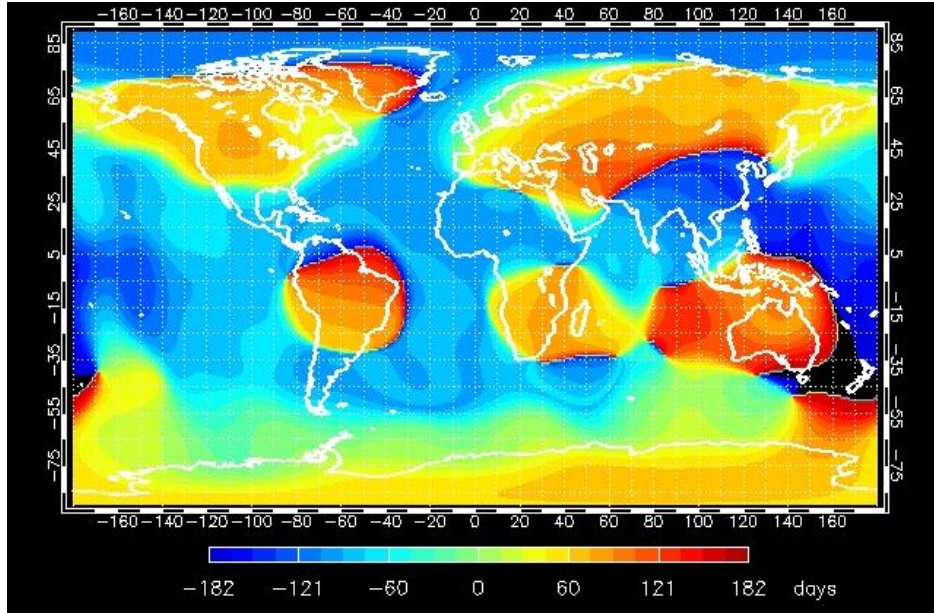


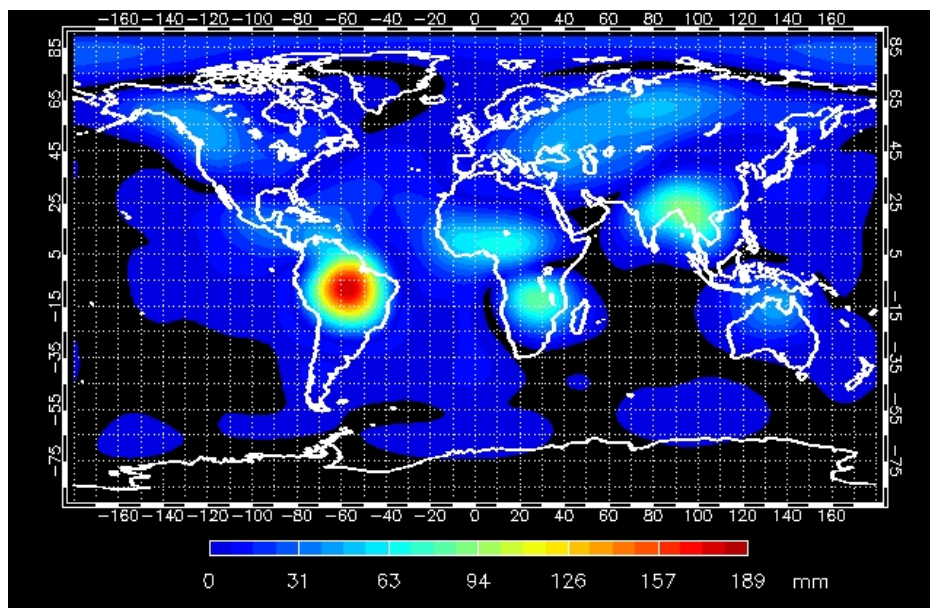
Satellite Gravimetry: exercises

1) Below are a series of spatial maps produced from GRACE data. For each image, describe what parameter is being plotted. (HINT: 3 of these plots are components of the GRACE time series. For these, think about the temporal signature of various geophysical signals, such as precipitation patterns).



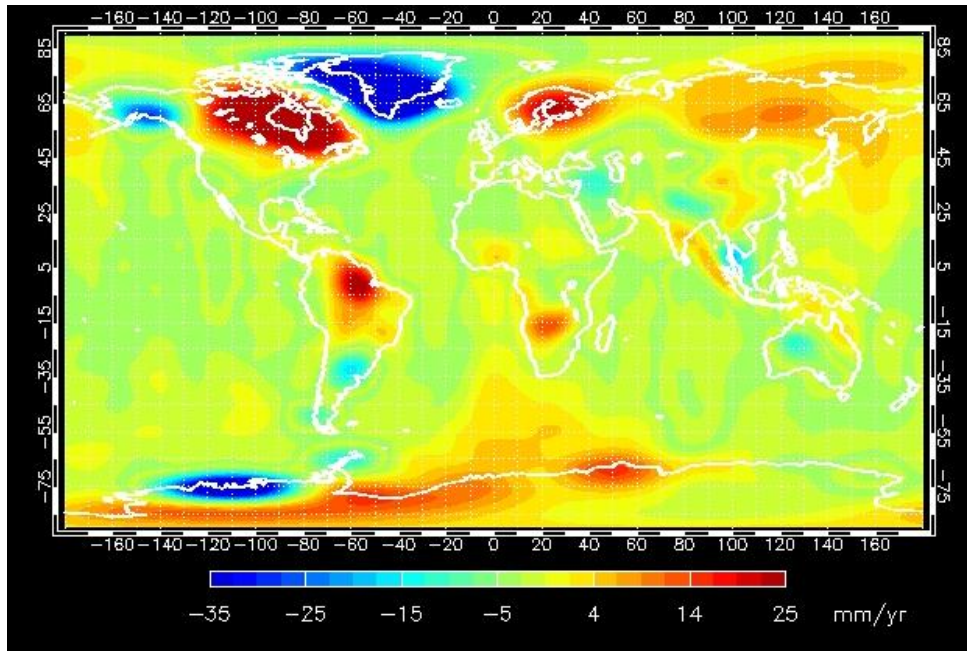
parameter: phase

observed geophysical signals: loading in Northern hemisphere due to snow cover is about 180 days out of phase with e.g. monsoon rains in India.

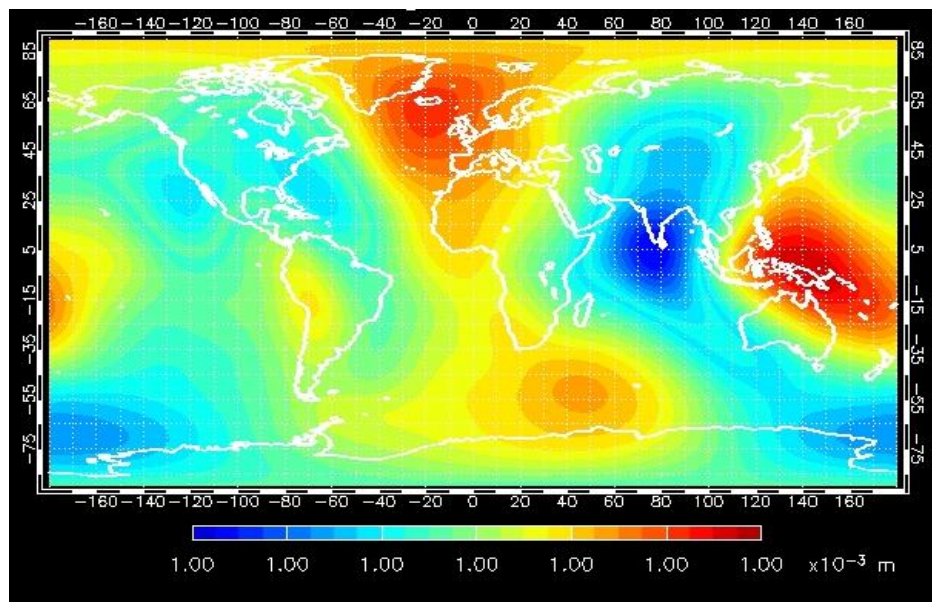


parameter: amplitude

observed geophysical signals: high rainfall in Amazon Basin, India



parameter: trend
 observed geophysical signals: GIA over Hudson's Bay, ice mass loss in Greenland, Patagonia
 Antarctic Peninsula, Alaska



parameter: geoid
 observed geophysical signals: distribution of mass on the Earth

2) Compare these two plots of the trend in global water mass in mm w.e. per year. Both plots use the same Stokes coefficients from the same data processing center. The first plot is close to the raw GRACE observation. The second plot has been modified with an algorithm.

a) What type of post-processing has been used?

Smoothing

b) What does this processing do to the amplitude of the observed signal?

Amplitude is decreased (attenuated)

c) What causes the “ringing” near the equator in the first plot? Is this a real signal?

Occurs due to orbital frequency of GRACE satellites, setting up resonance in degrees 15/16. Also occurs due to poorer coverage of GRACE in equatorial regions. This is not a real signal.

