MY NASA DATA Earth System Data Set Card Activity

Purpose:

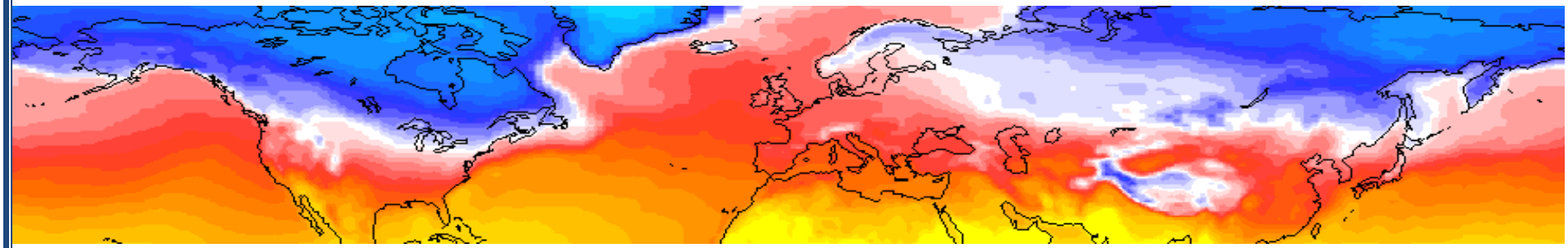
To identify global patterns and connections in environmental data and develop an understanding of the interactions within the Earth system.

Overview:

The Earth System Data Set Card Activity includes images displaying global environmental data over the course of 2013 that are compared in order to understand how the Earth works as a system. These images are taken from the Earth System Data Explorer visualization tool (https://mynasadata.larc.nasa.gov/EarthSystemLAS/UI.vm) located on the MY NASA DATA website (https:mynasadata.larc.nasa.gov/).

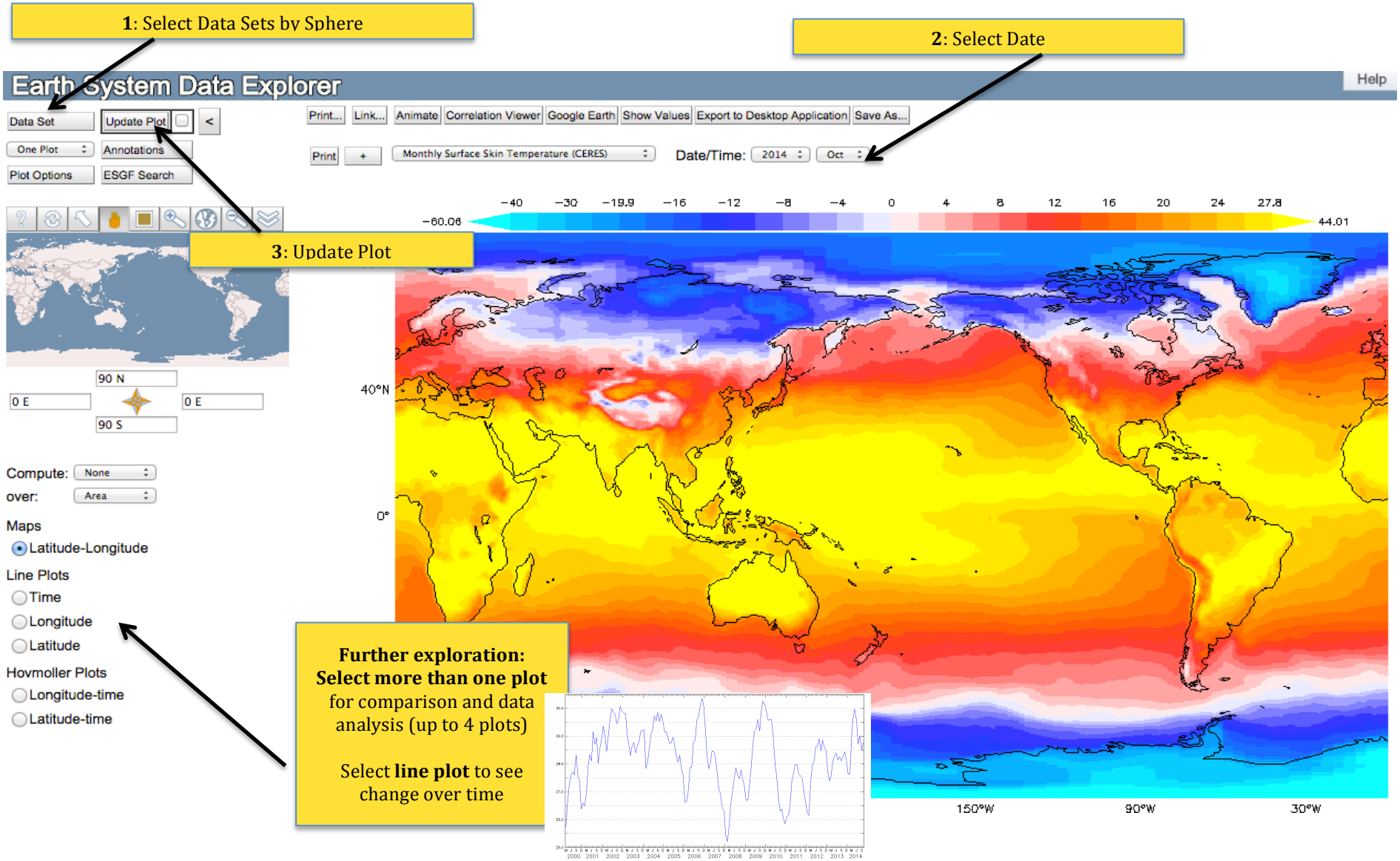
Student Outcomes:

- Students will be able to explore the concepts of Earth as a system.
- Students will be able to find patterns and connections between and among maps containing different environmental data.
- Students will analyze the relationship between time and space in regard to global environmental data.
- Students will discover, adifferentiate, and interpret patterns in graphic displays of data.
- Students will conduct an analysis of mapped data.
- Students will develop descriptions, explanations and arguments from evidence.
- Students will communicate observations and explanations.



MY NASA DATA: Earth System Data Explorer Quick Guide
(https://mynasadata.larc.nasa.gov/EarthSystemLAS/UI.vm)

Browse, download, print and explore NASA Satellite data available for Earth system's spheres: atmosphere, biosphere, hydrosphere and geosphere.

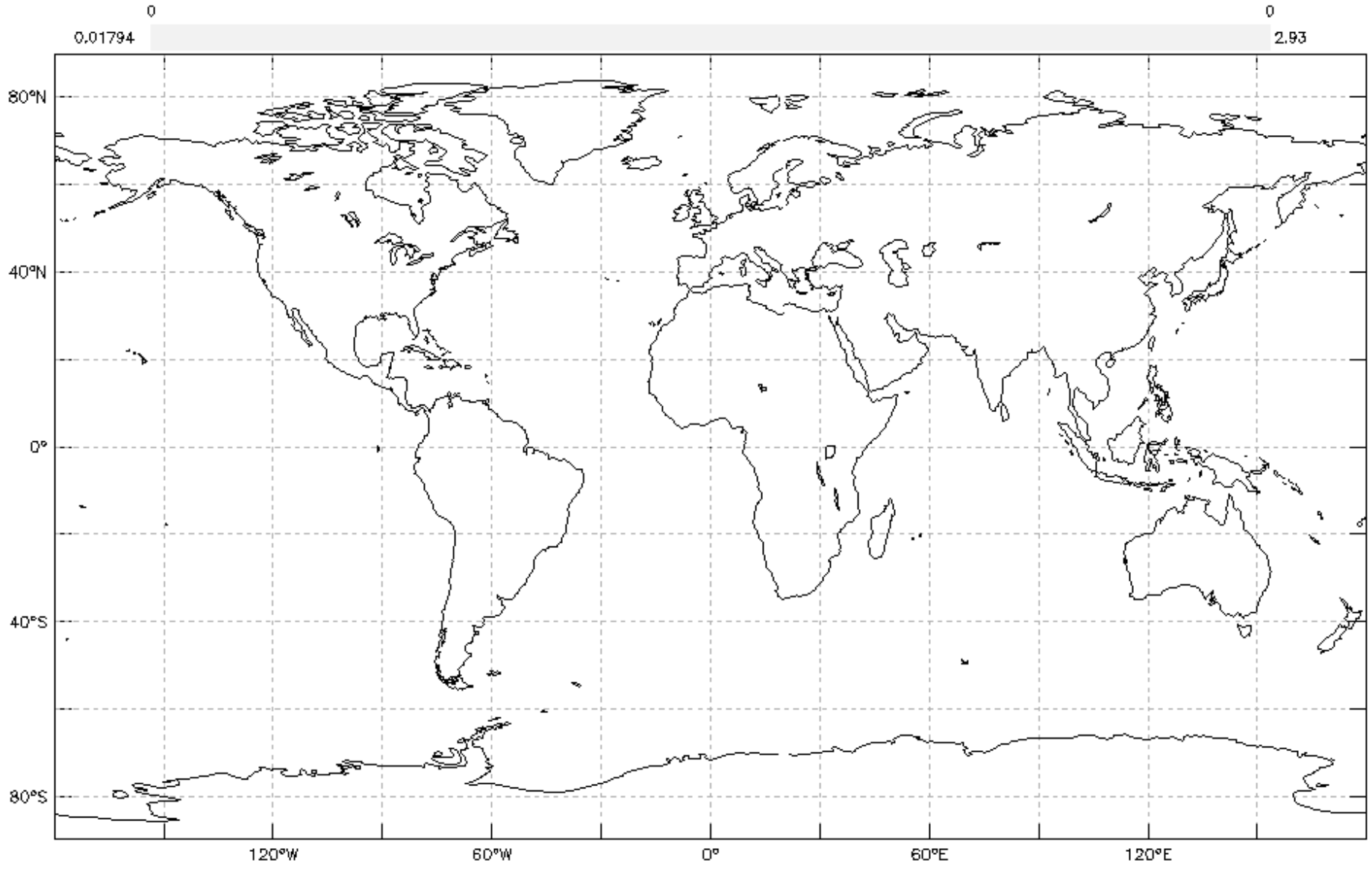


MY NASA DATA Earth System Data Set Card Variable Descriptions

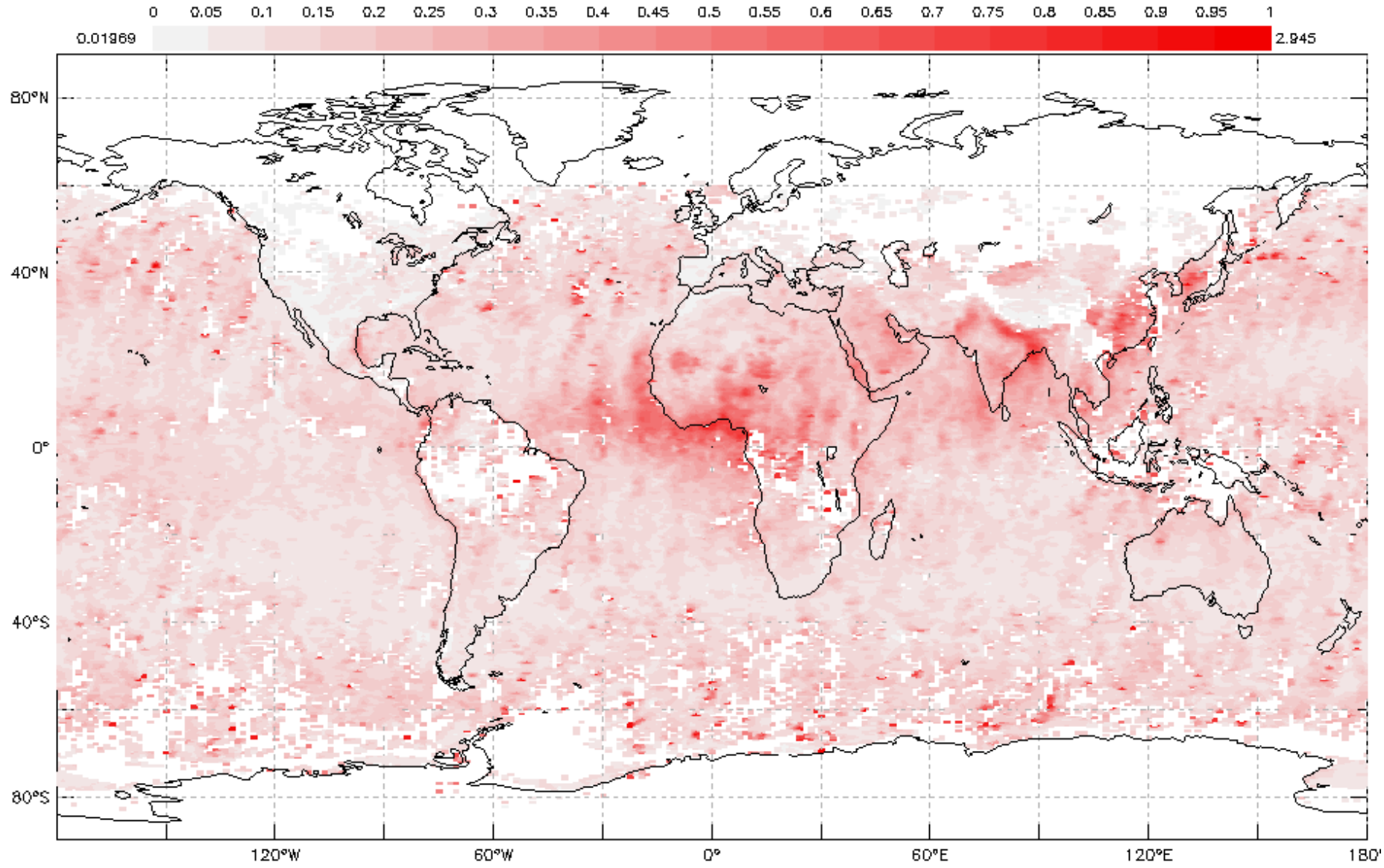
- **Aerosol Optical Thickness:** referred to as (AOT, also called aerosol optical depth) is a measure of how much of the Sun's light is prevented from reaching the Earth's surface due to scattering and absorption by aerosols. The images show measurements of aerosol optical thickness as seen from space. Clear skies usually have low AOT values (0.1 or lower) while regions with AOT values greater than 0.3 are often experiencing an aerosol event such as wildfire, a dust storm, or a pollution event. The larger the optical thickness, the less light reaches Earth's surface. The more aerosols in the atmosphere, the greater the AOT value will be.
- **Cloud Coverage:** Cloud coverage is the percent of Earth's surface covered by clouds relative to the portion of Earth that is not covered by clouds. This is measured using MODIS (Moderate Resolution Imaging Spectroradiometer) aboard NASA's Terra and Aqua satellites. MODIS collects information in pixels with a resolution of one square kilometer.
- **Solar Insolation:** Insolation (incoming solar radiation) is the rate of incoming sunlight reaching the Earth's surface measured in watts per square meter (W/m^2). The amount of solar energy reaching the Earth's surface varies due to air molecules, clouds and aerosols. These images are derived from measurements of radiant energy escaping the top of Earth's atmosphere by the CERES instrument aboard NASA's Terra and Aqua satellites.
- **Precipitation:** Precipitation is the total rainfall measured in millimeters (mm) derived from data collected by the Precipitation Radar instrument aboard the Tropical Rainfall Measuring Mission (TRMM). TRMM is a joint mission sponsored by NASA and the Japanese Space Agency (JAXA).
- **Surface Temperature:** Surface skin temperature is the temperature on the surface ("skin") of the Earth where humans, plants, and animals live and is measured in degrees Celsius (^oC). TEarth's surface temperature measurements are collected using the CERES instrument aboard NASA's Terra satellite.
- **Green Up/Down:** Green Up/Down images are composed of Chlorophyll Concentration and NDVI (Normalized Difference Vegetation Index) images. Chlorophyll is a pigment found in phytoplankton (tiny aquatic protists). Its concentration, measured in milligrams per cubic meter (mg/m^3), is used as an index of phytoplankton biomass. NDVI images show a global measure of the "greenness" of vegetation across Earth's landscapes for a given composite period. These images are accurate measures of vegetation activity at the land surface. NDVI images were made using data collected by the MISR (Multi-angle Imaging SpectoRadiometer) instrument aboard NASA's Terra satellite.

MY NASA DATA

Blackmaster for Grid Overlay



Data Set: Aerosols **Variable**: Monthly Aerosol Optical Depth (MISR) January 2013



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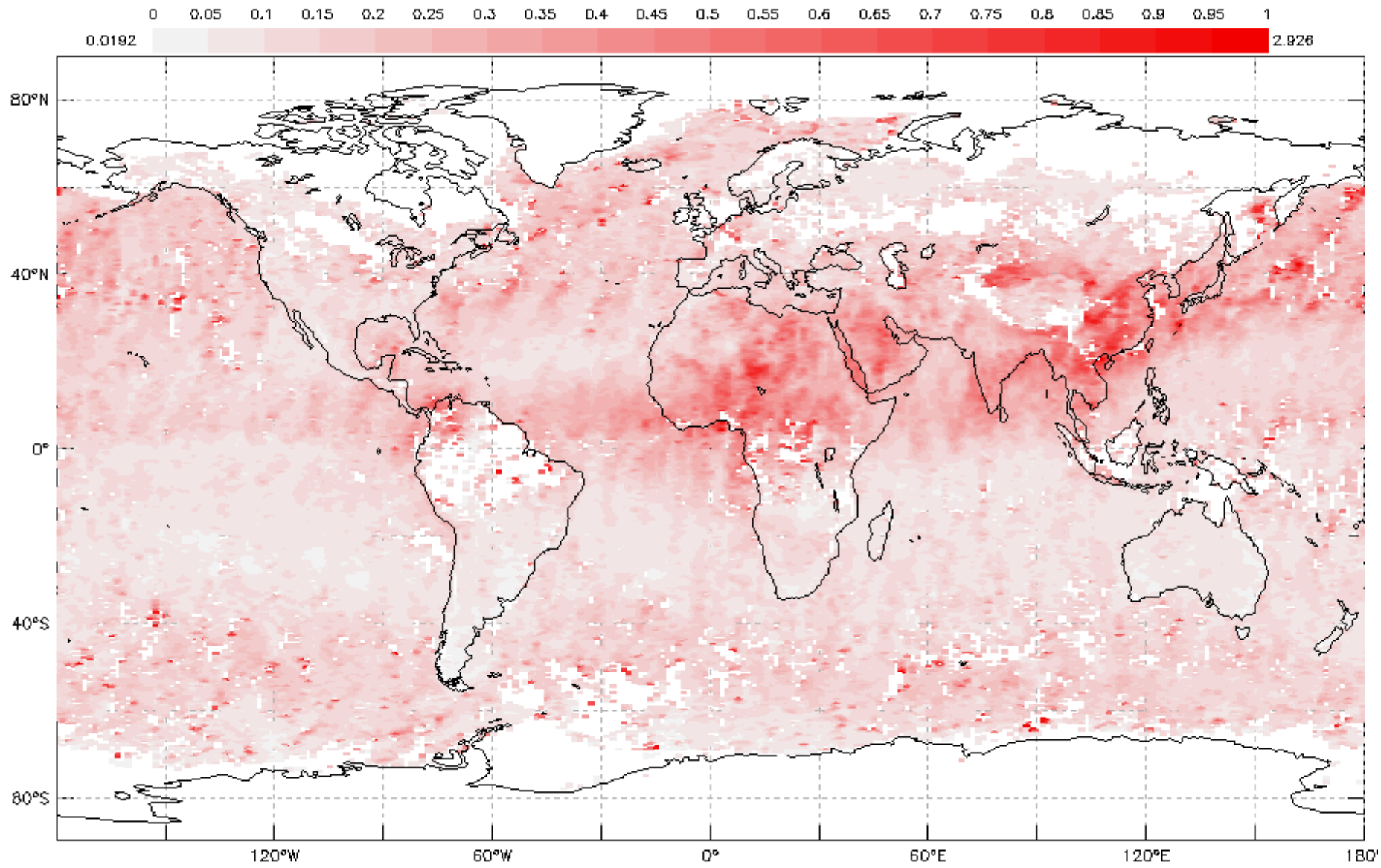
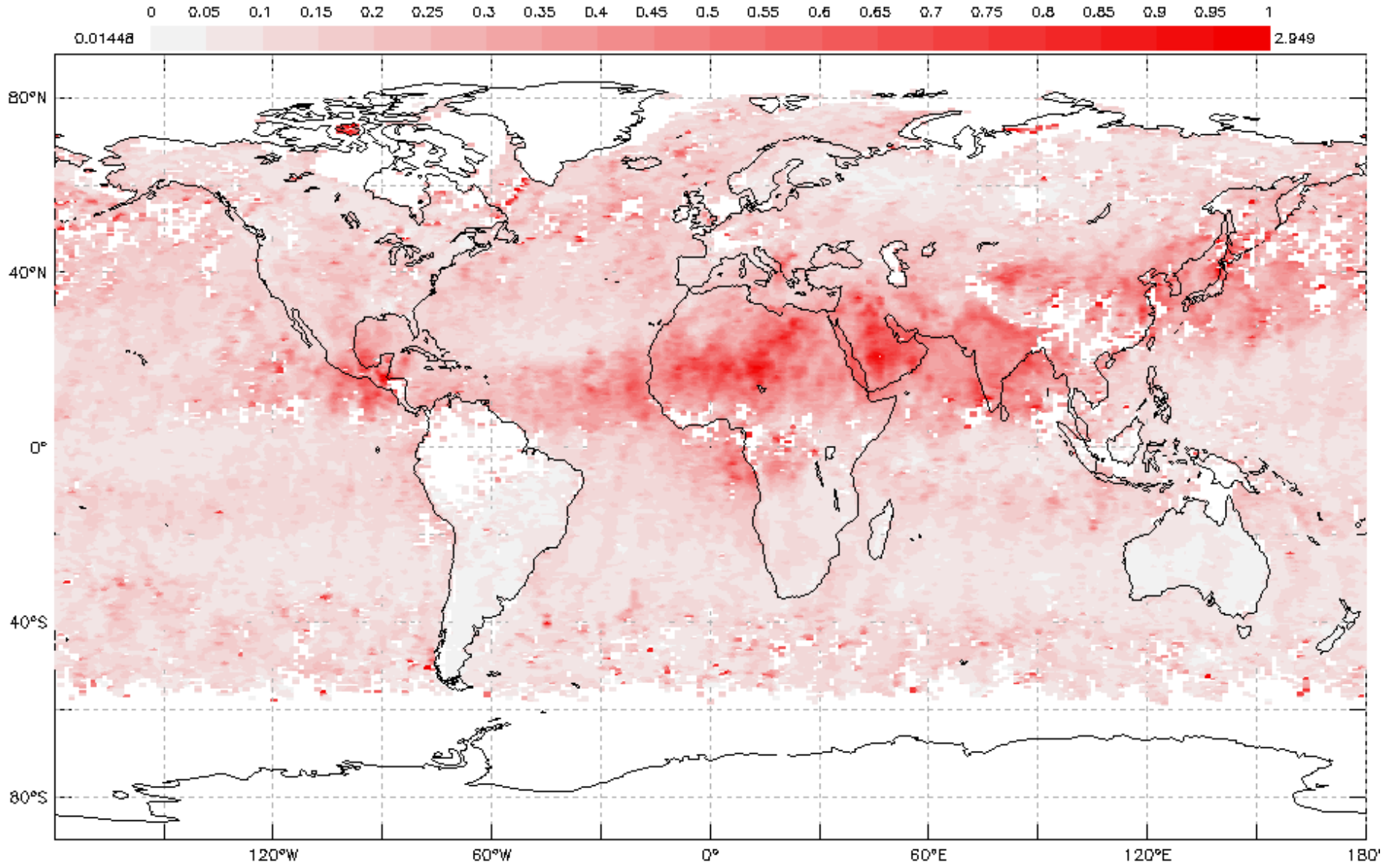
Data Set: Aerosols **Variable**: Monthly Aerosol Optical Depth (MISR) March 2013



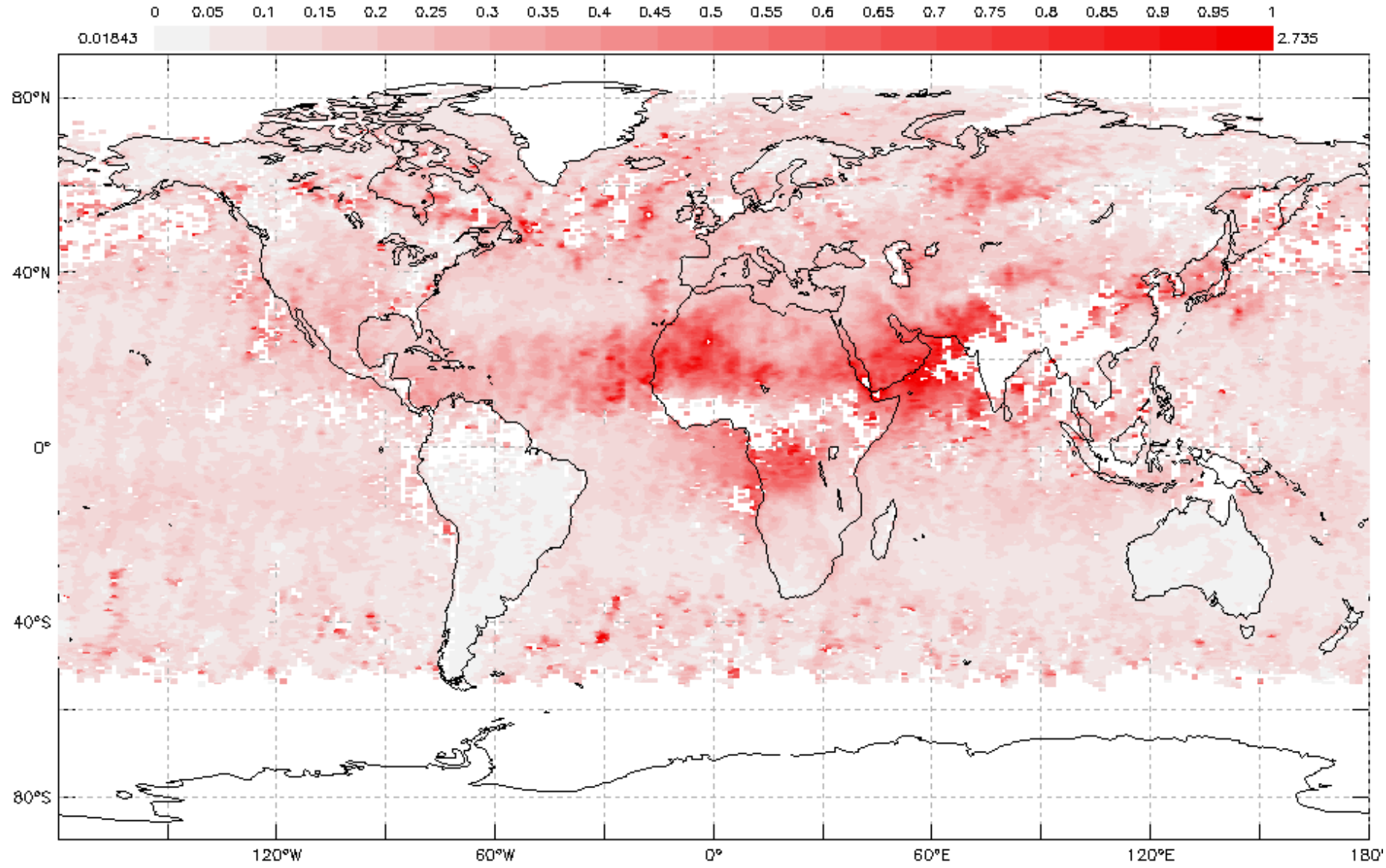
NASA Langley Research Center, MY NASA DATA

Data Set: Aerosols **Variable**: Monthly Aerosol Optical Depth (MISR) May 2013



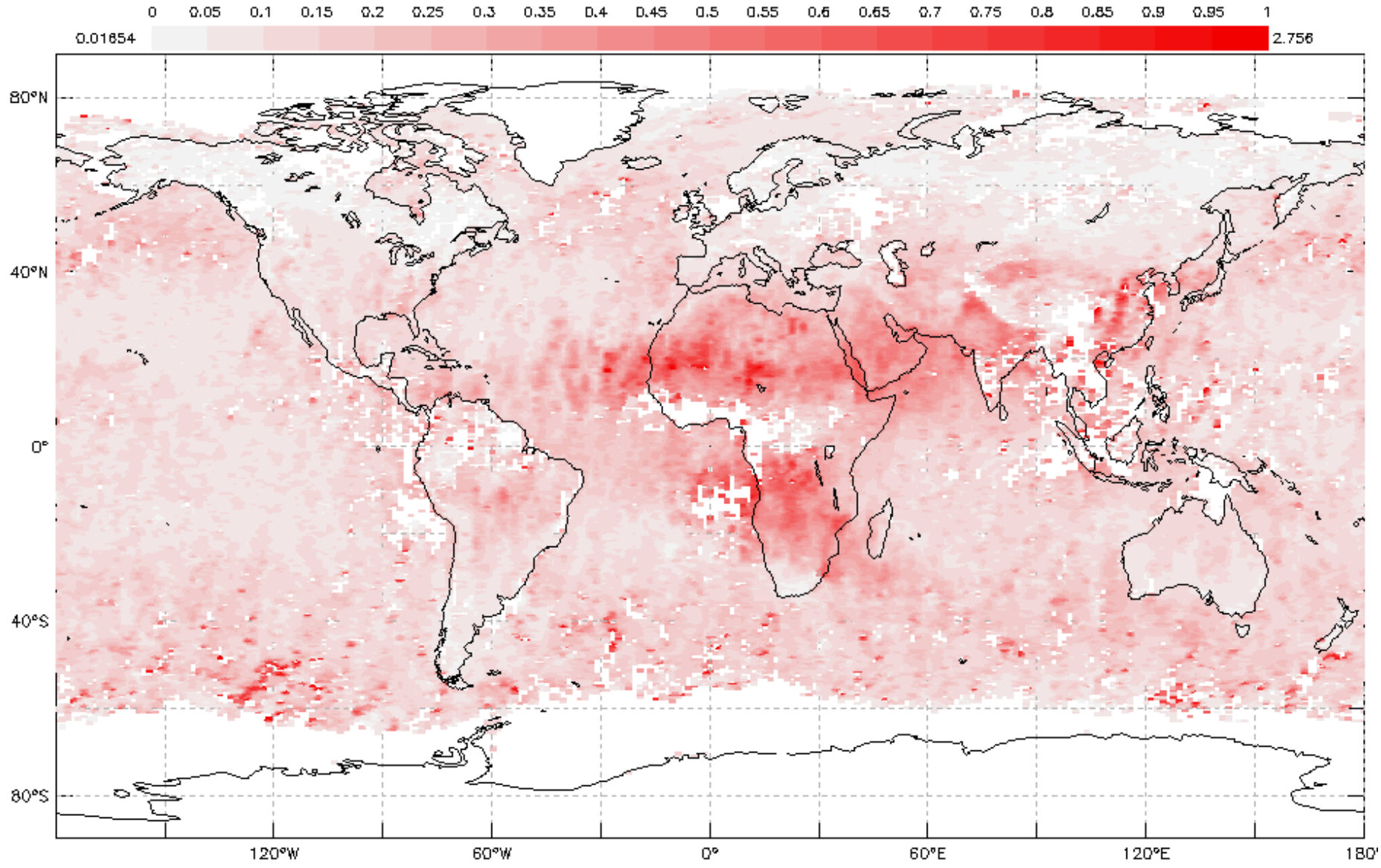
NASA Langley Research Center, MY NASA DATA

Data Set: Aerosols **Variable**: Monthly Aerosol Optical Depth (MISR) July 2013



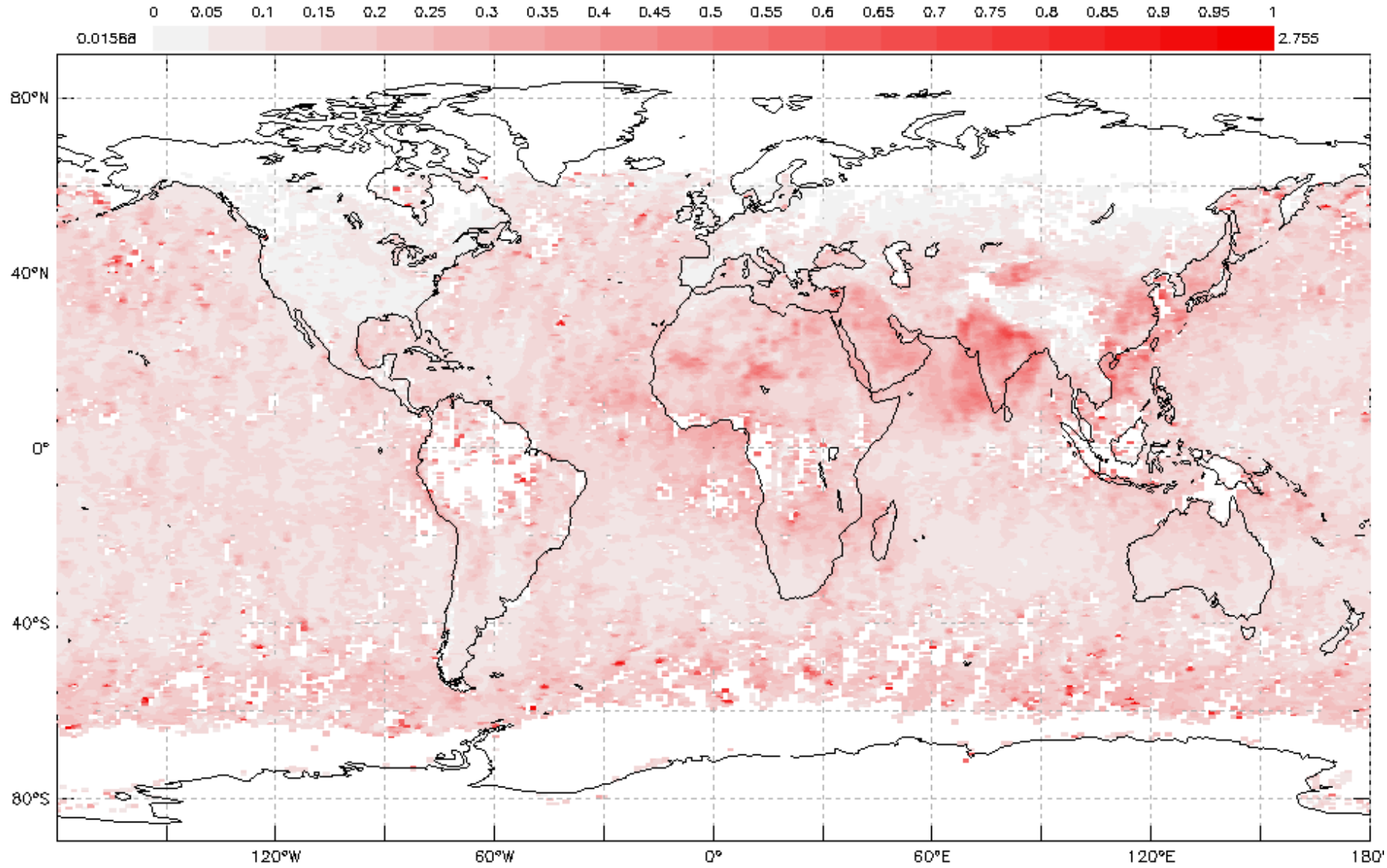
NASA Langley Research Center, MY NASA DATA

Data Set: Aerosols **Variable**: Monthly Aerosol Optical Depth (MISR) September 2013



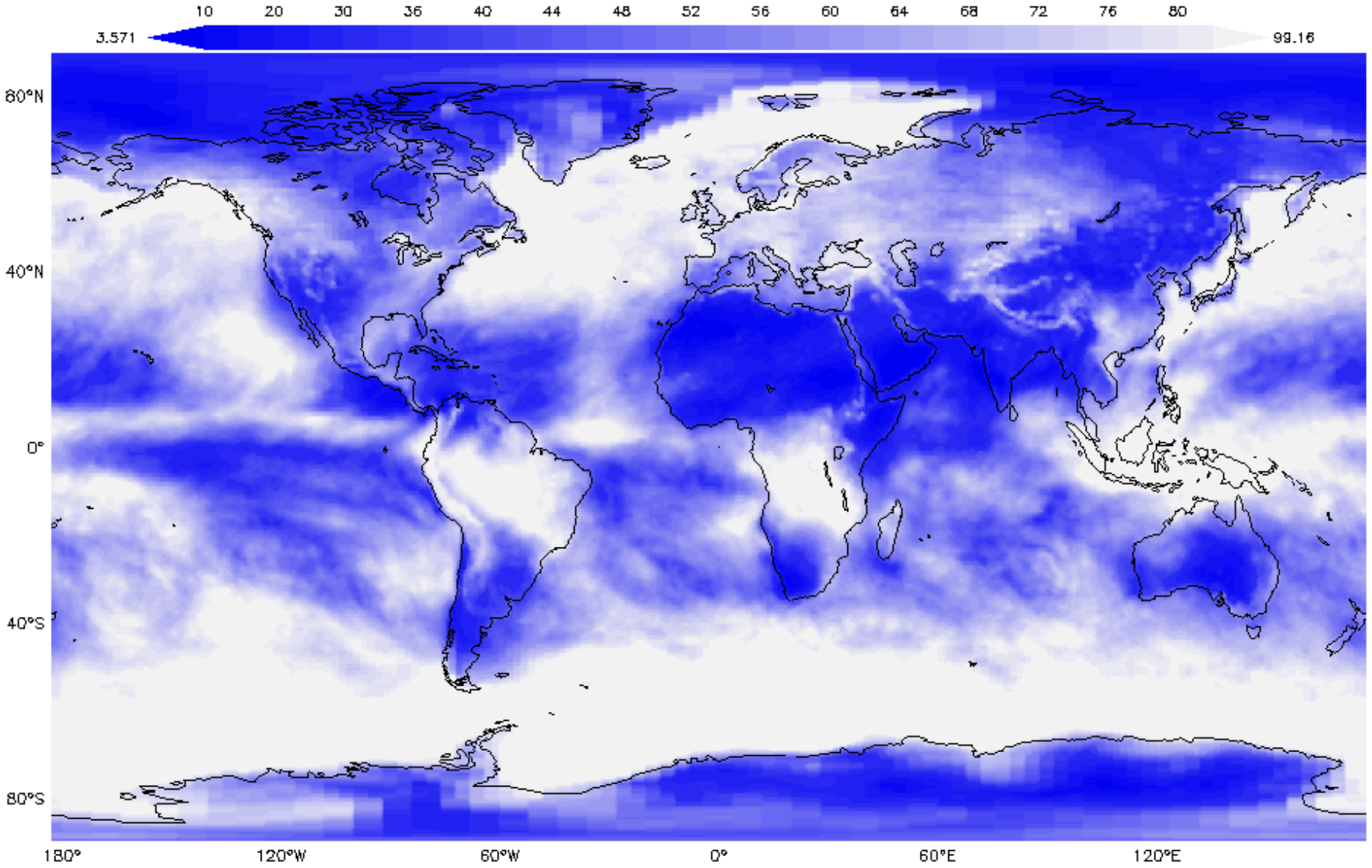
NASA Langley Research Center, MY NASA DATA

Data Set: Aerosols **Variable**: Monthly Aerosol Optical Depth (MISR) November 2013



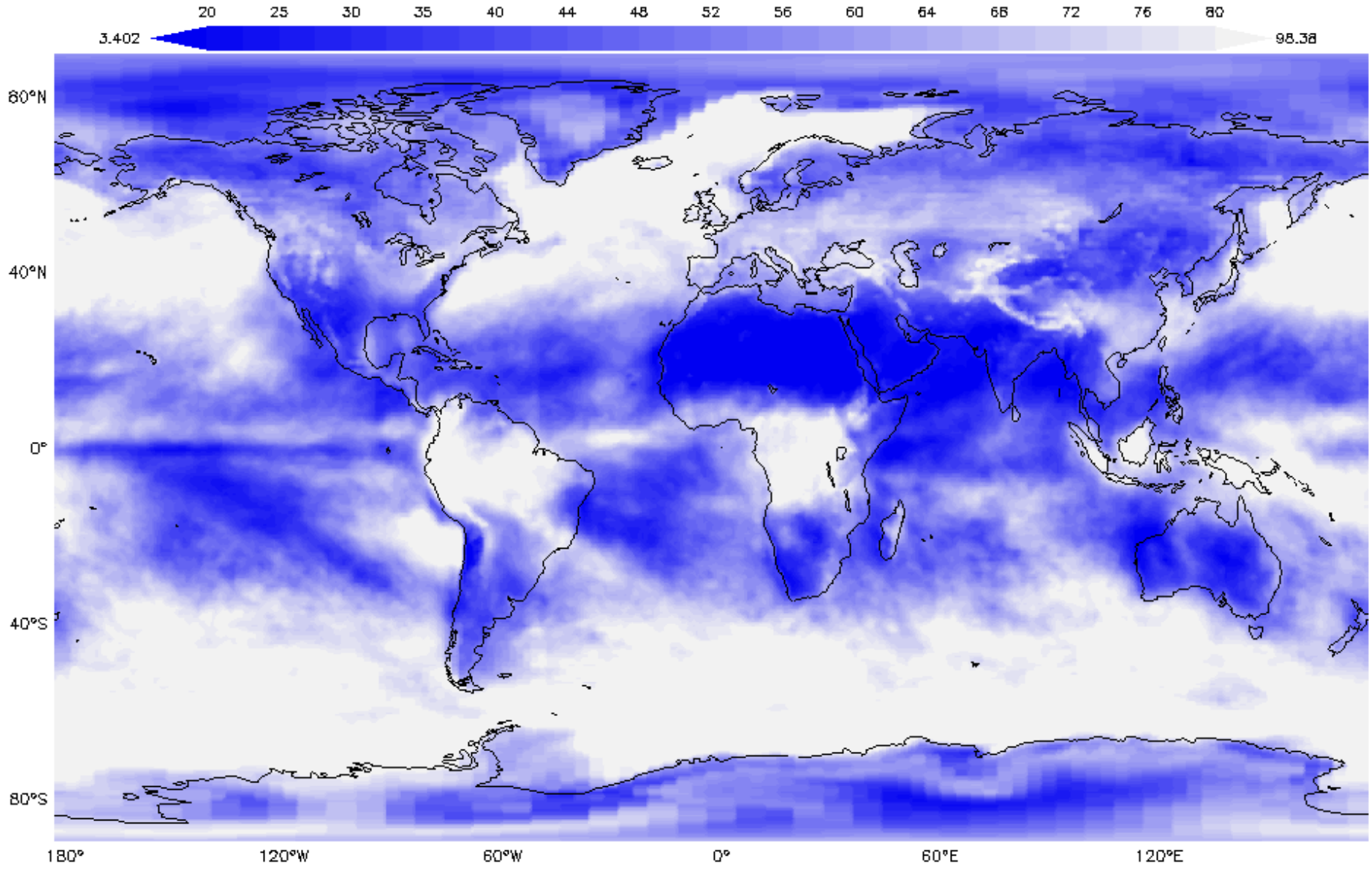
NASA Langley Research Center, MY NASA DATA

Data Set: Clouds **Variable**: Monthly Cloud Coverage (CERES TERRA) (%) January 2013



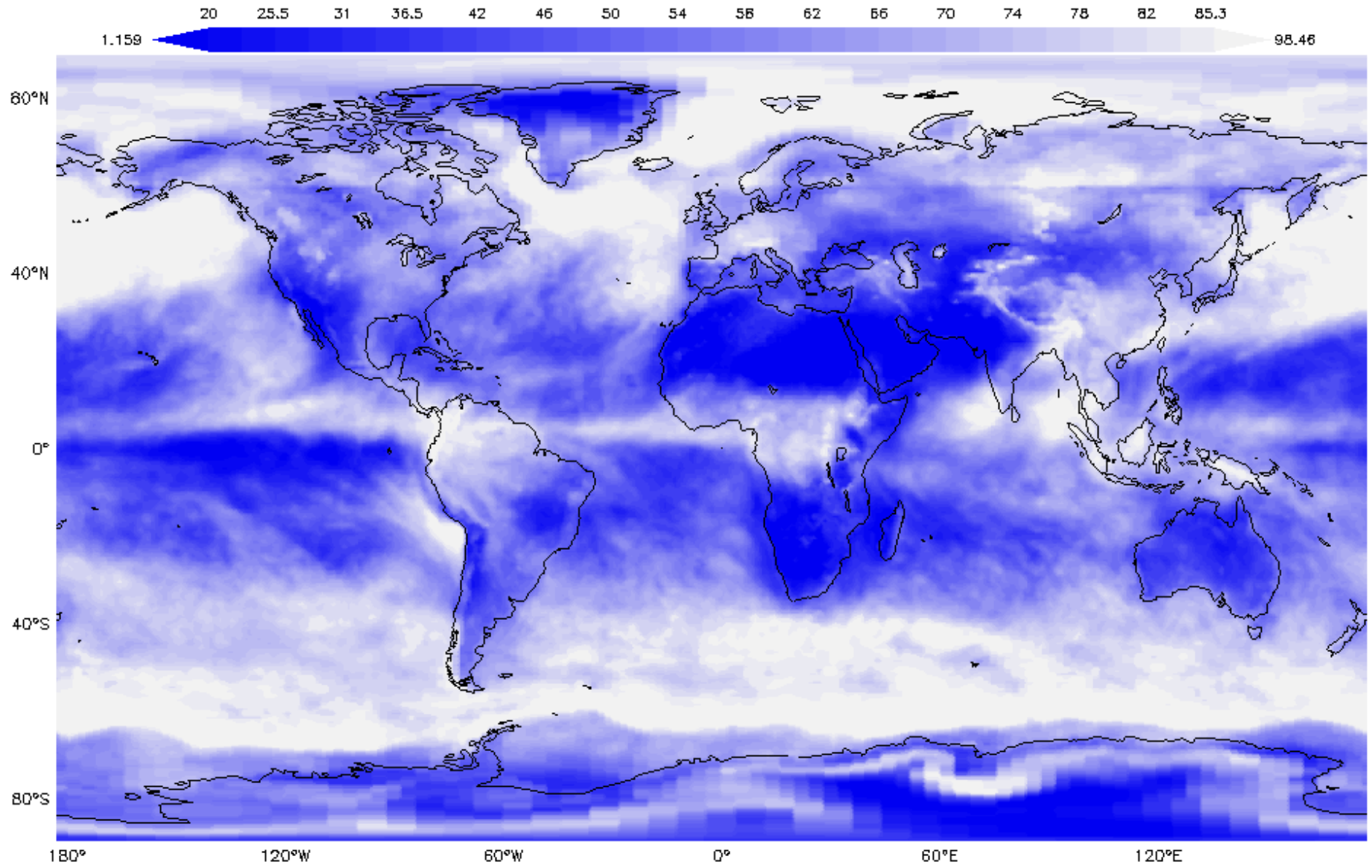
NASA Langley Research Center, MY NASA DATA

Data Set: Clouds **Variable**: Monthly Cloud Coverage (CERES TERRA) (%) March 2013



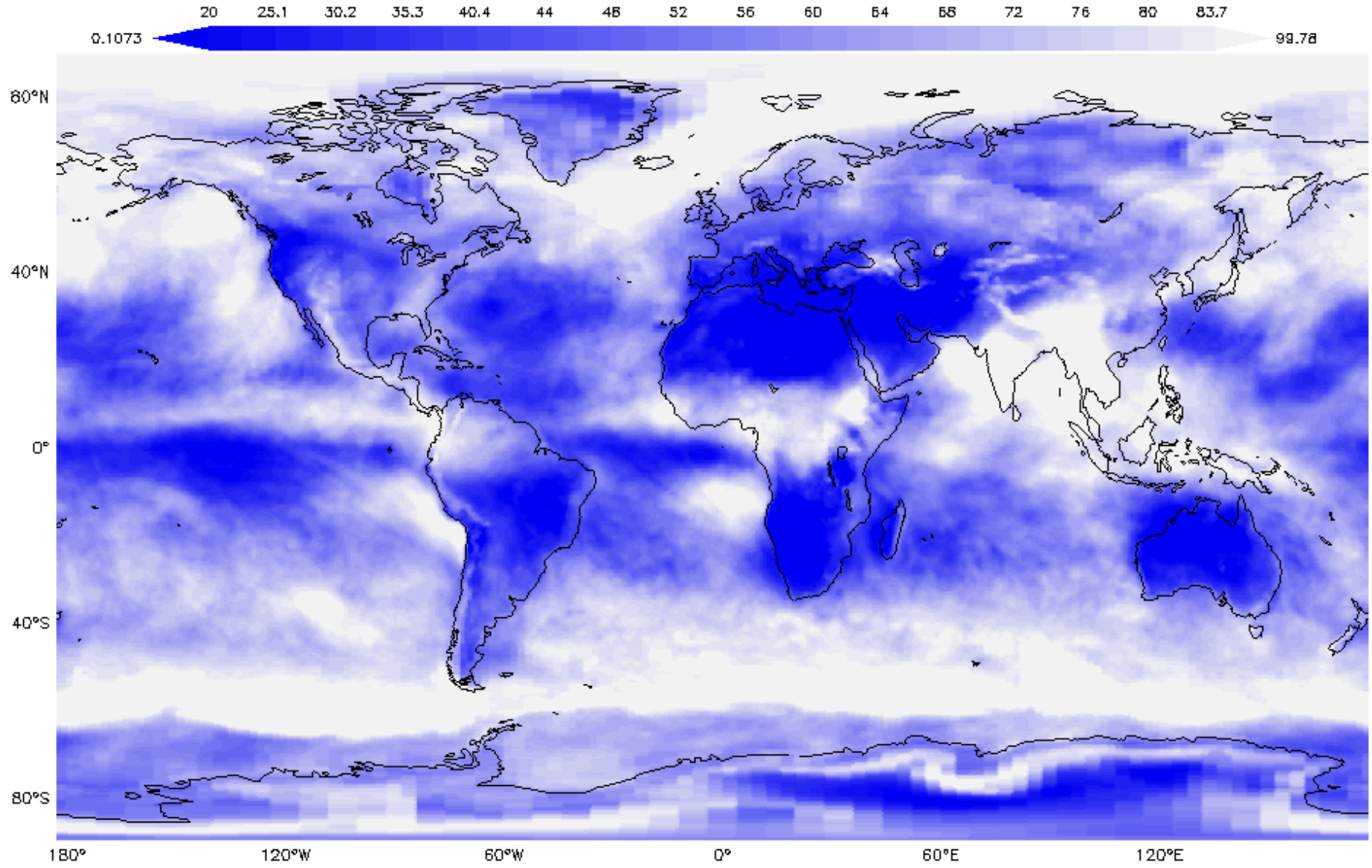
NASA Langley Research Center, MY NASA DATA

Data Set: Clouds **Variable**: Monthly Cloud Coverage (CERES TERRA) (%) May 2013



NASA Langley Research Center, MY NASA DATA

Data Set: Clouds **Variable**: Monthly Cloud Coverage (CERES TERRA) (%) July 2013



NASA Langley Research Center, MY NASA DATA

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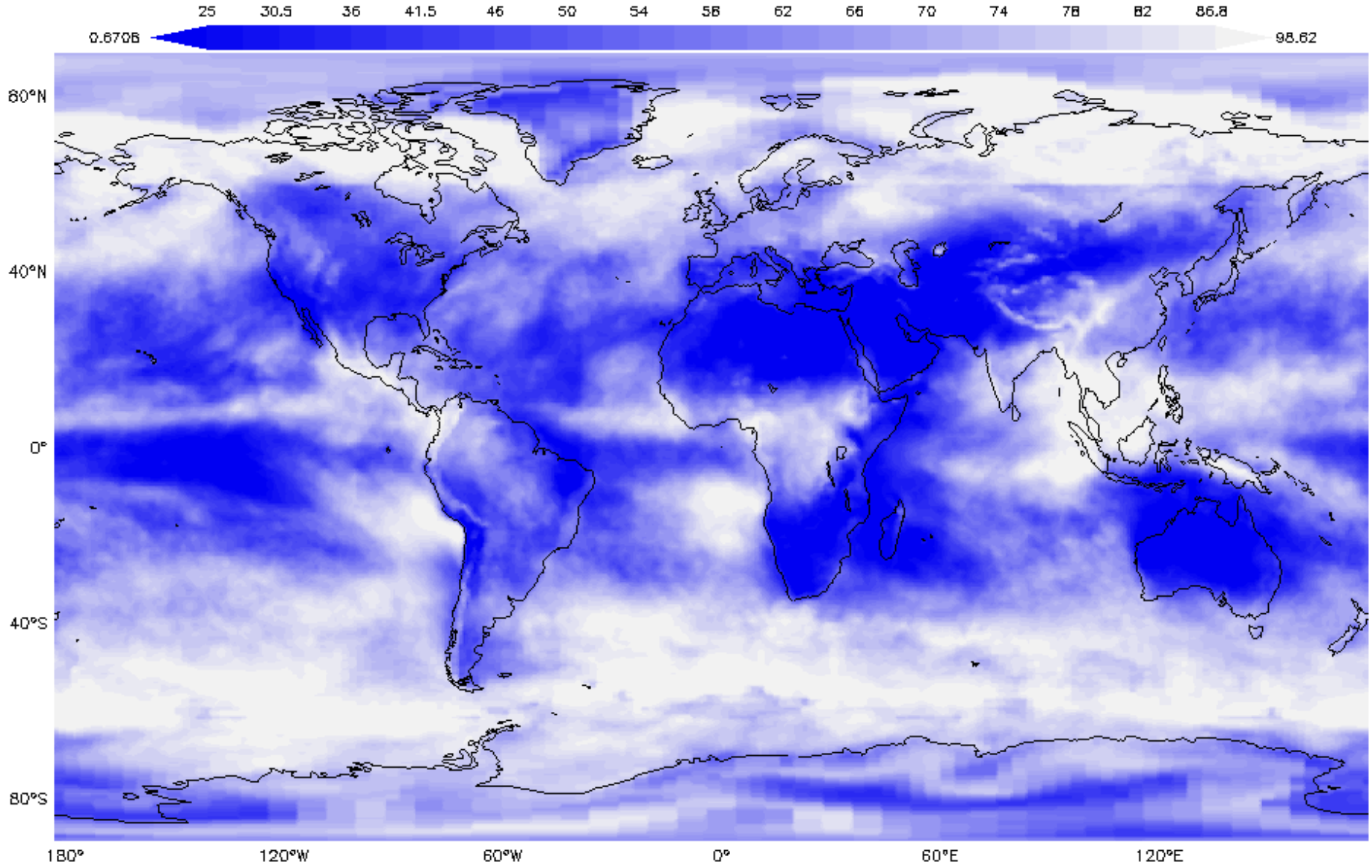

NASA Langley Research Center, MY NASA DATA

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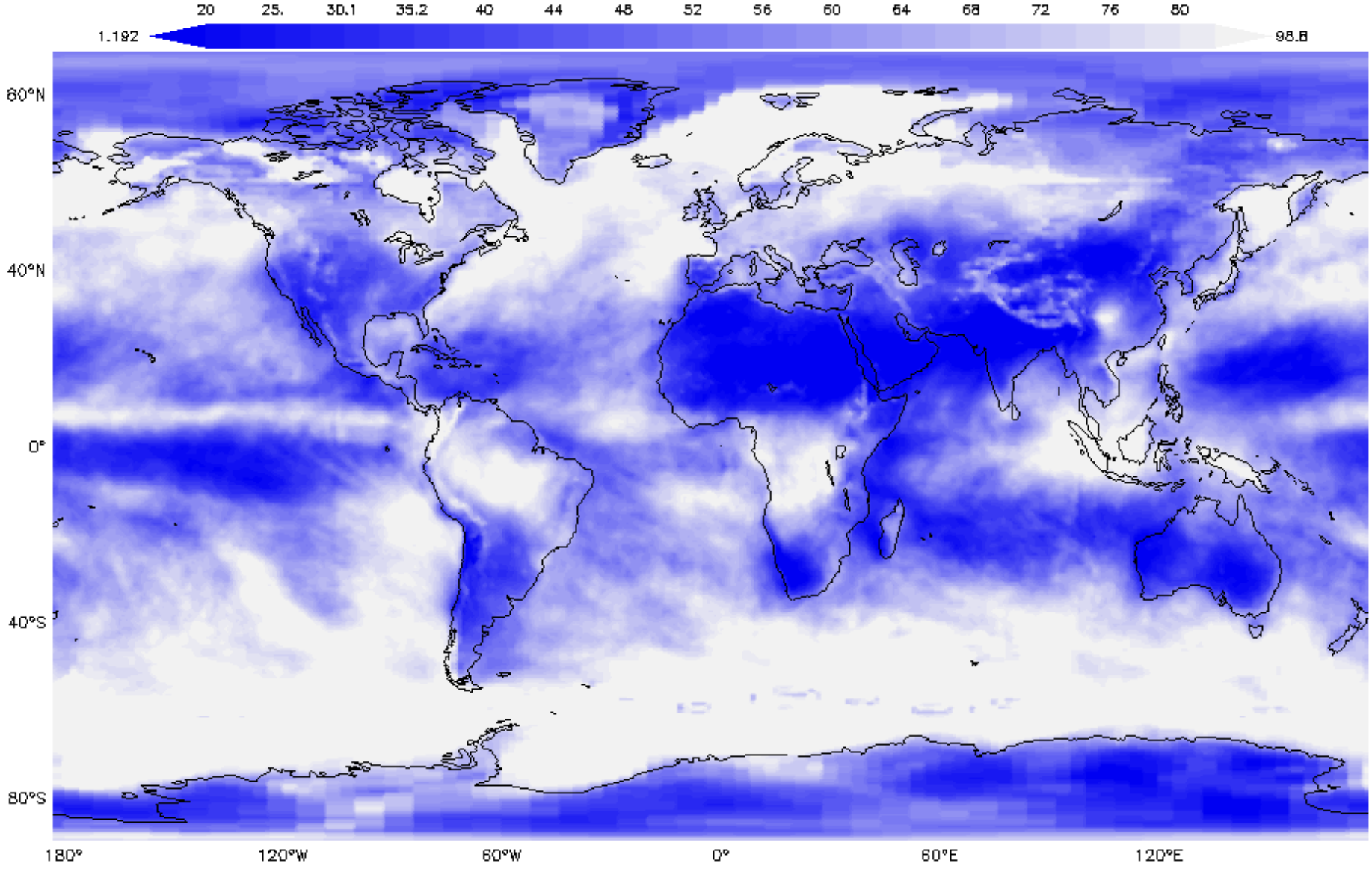
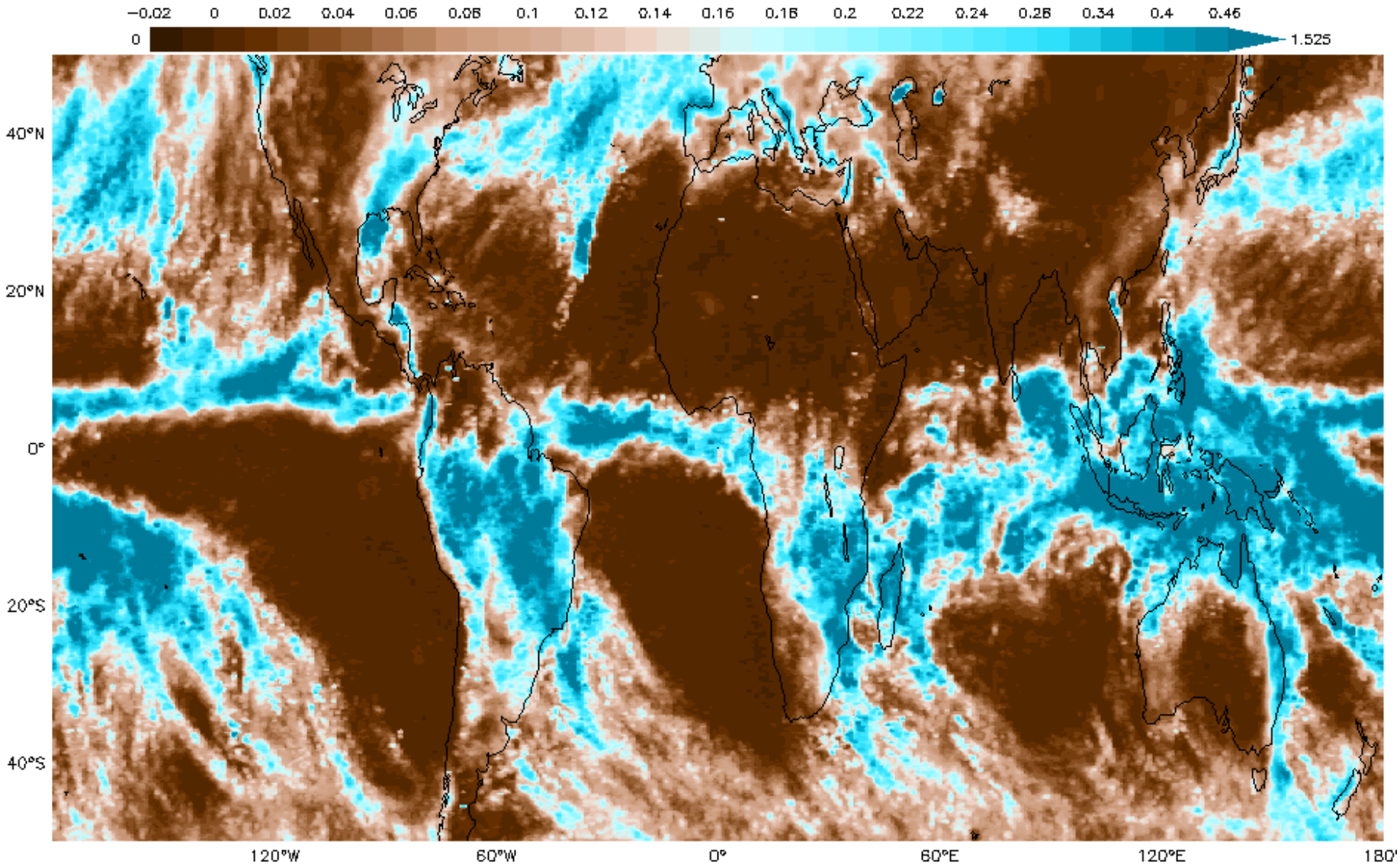


NASA Langley Research Center, MY NASA DATA

Data Set: Monthly Precipitation **Variable**: Monthly Precipitation (TRMM) (mm/hr) January 2013



NASA Langley Research Center, MY NASA DATA

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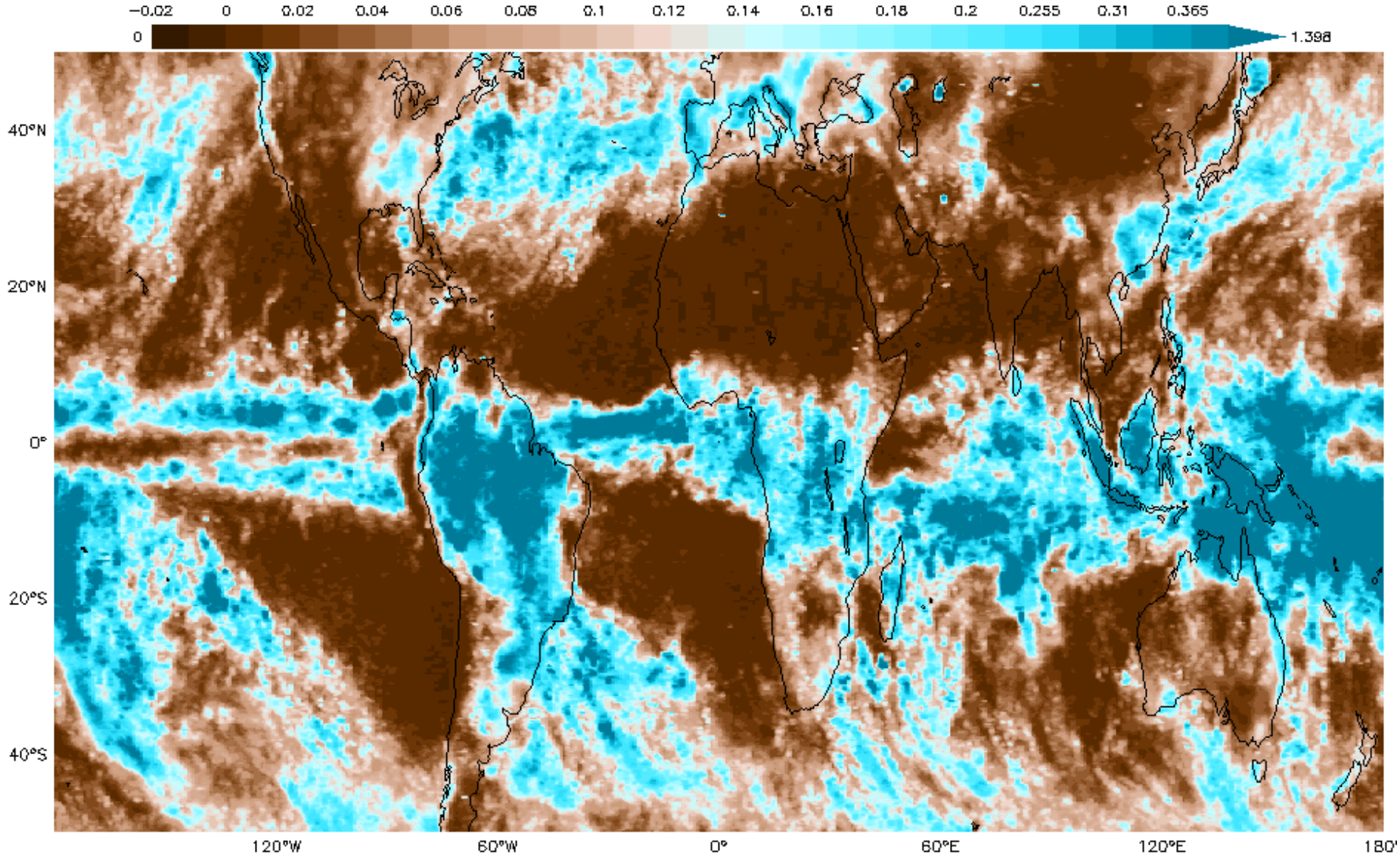
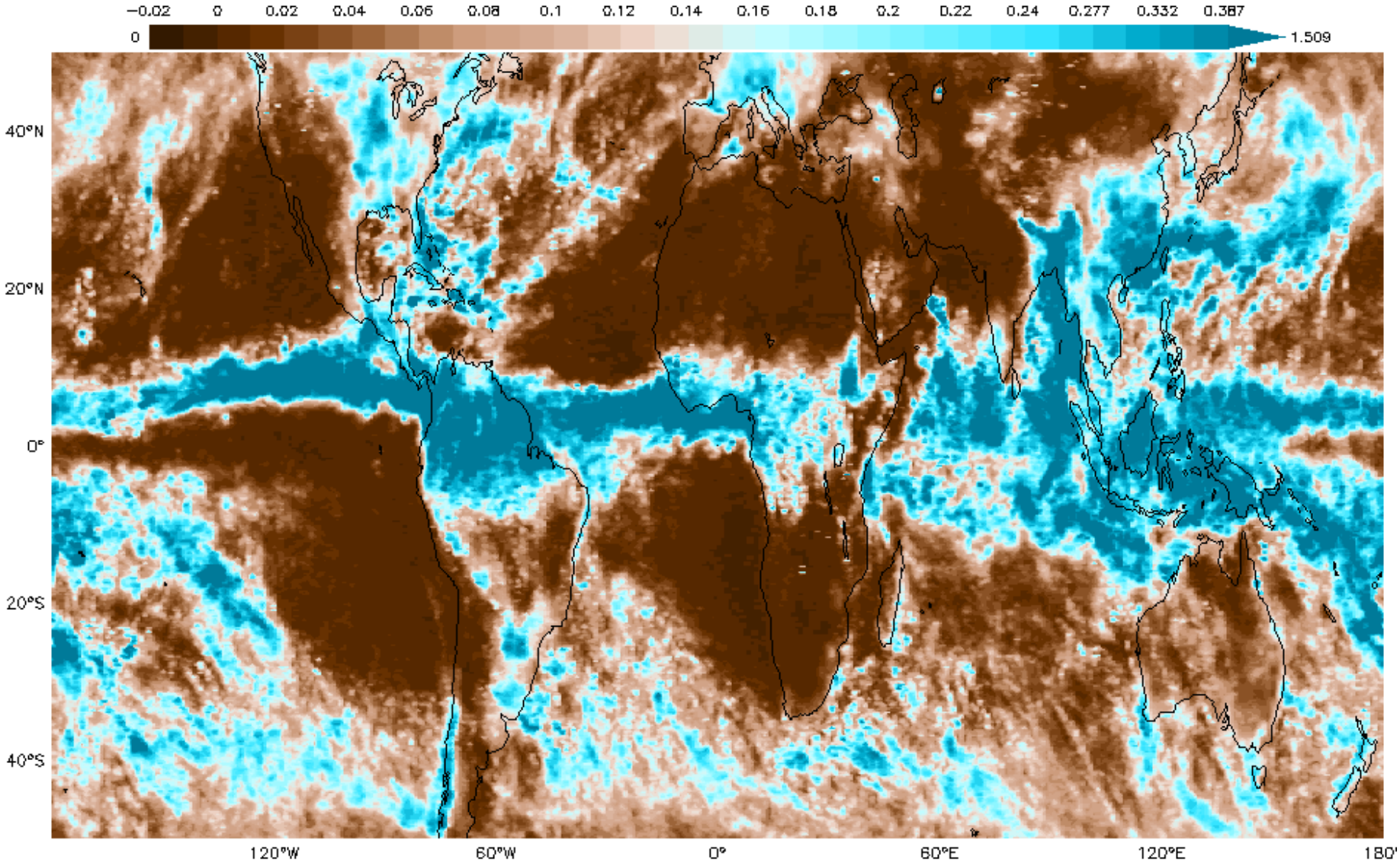


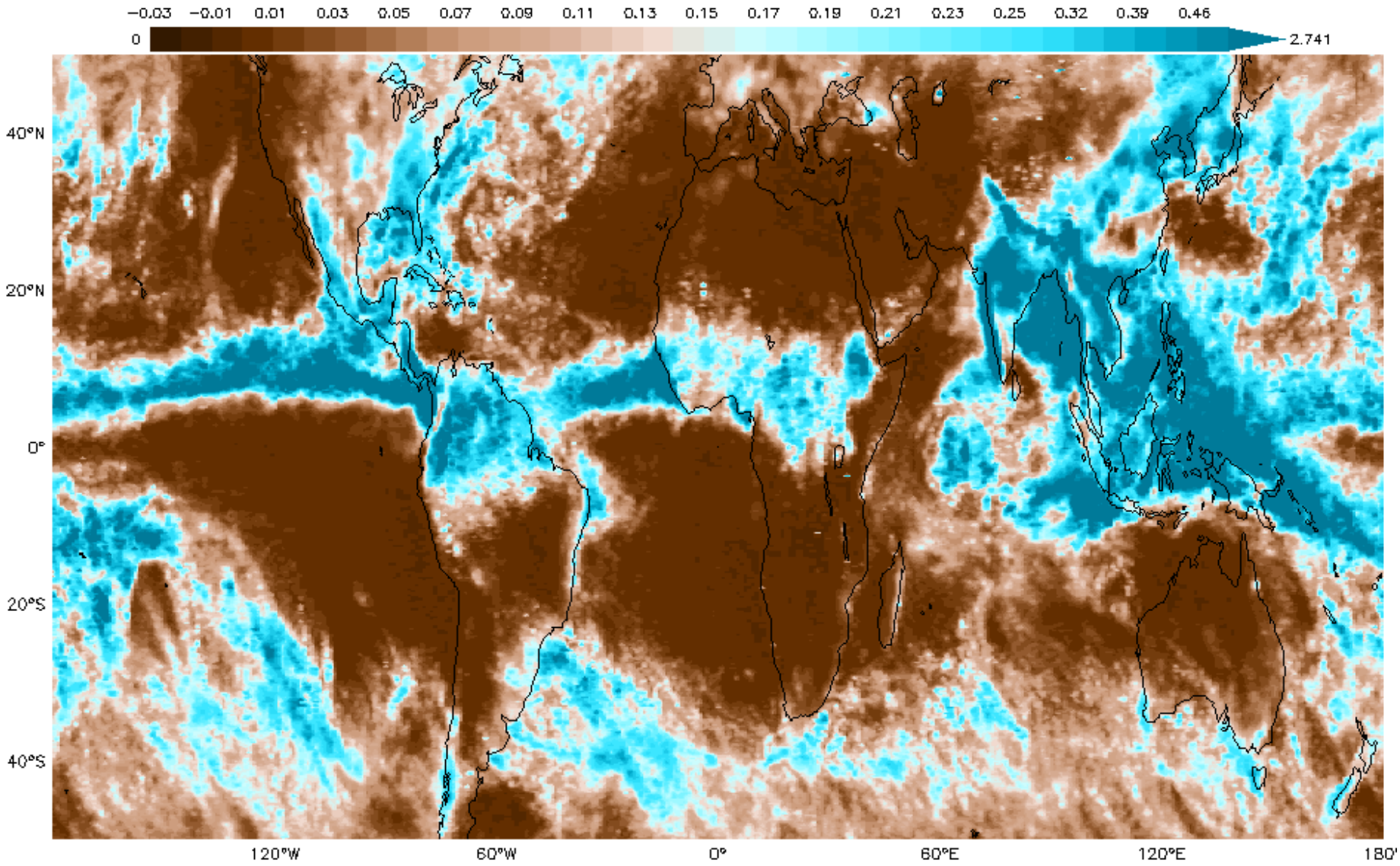
NASA Langley Research Center, MY NASA DATA

Data Set: Monthly Precipitation **Variable**: Monthly Precipitation (TRMM) (mm/hr) May 2013



NASA Langley Research Center, MY NASA DATA

Data Set: Monthly Precipitation **Variable**: Monthly Precipitation (TRMM) (mm/hr) July 2013



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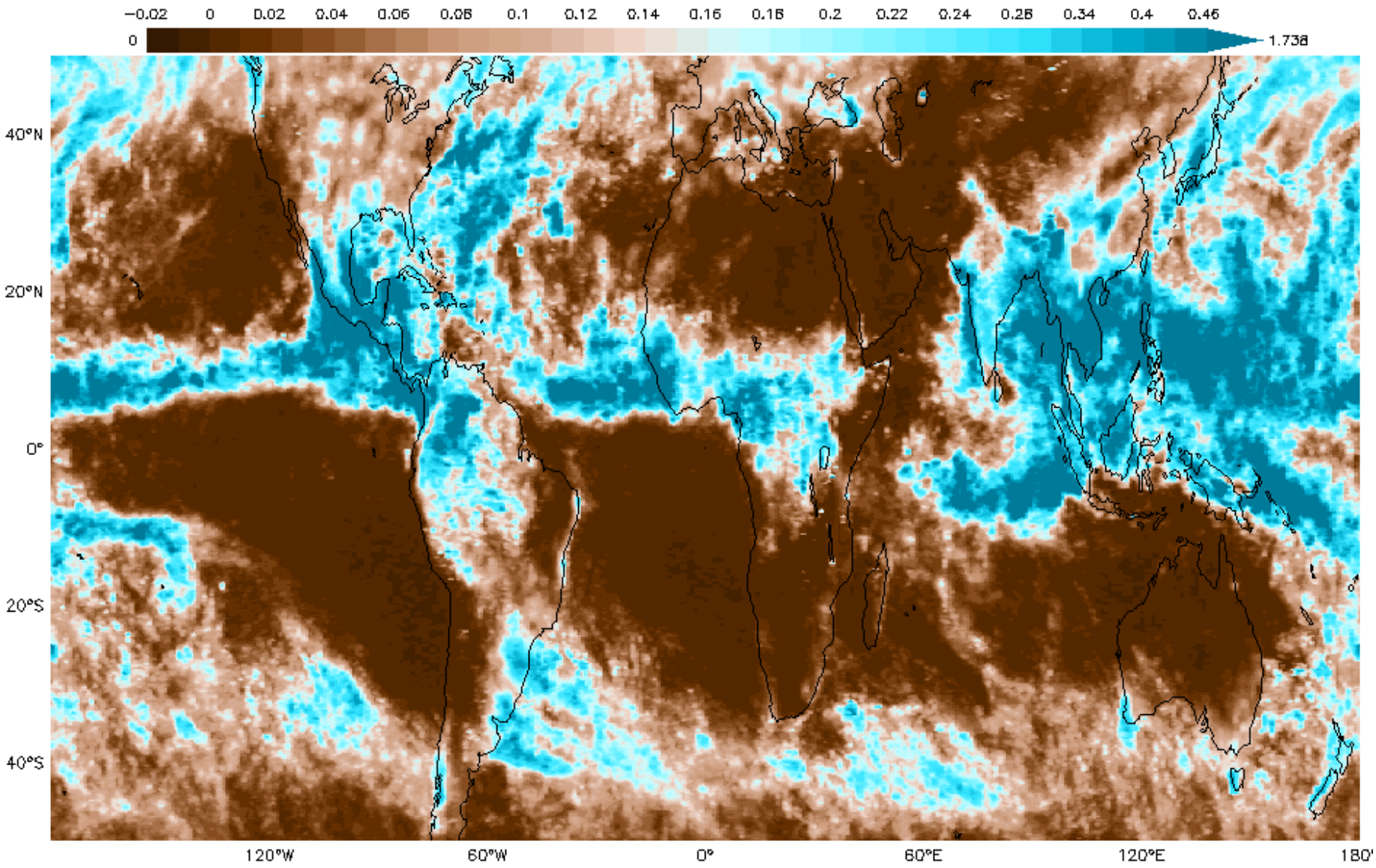

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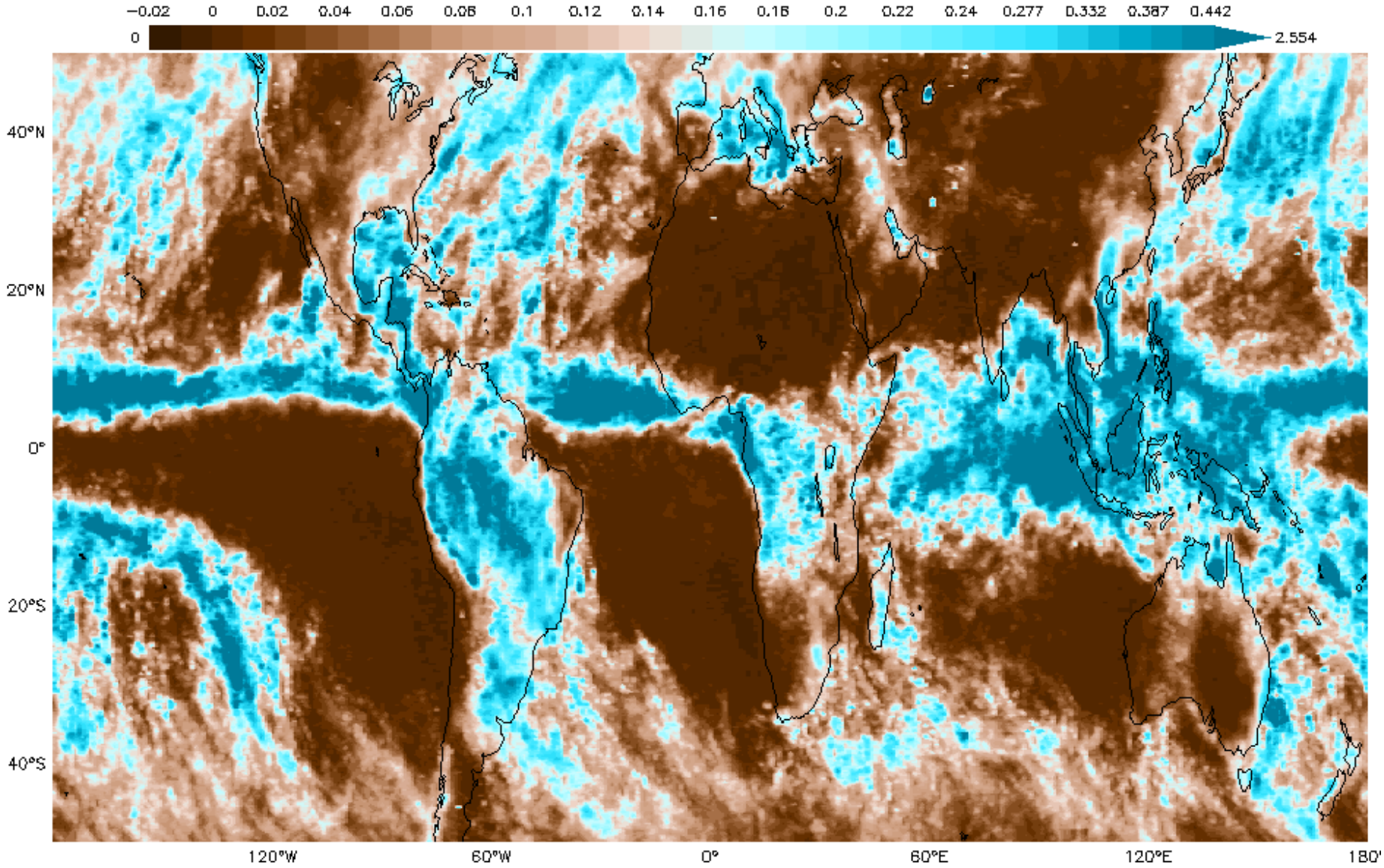
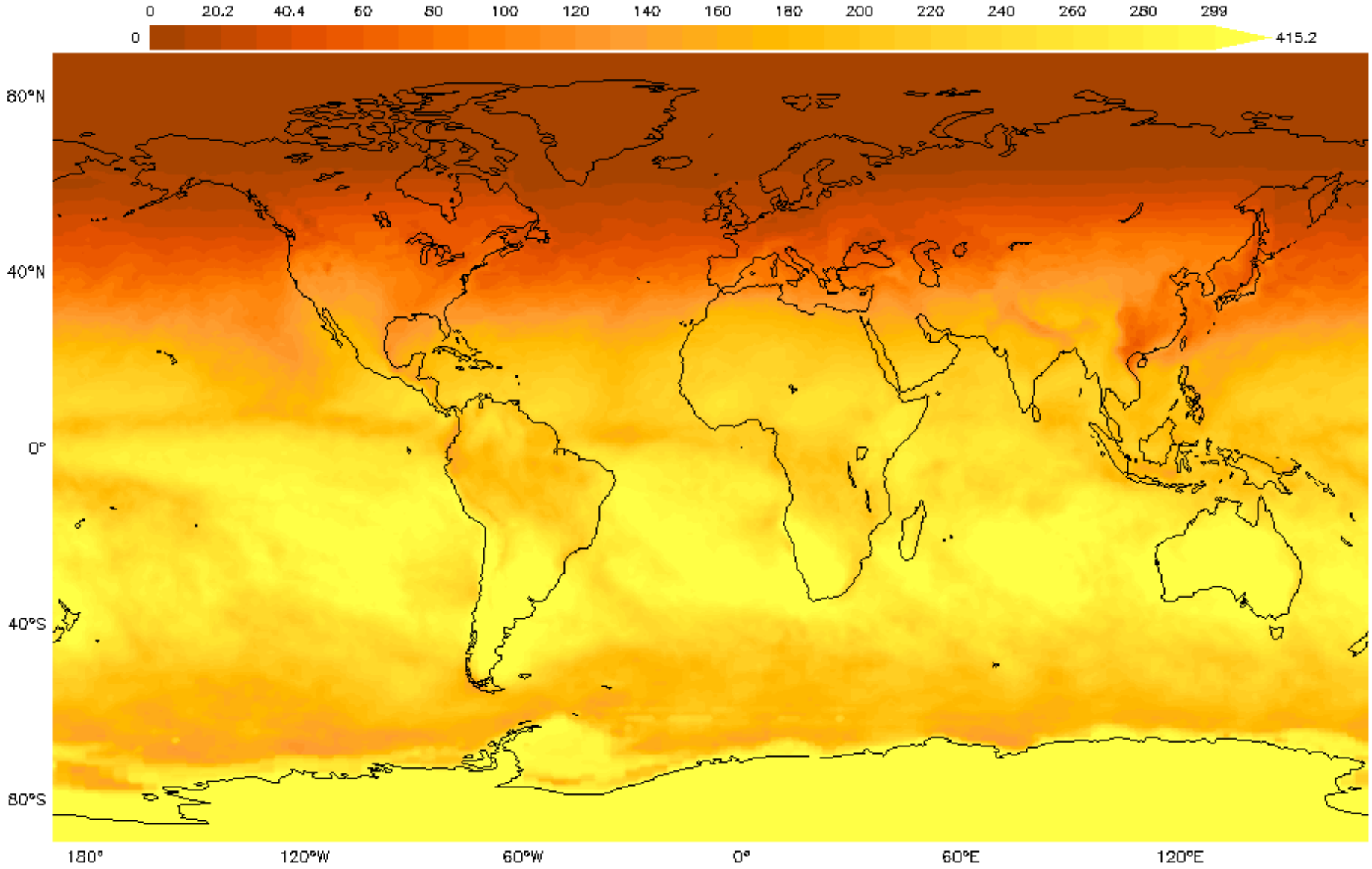


NASA Langley Research Center, MY NASA DATA

Data Set: Solar Insolation **Variable**: Solar Insolation (CERES EBAF) (W/m^2) January 2013



NASA Langley Research Center, MY NASA DATA

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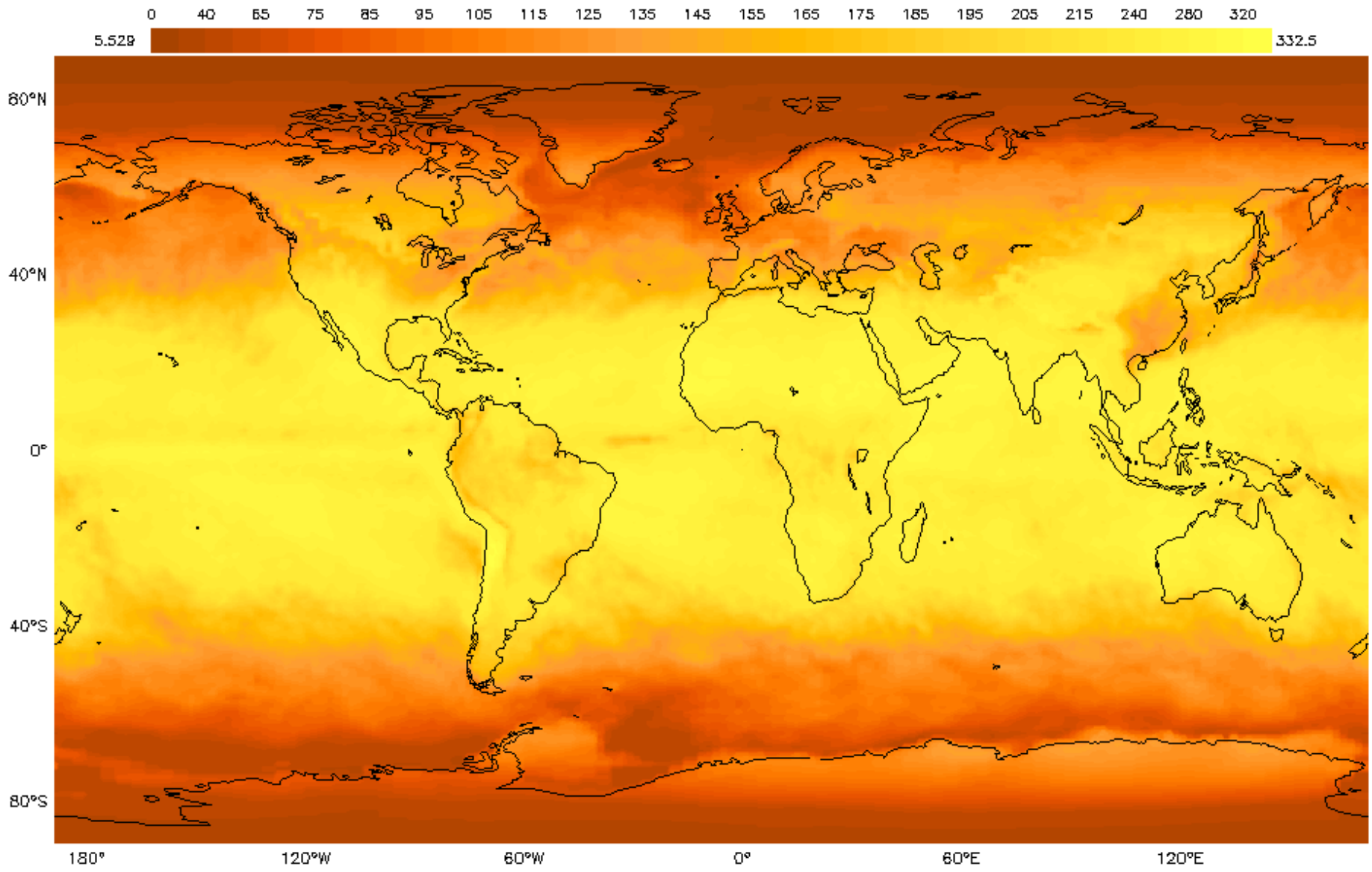
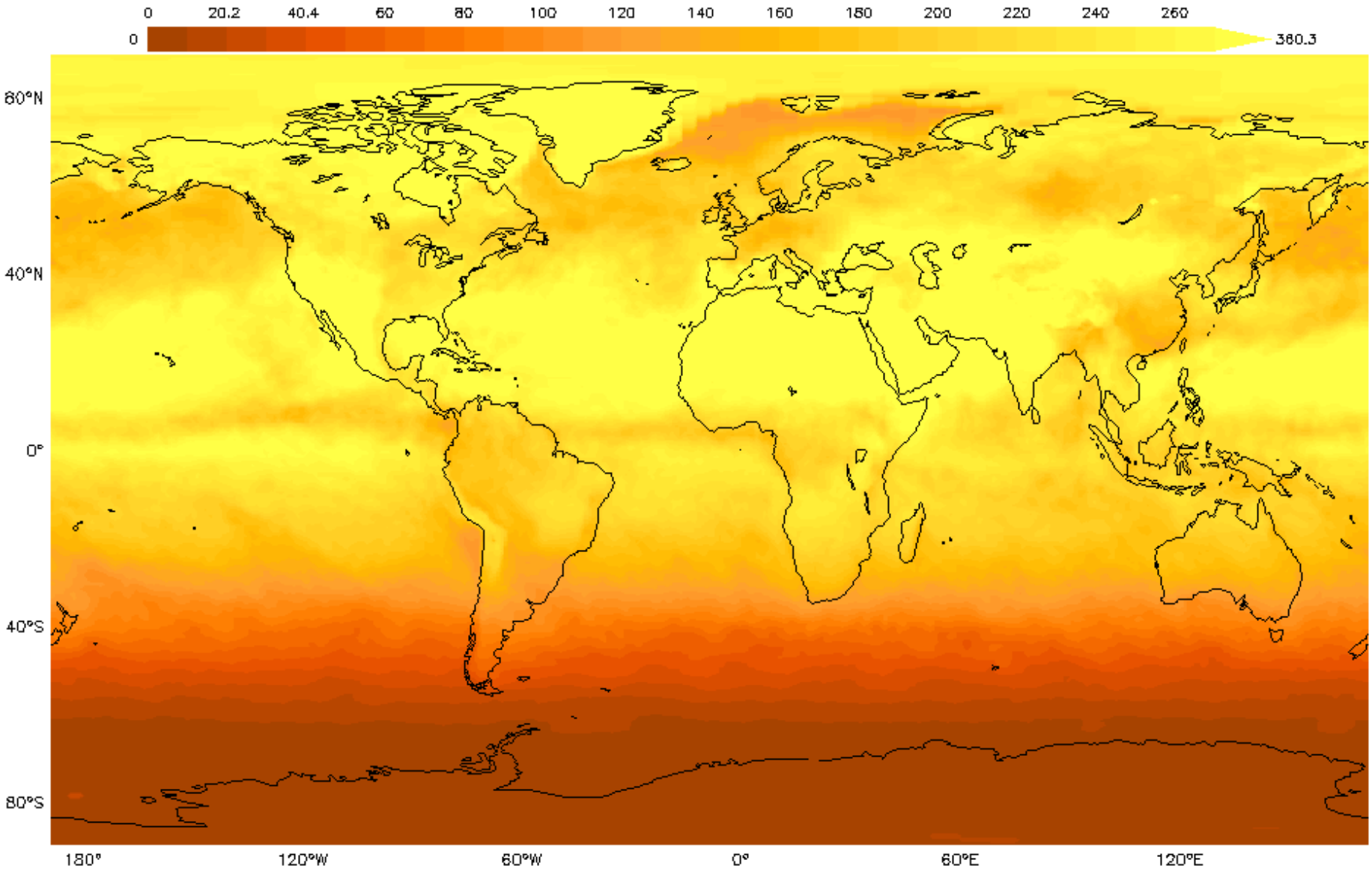


NASA Langley Research Center, MY NASA DATA

Data Set: Solar Insolation **Variable**: Solar Insolation (CERES EBAF) (W/m^2) May 2013



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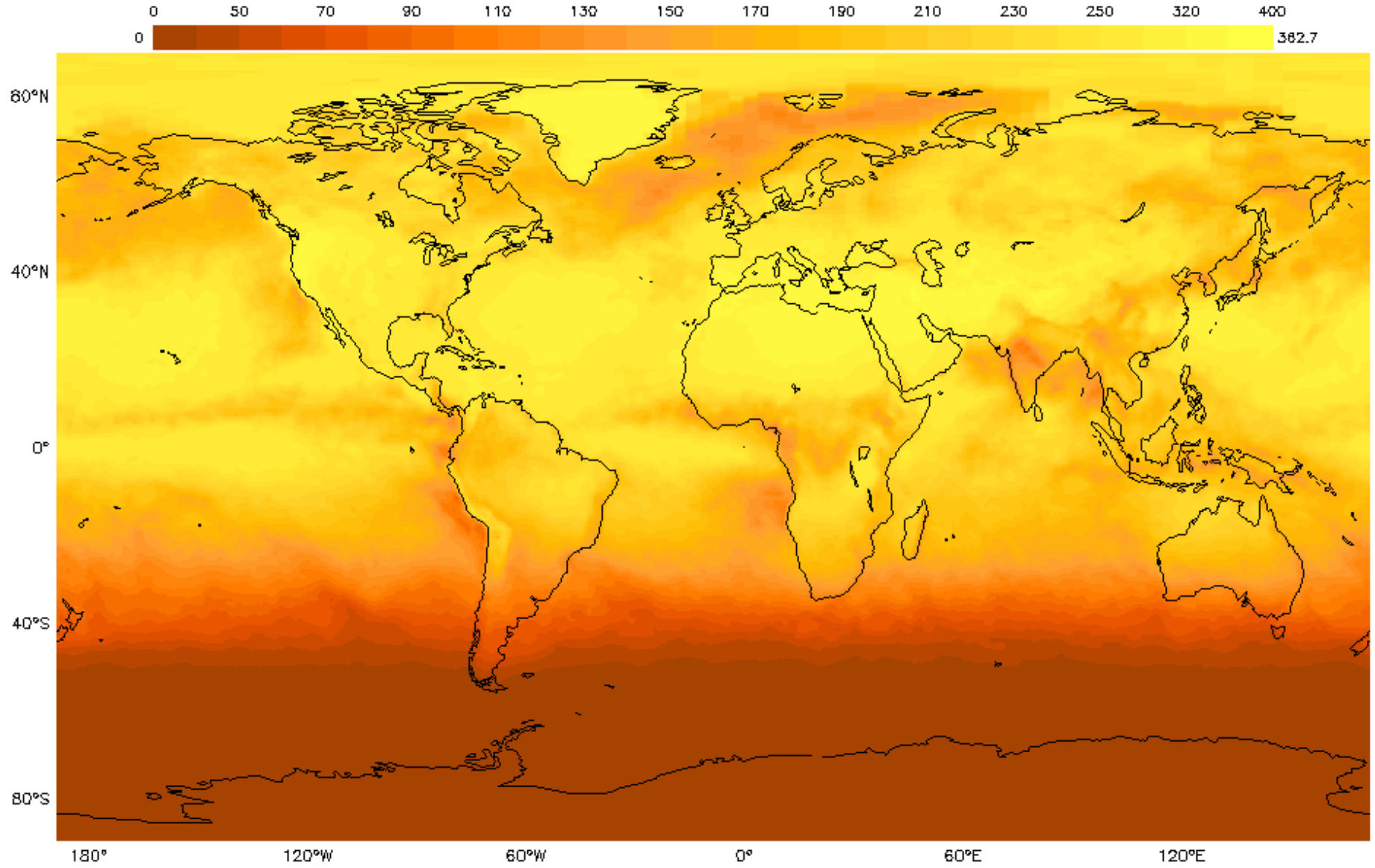

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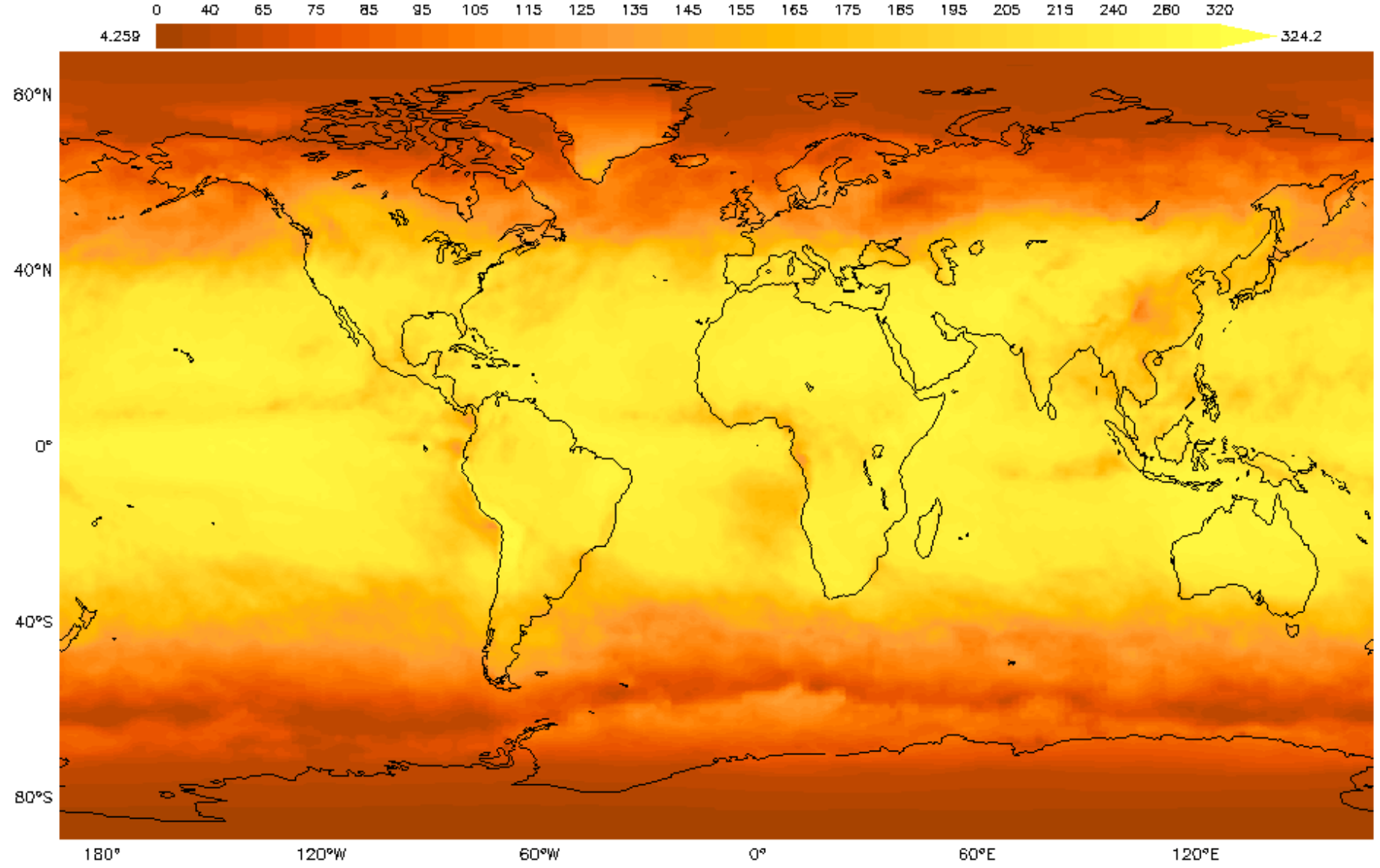

NASA Langley Research Center, MY NASA DATA

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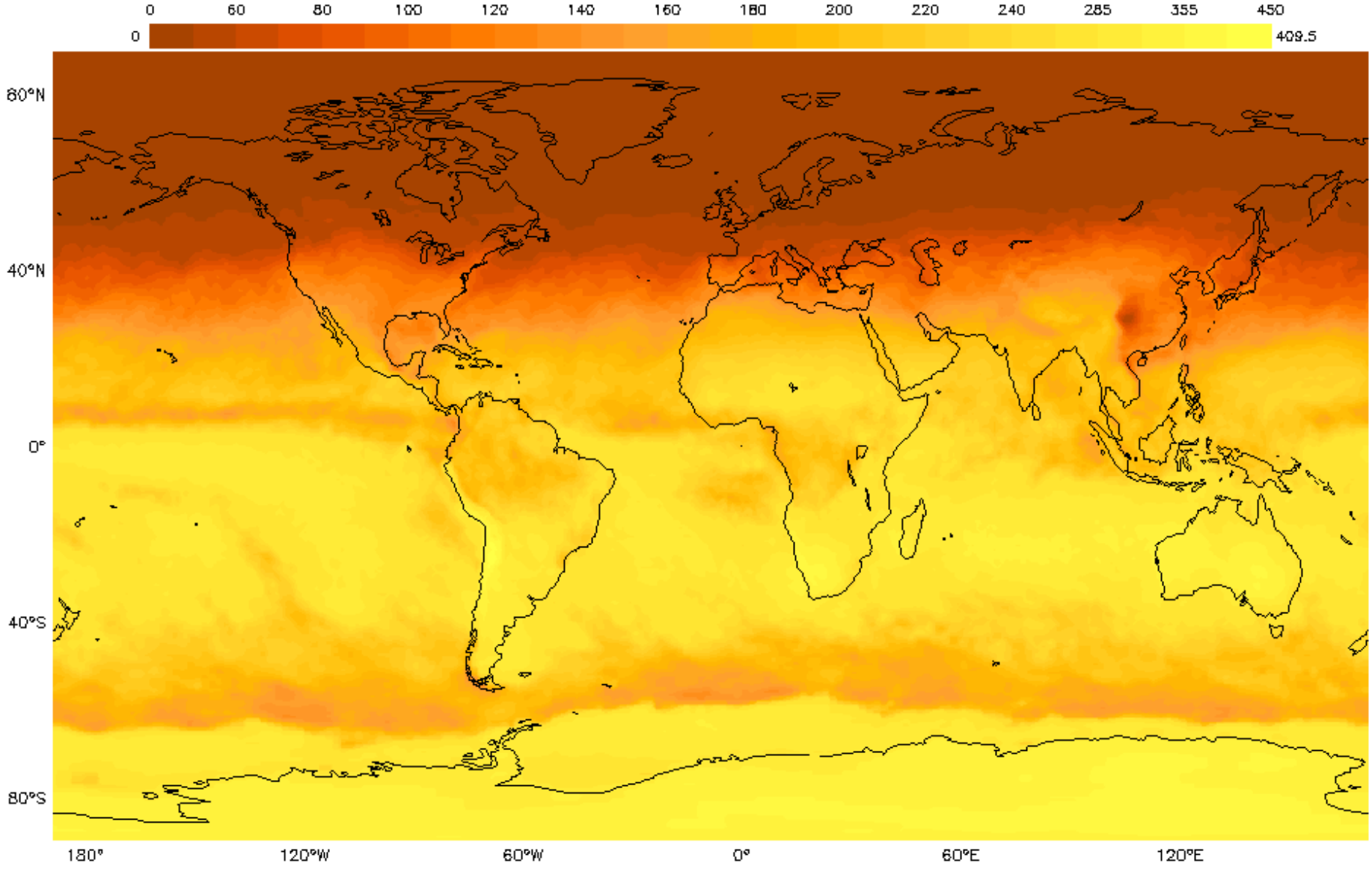
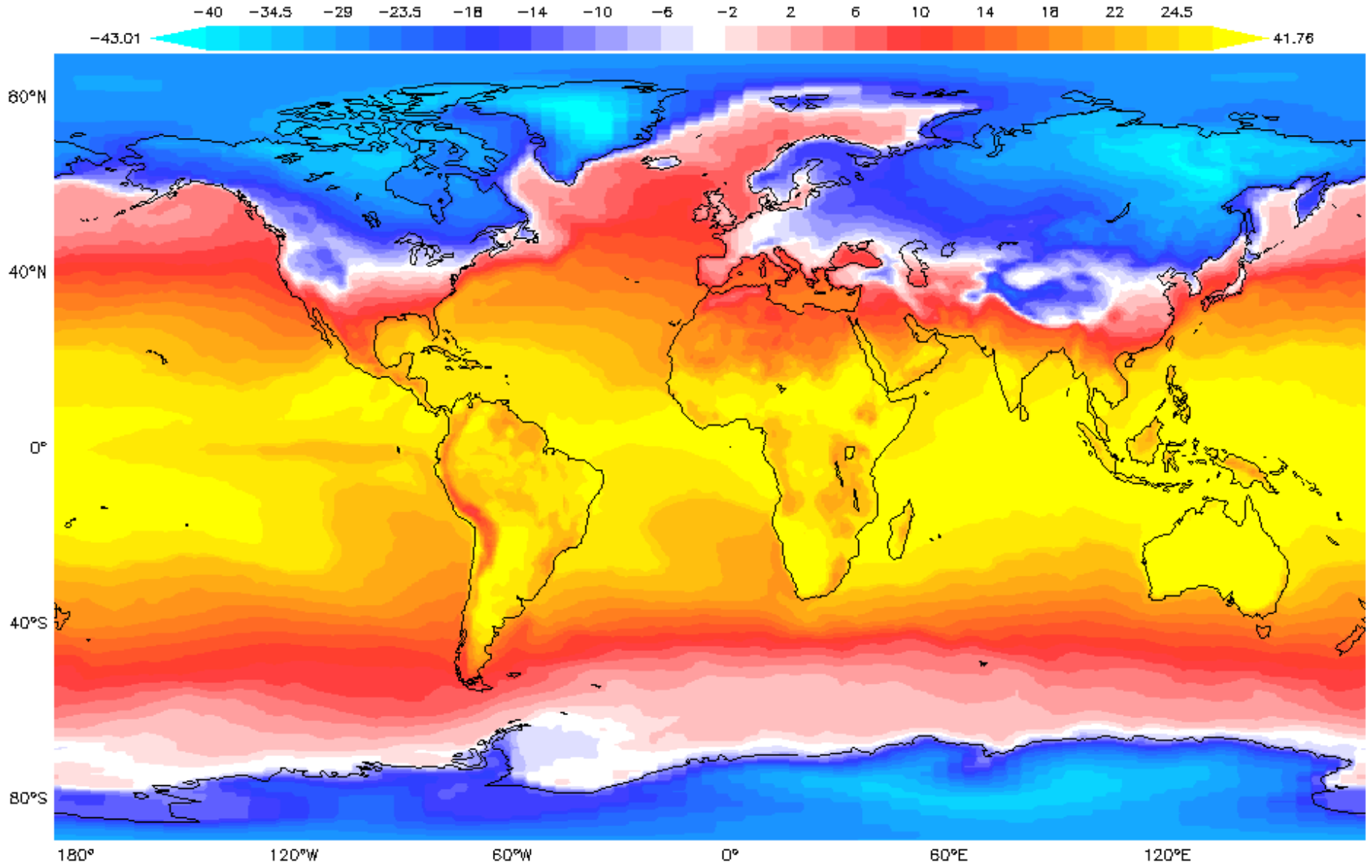


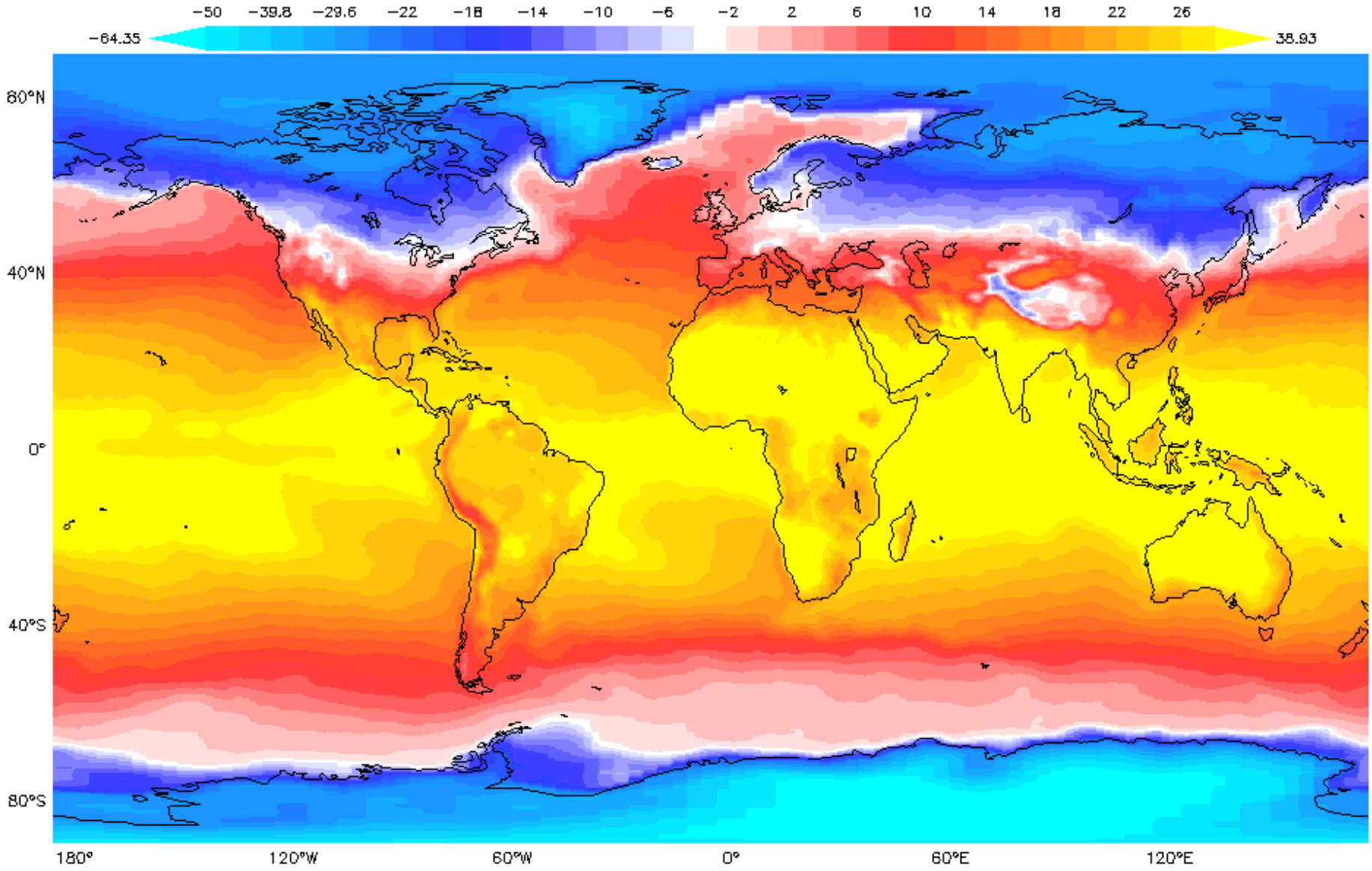
NASA Langley Research Center, MY NASA DATA

Data Set: Surface Temperature **Variable**: Monthly Surface Skin Temperature (CERES) (Celsius) January 2013



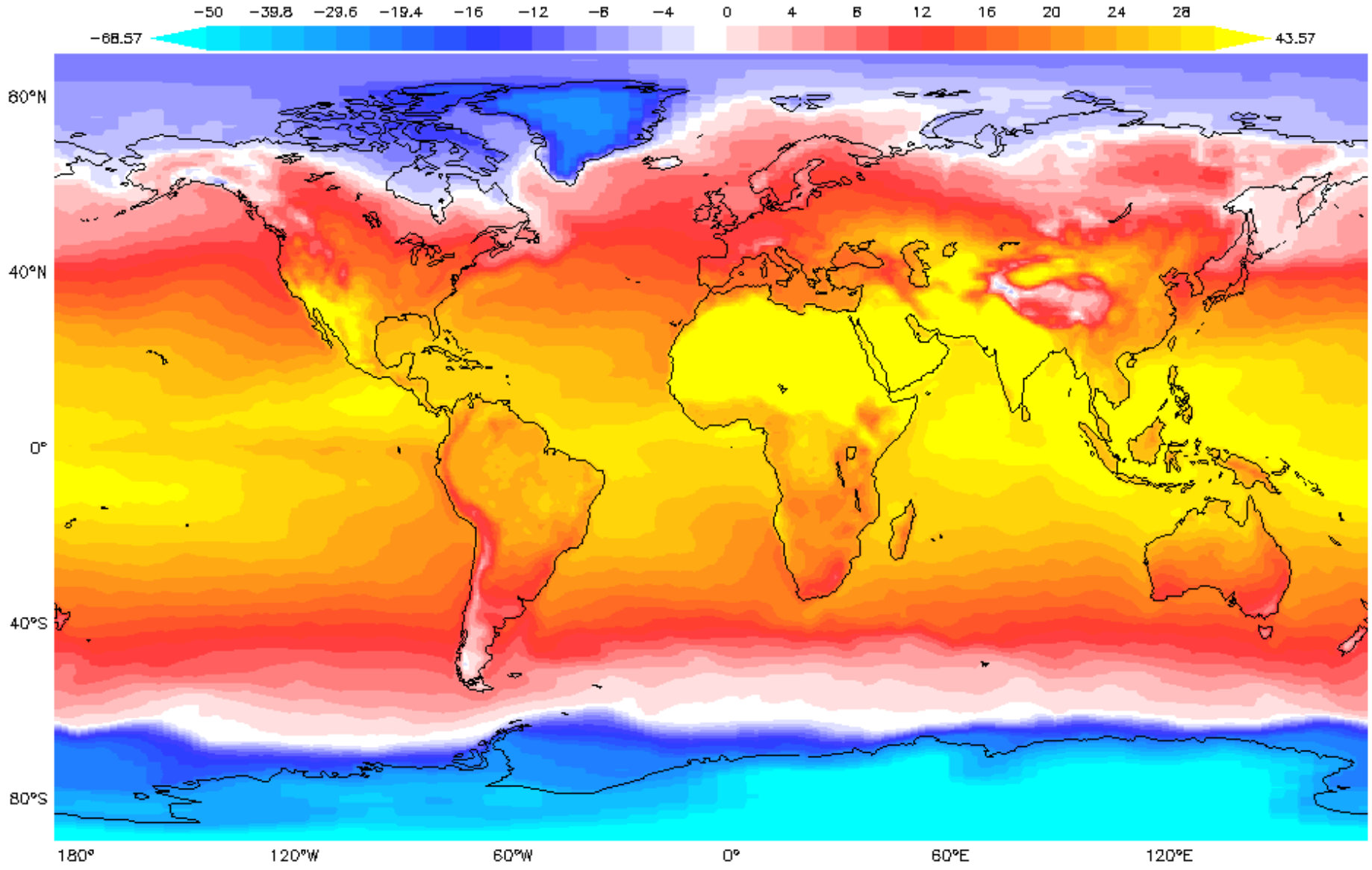
NASA Langley Research Center, MY NASA DATA

Data Set: Surface Temperature **Variable**: Monhly Surface Skin Temperature (CERES) (Celsius) March 2013



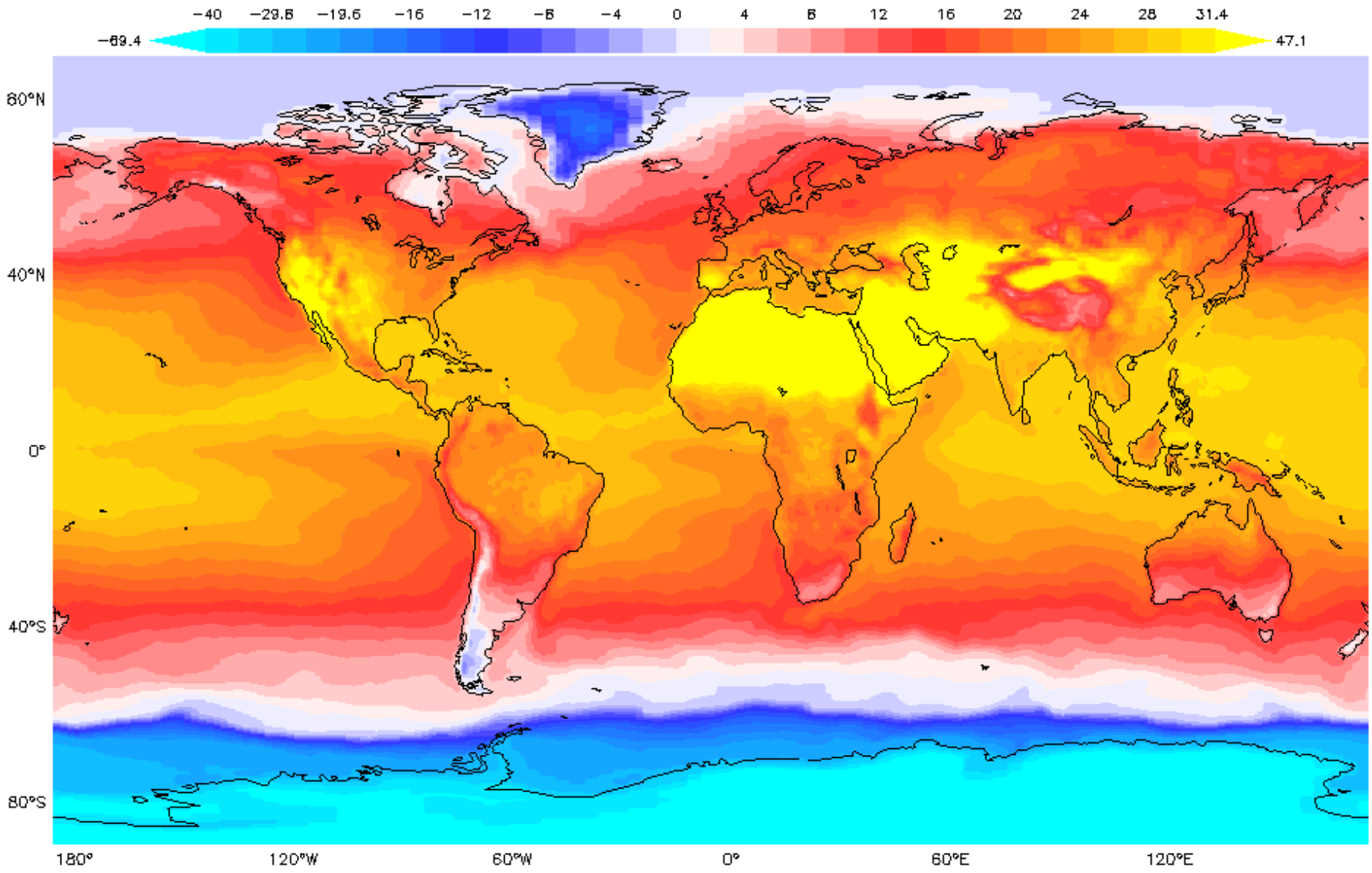
NASA Langley Research Center, MY NASA DATA

Data Set: Surface Temperature **Variable:** Monthly Surface Skin Temperature (CERES) (Celsius) May 2013



NASA Langley Research Center, MY NASA DATA

Data Set: Surface Temperature **Variable:** Monthly Surface Skin Temperature (CERES) (Celsius) July 2013



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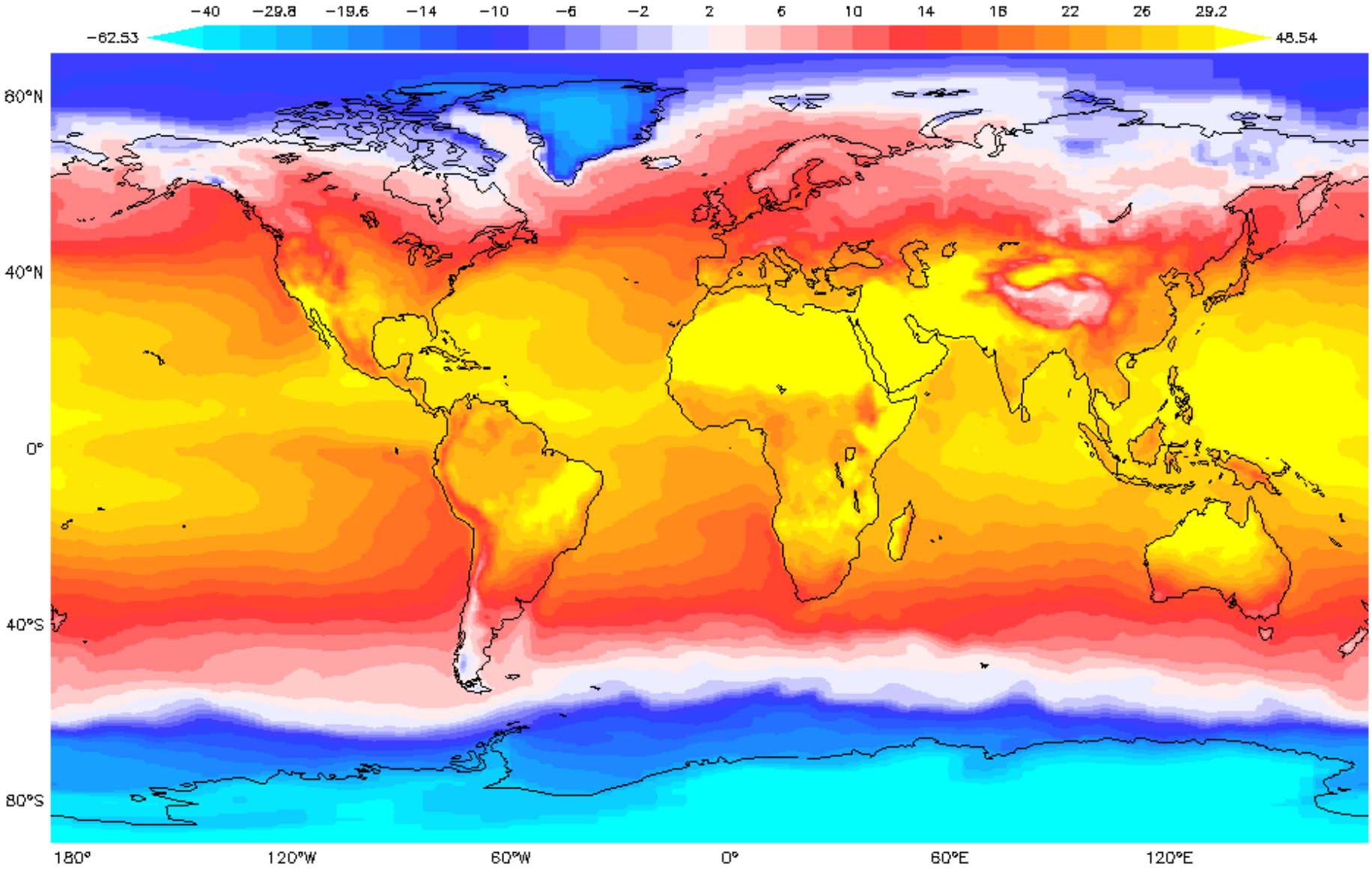

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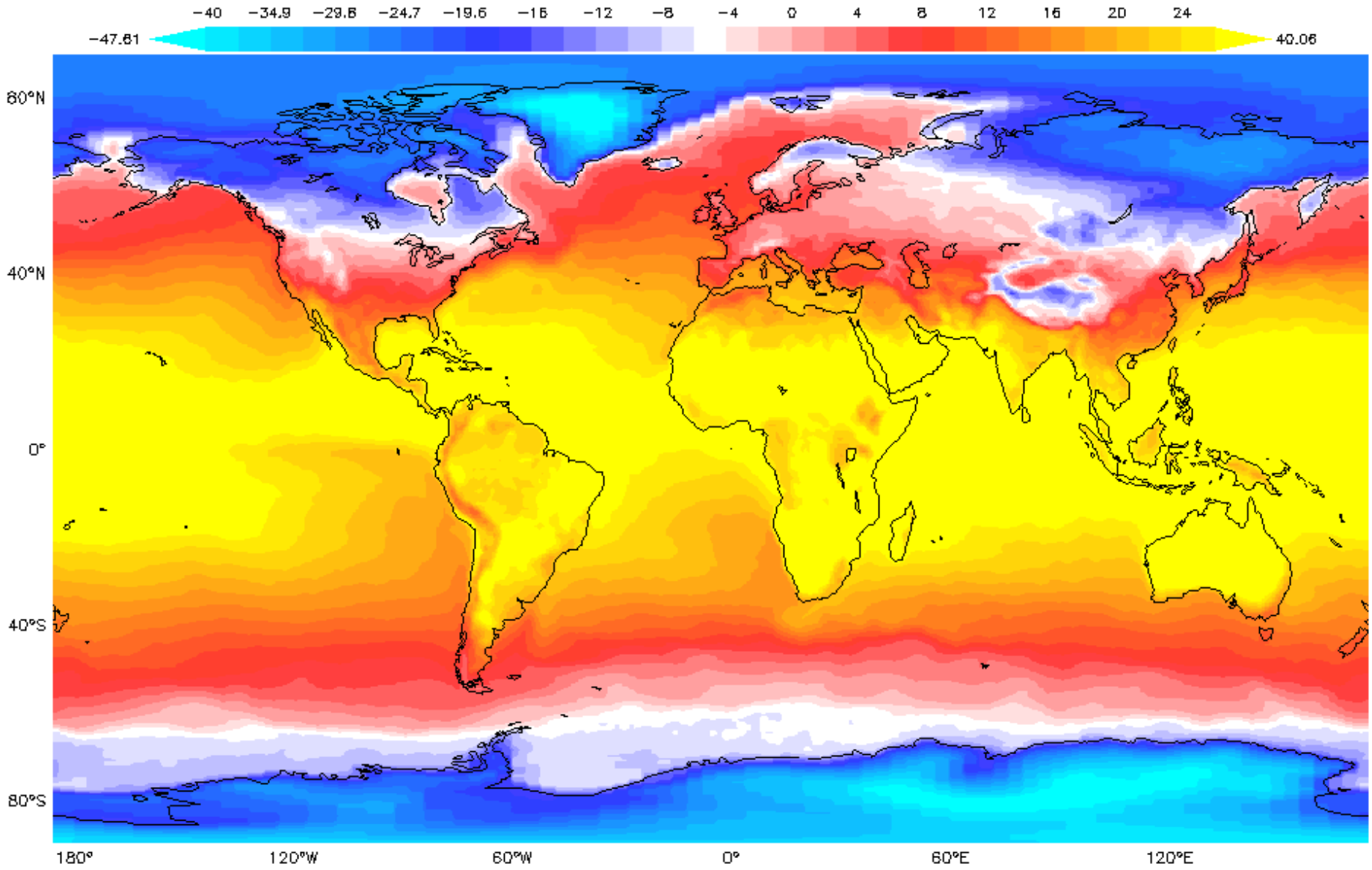
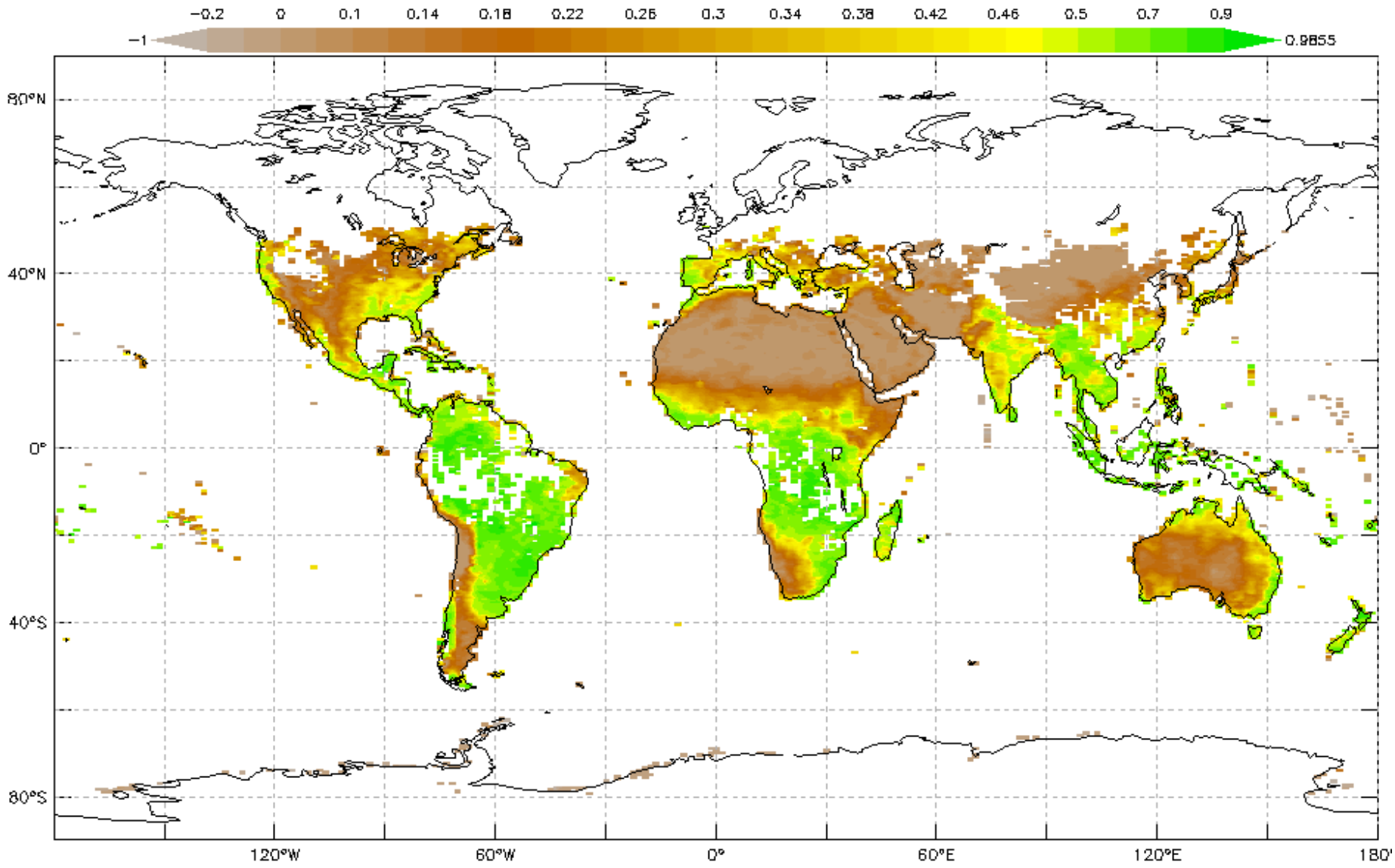
Data Set: Surface Temperature **Variable:** Monthly Surface Skin Temperature (CERES) (Celsius) November 2013



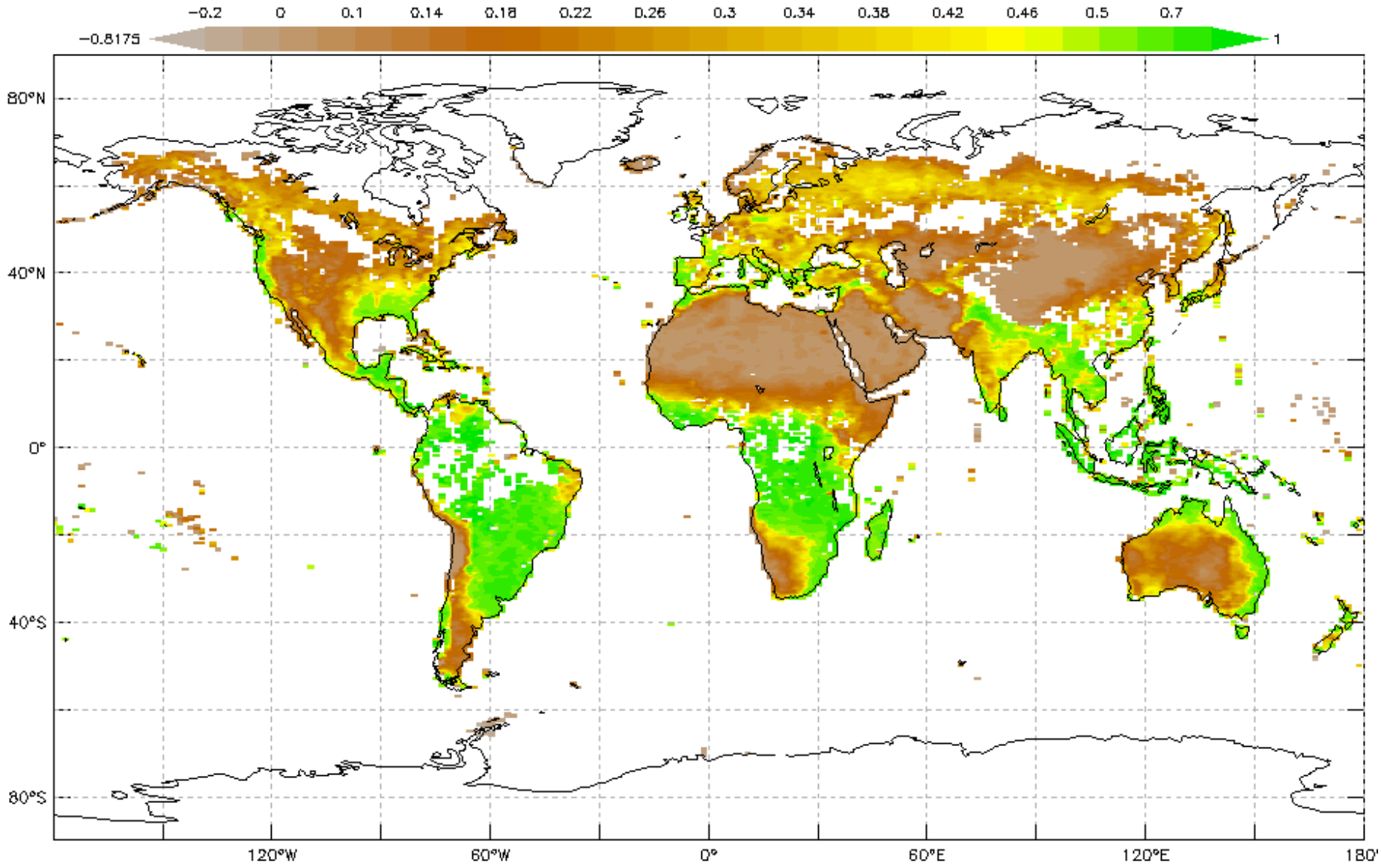
NASA Langley Research Center, MY NASA DATA

Data Set: Green Up/Down **Variable**: Normalized Difference Vegetation Index (MISR) January 2013



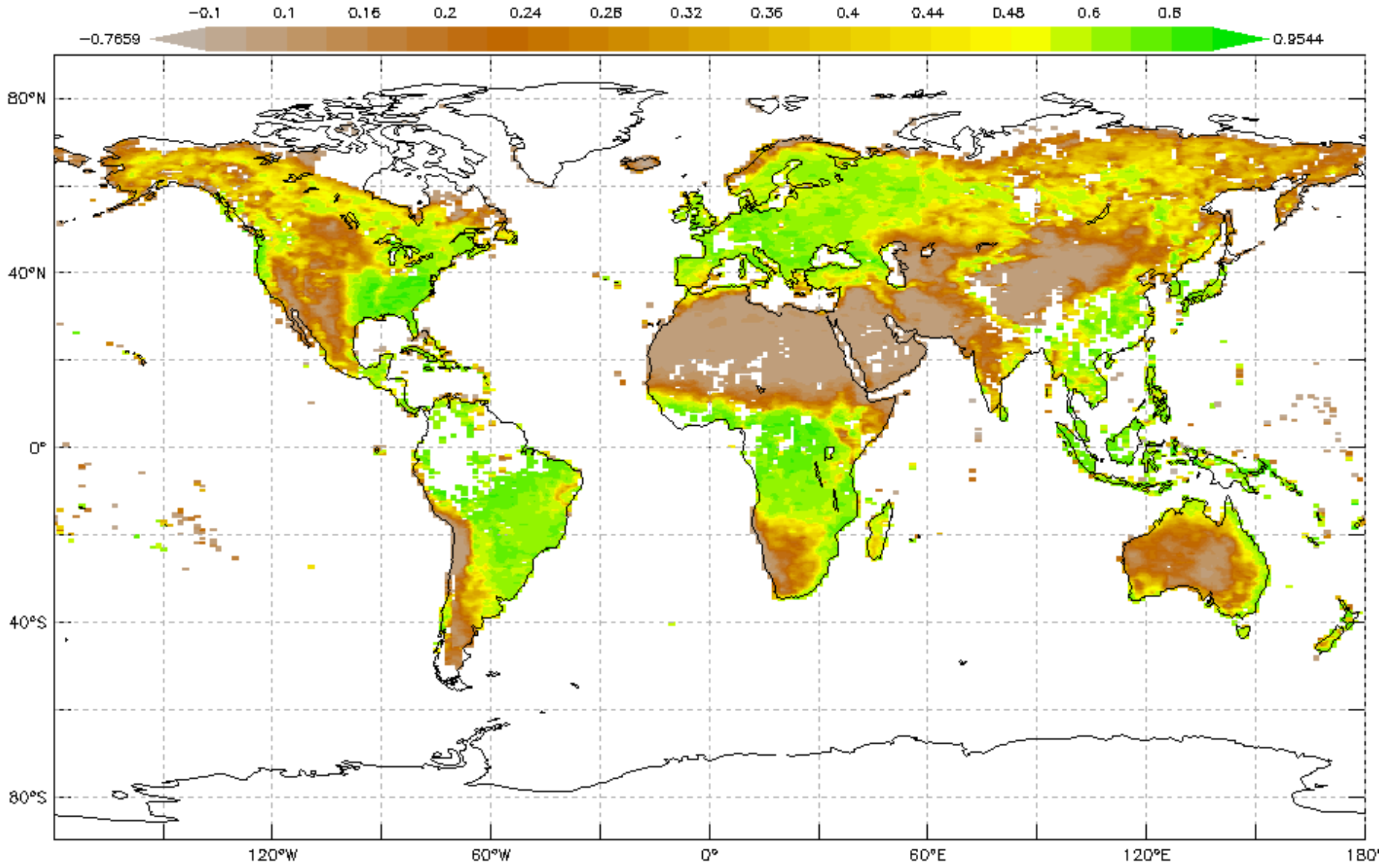
NASA Langley Research Center, MY NASA DATA

Data Set: Green Up/Down Variable: Normalized Difference Vegetation Index (MISR) March 2013



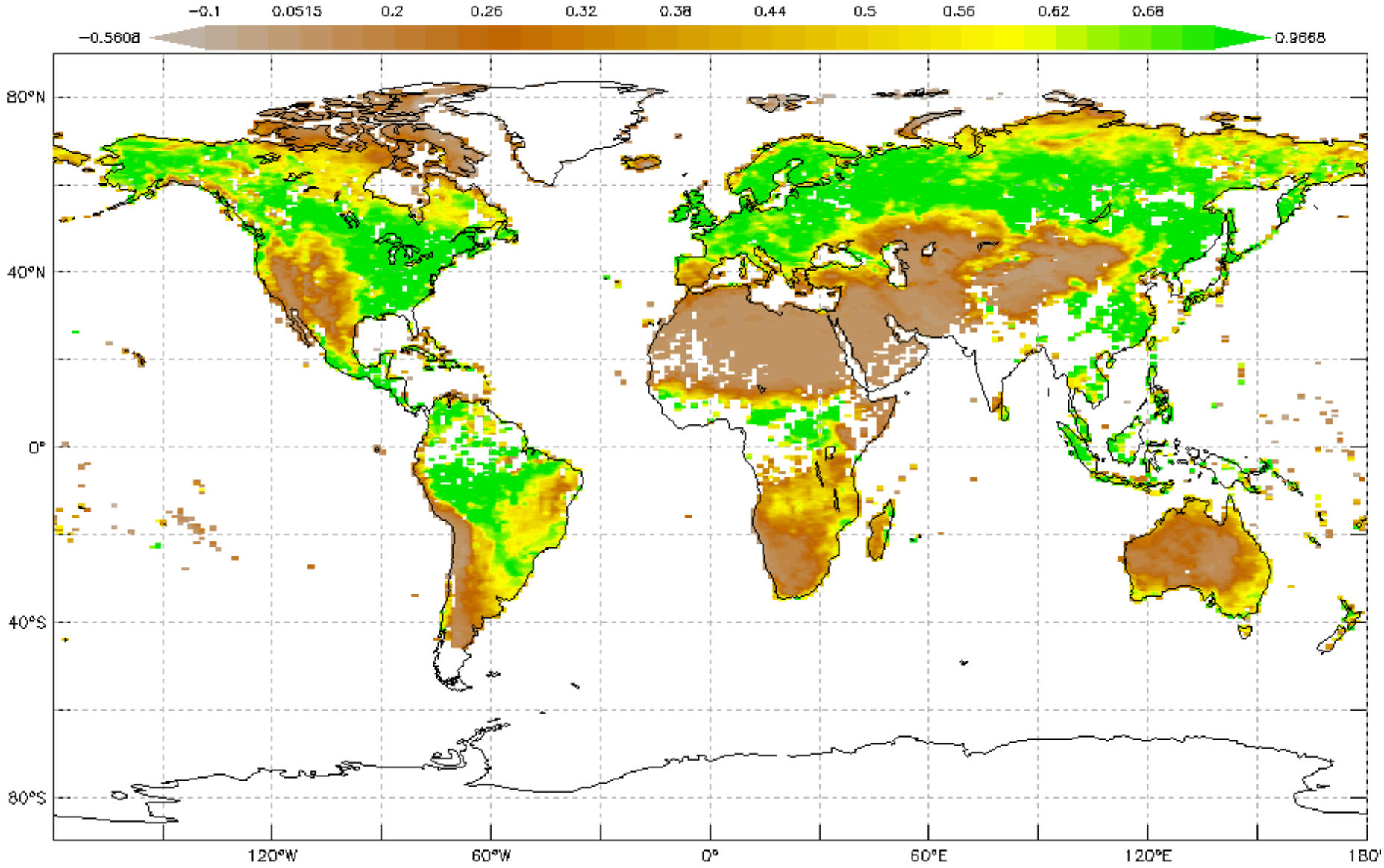
NASA Langley Research Center, MY NASA DATA

Data Set: Green Up/Down Variable: Normalized Difference Vegetation Index (MISR) May 2013



NASA Langley Research Center, MY NASA DATA

Data Set: Green-up/Down **Variable**: Normalized Difference Vegetation Index (MISR) July 2013



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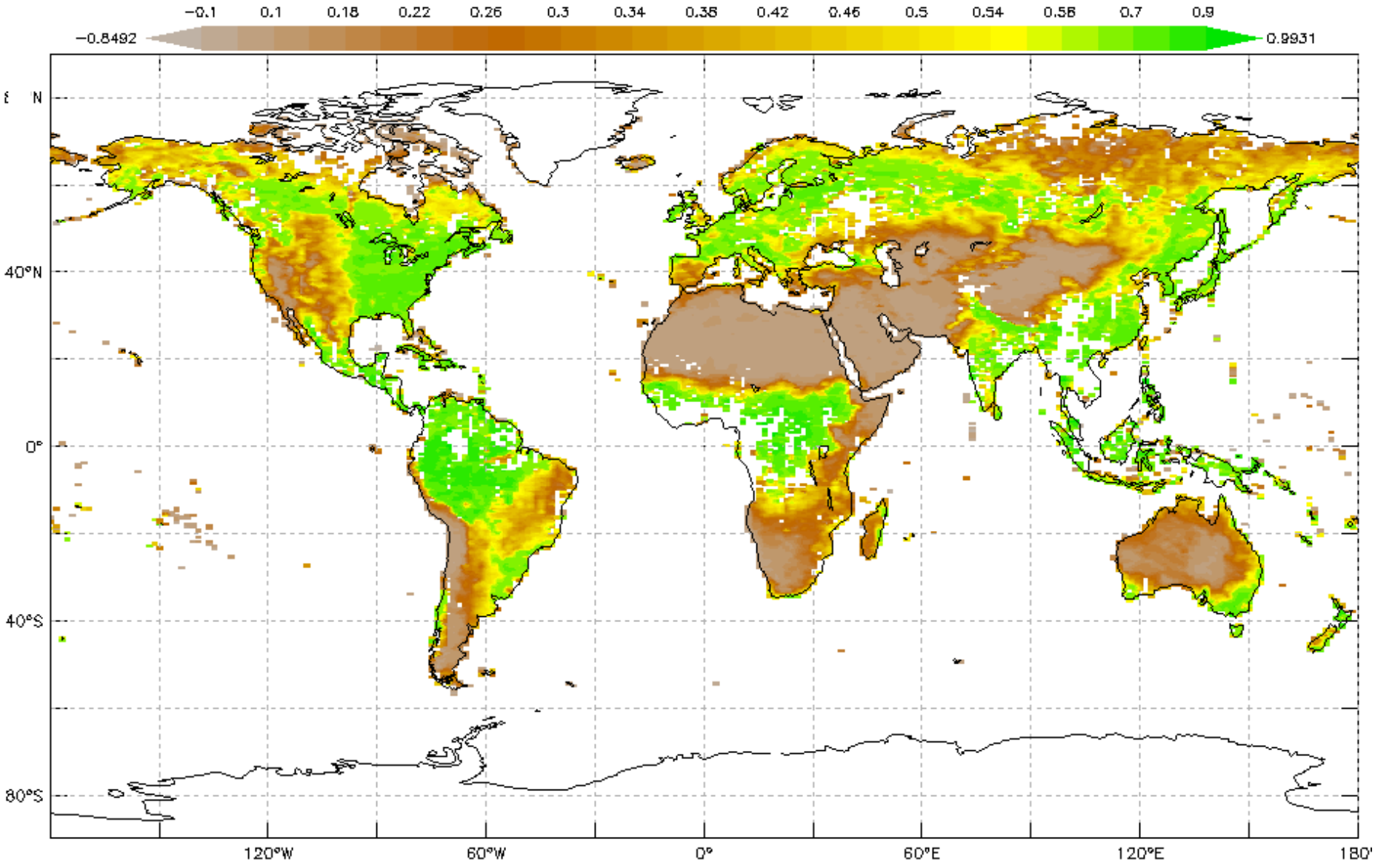

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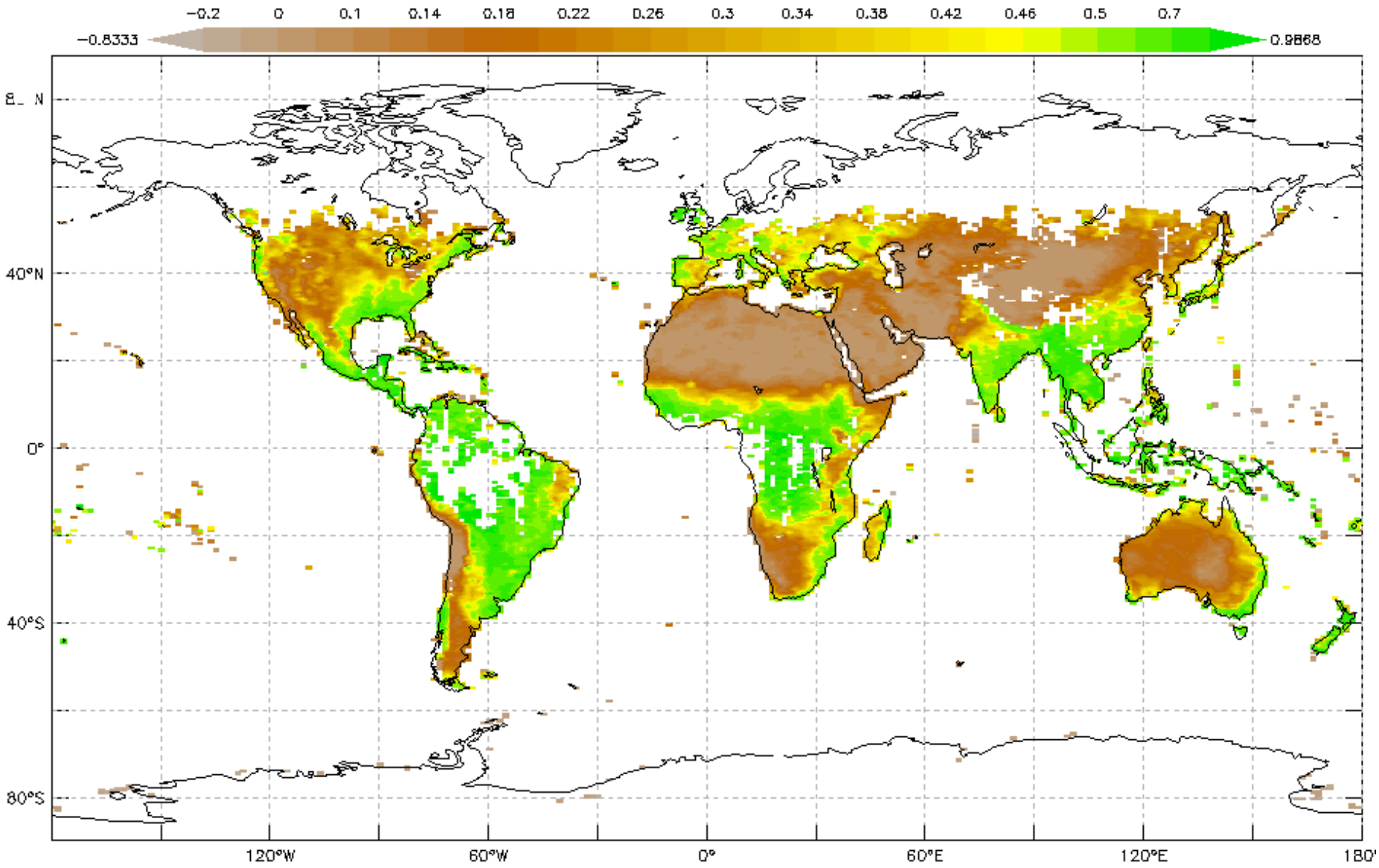

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