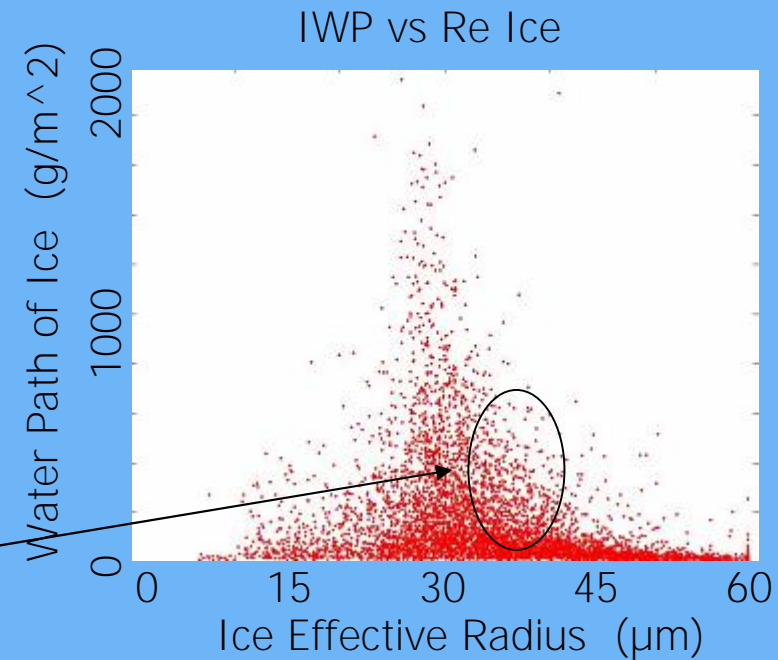
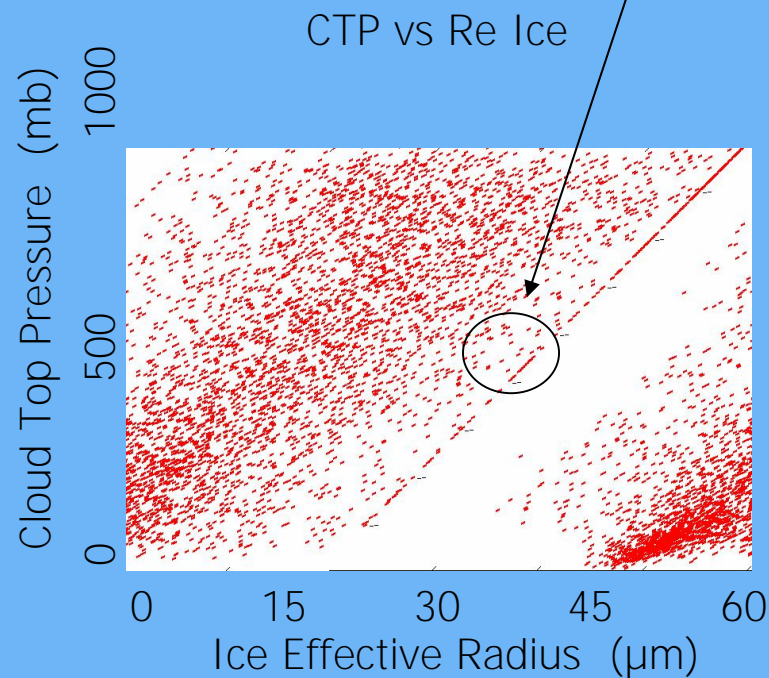
? Mean phase properties can't be fully characterized

Mean Ice Properties:

?á cloud regimes

?ñ cloud height or phase

?ë particle size or path



Property comparison limitations:

?c data subsets (large particle size, phase, etc)

?V multiple data set comparison

Possible solutions:

?G new joint histogram (in collection 5)

?- means of property subsets

? (multi dimensional histograms

Summary and Conclusions:

?á Implement a secondary processing between L2 and L3.

?J Add additional SDSs

- 1) that can be used to further compare the microphysical properties of clouds and other atmospheric parameters
- 2) that allow for a further intuitive interpretations
- 3) near nadir.

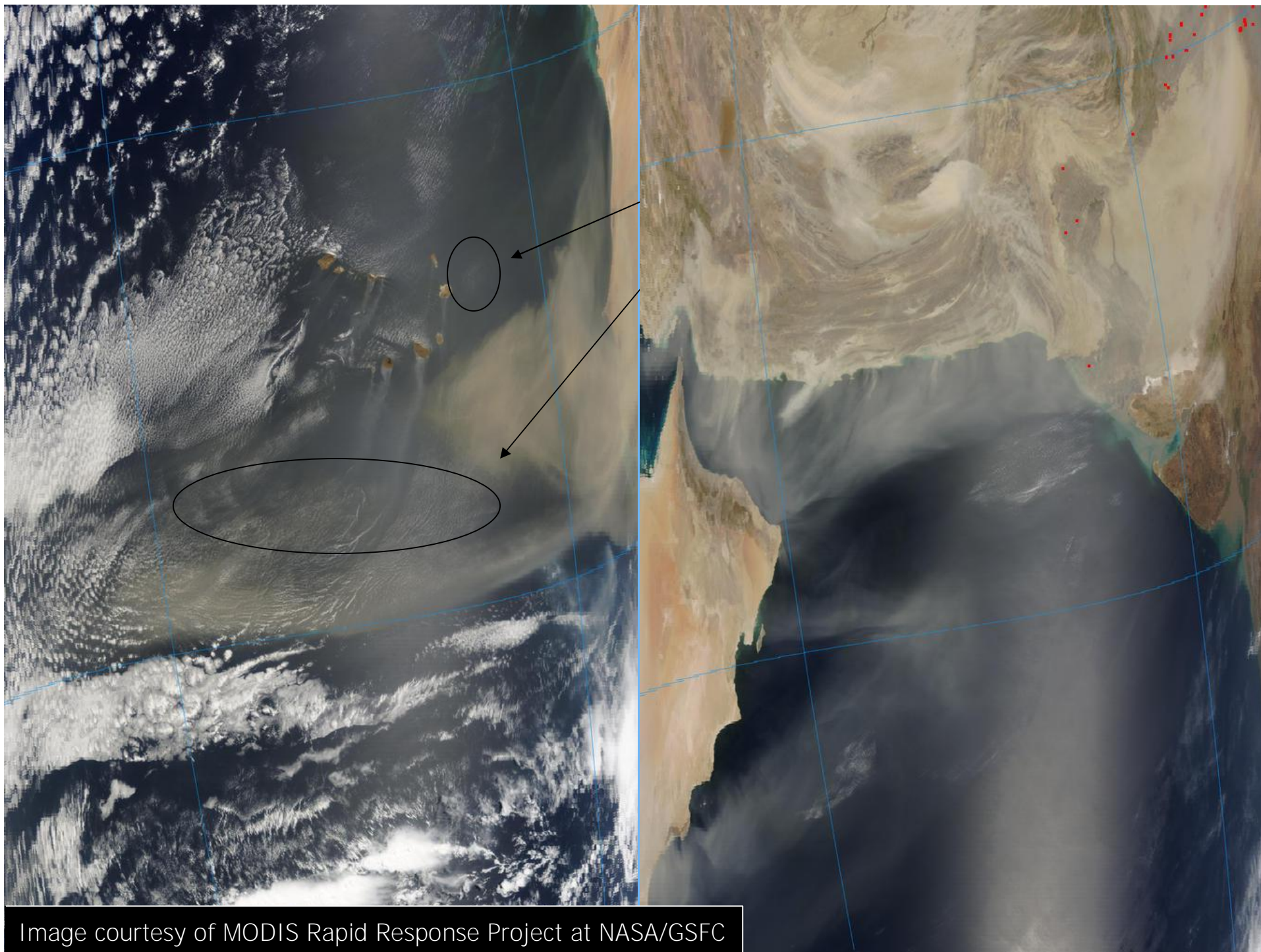
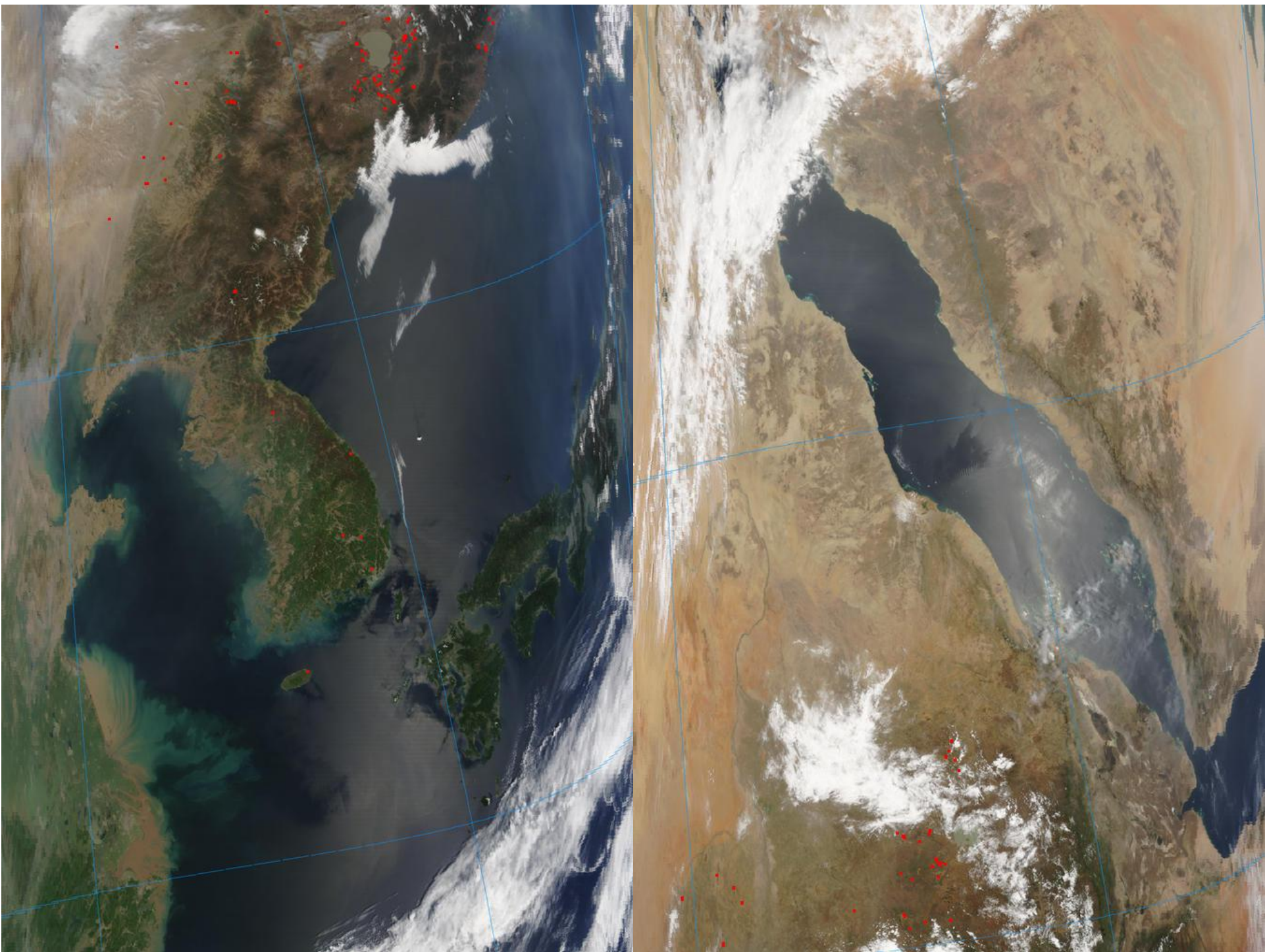
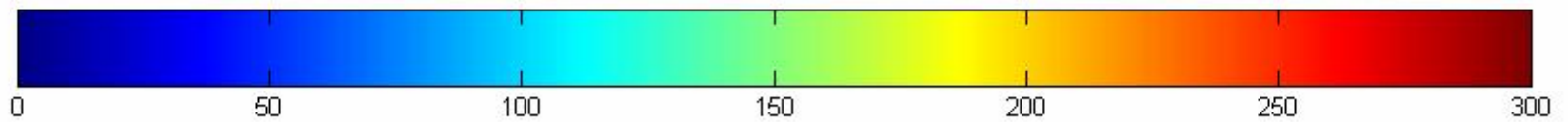
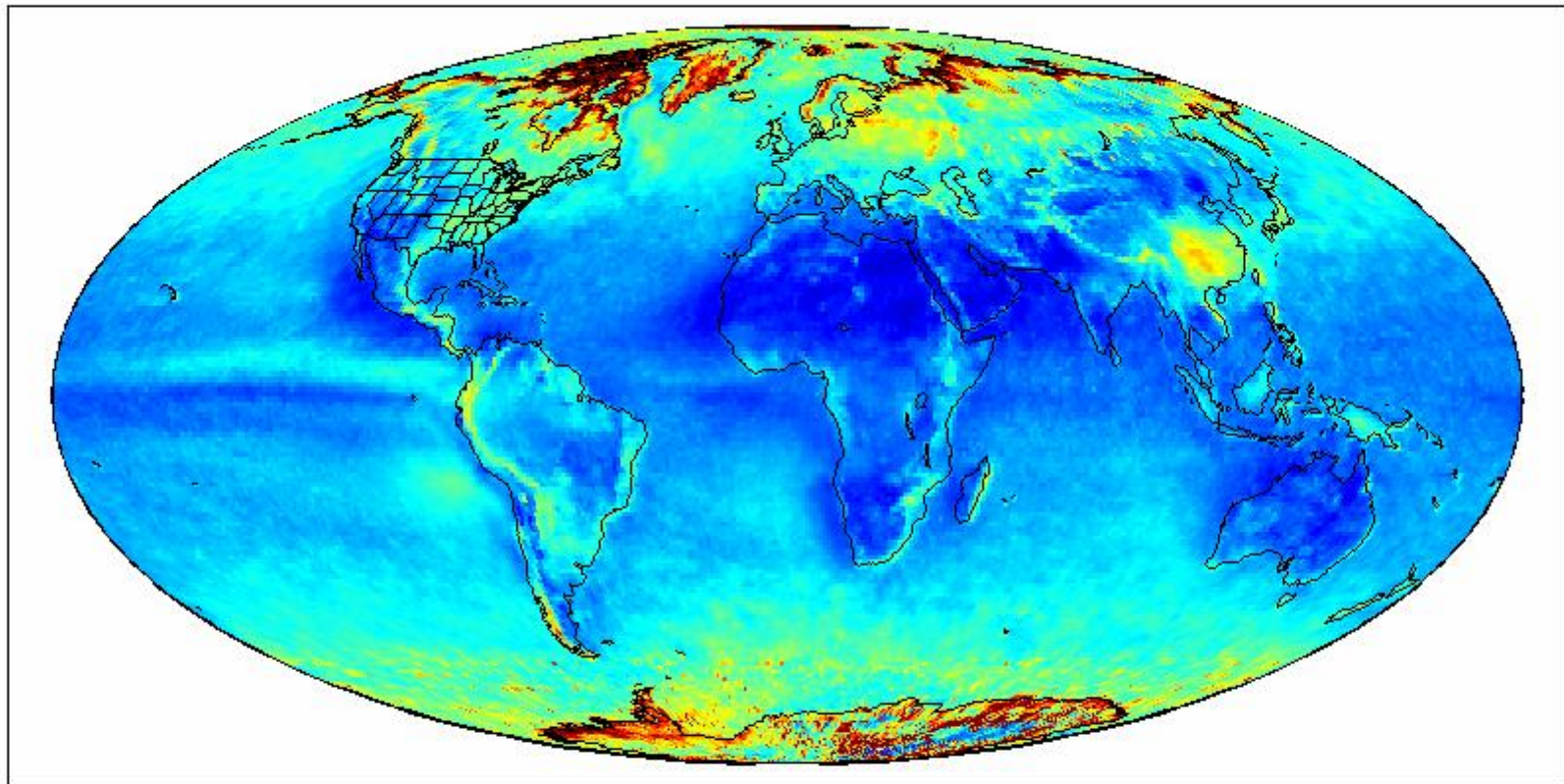


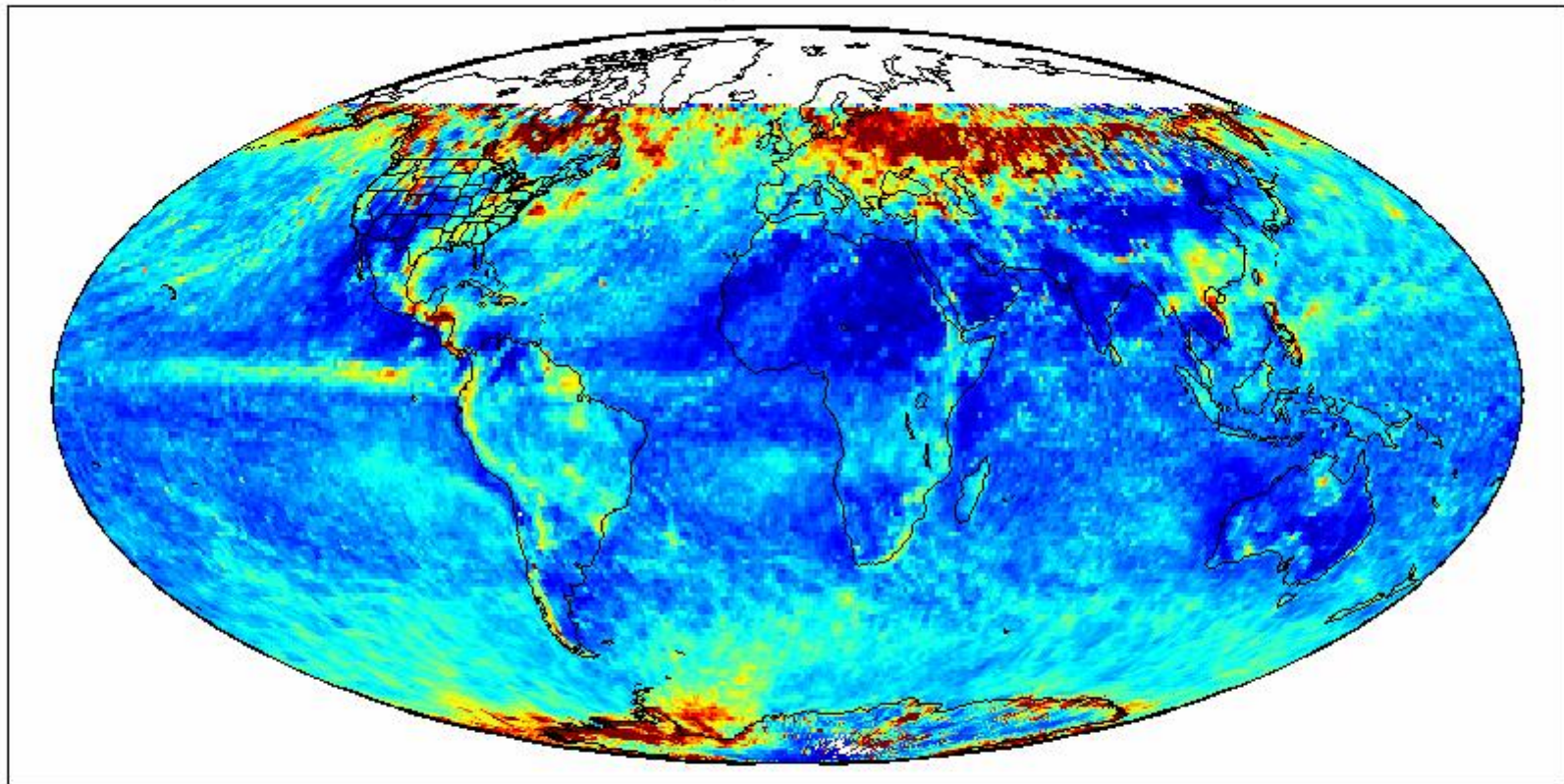
Image courtesy of MODIS Rapid Response Project at NASA/GSFC



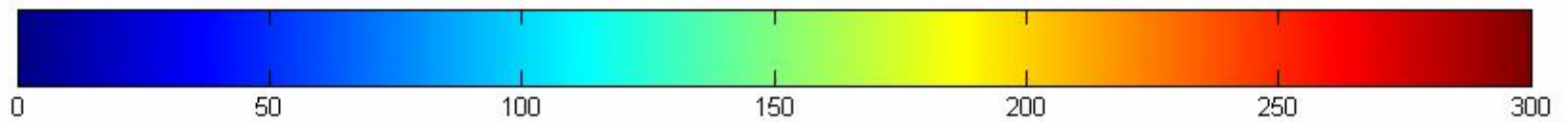
2003 Mean LWP



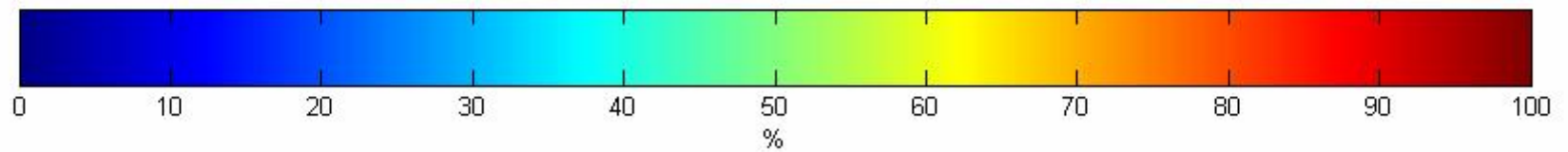
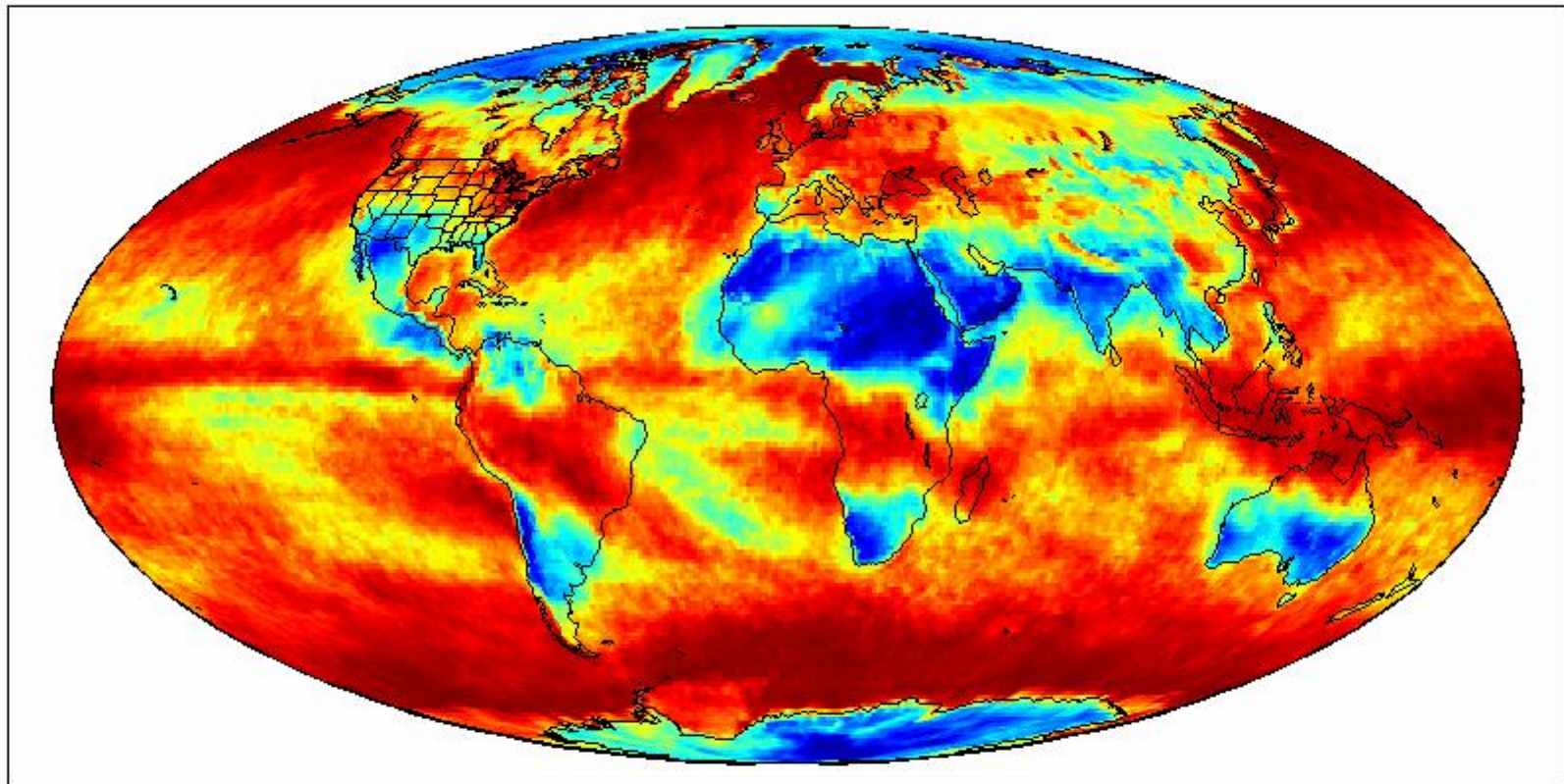
January 2003 Mean LWP



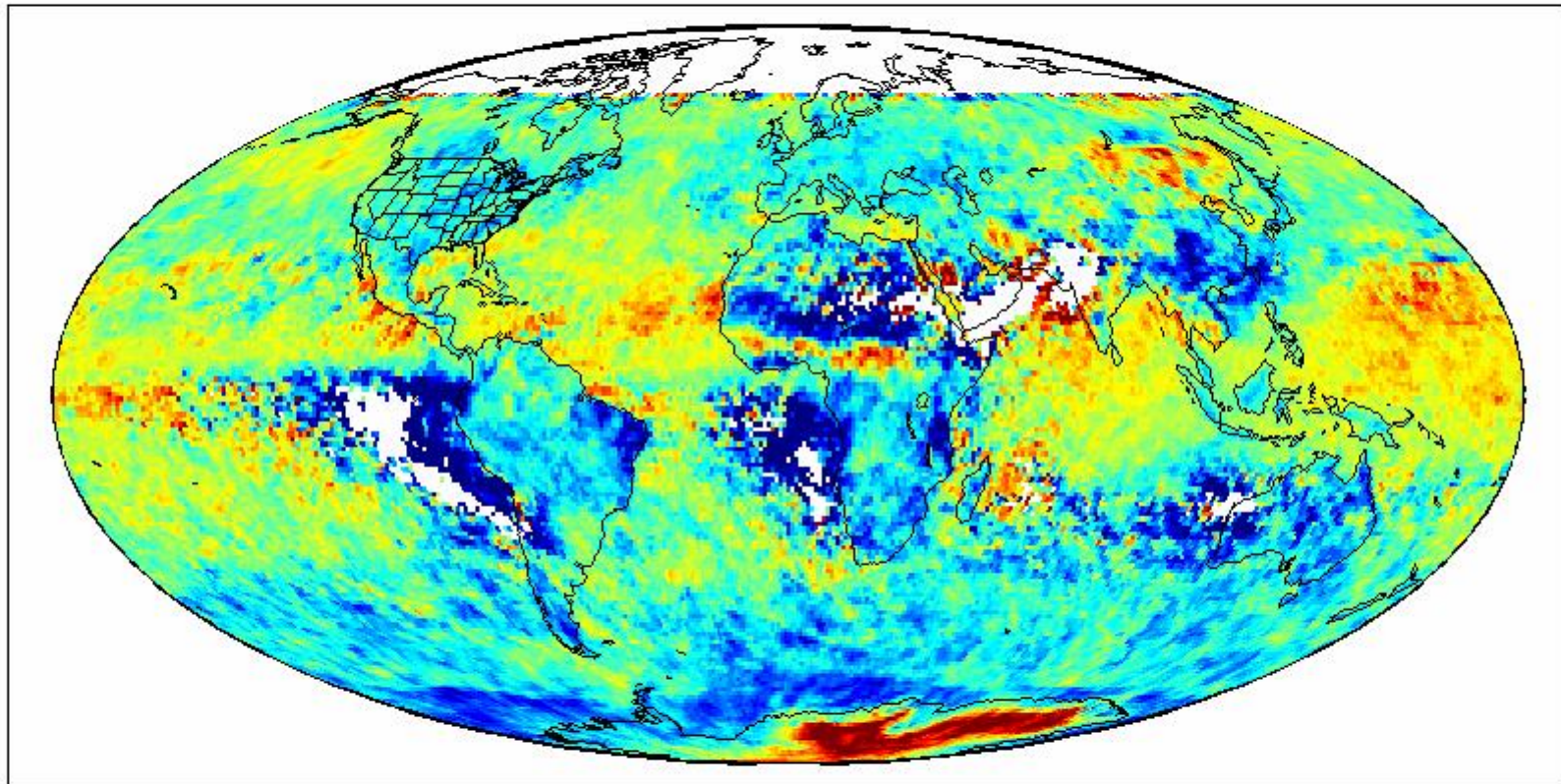
g/m^2



Jan 2003 Cloud Fraction



Nov 2001



October 2002

