My NASA Data features resources for GLOBE protocols that provide connections to NASA datasets in the Earth System Data Explorer, as well as background information for the protocol, student data sheets, and related learning activities. For more information on GLOBE or Atmosphere protocols see the resources at the bottom of the page. It is important to note that a particular protocol may support more than one phenomenon and may support phenomena from different spheres. To see how individual protocols relate to a particular phenomenon, you can visit the GLOBE Connection for that phenomenon (i.e., Urban Heat Island, Hurricane Dynamics, Changing Air Temperatures, etc.).

**Related Earth System Data Explorer datasets:**

The datasets in My NASA Data's Earth System Data Explorer which supplement exploration of each protocol are also indicated. These supplemental datasets may measure the same variable or related variables, and they may have a different temporal scale. Specific research questions may also have additional supporting datasets which can be explored. All data available through My NASA Data can be found on the Data Collections: Earth System Data Explorer page.

Explore the MND GLOBE Connections Datasets spreadsheet to review the range of Atmospheric datasets in the Earth System Data Explorer by visiting this link.
The GLOBE Atmosphere protocols related to phenomena or datasets supported by My NASA Data (MND) are outlined below. Under each protocol, there is a list of related Earth System Data Explorer datasets.

### Aerosols

<table>
<thead>
<tr>
<th>GLOBE Protocol</th>
<th>Earth System Data Explorer Dataset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerosols</td>
<td>Daily Aerosol Optical Depth (VIIRS)</td>
</tr>
<tr>
<td></td>
<td>Daily High Cloud Coverage</td>
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<tr>
<td></td>
<td>Daily Low Cloud Coverage</td>
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<td></td>
<td>Daily Middle Cloud Coverage</td>
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<tr>
<td></td>
<td>Daily Total Cloud Coverage</td>
</tr>
<tr>
<td></td>
<td>Monthly Aerosol Optical Depth (MISR)</td>
</tr>
<tr>
<td></td>
<td>Monthly High Cloud Coverage</td>
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<tr>
<td></td>
<td>Monthly Low Cloud Coverage</td>
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<tr>
<td></td>
<td>Monthly Middle Cloud Coverage</td>
</tr>
<tr>
<td></td>
<td>Monthly Total Cloud Coverage</td>
</tr>
</tbody>
</table>

### Air Temperature

<table>
<thead>
<tr>
<th>Earth System Data Explorer Dataset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily Mean Surface Air Temperature</td>
</tr>
<tr>
<td>Monthly Surface Air Temperature</td>
</tr>
<tr>
<td>Monthly Surface Air Temperature Anomaly</td>
</tr>
</tbody>
</table>

### Barometric Pressure

<table>
<thead>
<tr>
<th>Earth System Data Explorer Dataset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily High Cloud Coverage</td>
</tr>
<tr>
<td>Daily Low Cloud Coverage</td>
</tr>
<tr>
<td>Daily Mean Surface Air Temperature</td>
</tr>
<tr>
<td>Daily Middle Cloud Coverage</td>
</tr>
<tr>
<td>Daily Total Cloud Coverage</td>
</tr>
<tr>
<td>Monthly High Cloud Coverage</td>
</tr>
<tr>
<td>Monthly Low Cloud Coverage</td>
</tr>
<tr>
<td>Monthly Middle Cloud Coverage</td>
</tr>
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<td>Monthly Surface Air Temperature</td>
</tr>
<tr>
<td>Monthly Surface Air Temperature Anomaly</td>
</tr>
<tr>
<td>Monthly Total Cloud Coverage</td>
</tr>
</tbody>
</table>

### Clouds

<table>
<thead>
<tr>
<th>Earth System Data Explorer Dataset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atmospheric Water Vapor</td>
</tr>
<tr>
<td>Cloud Opacity</td>
</tr>
<tr>
<td>Cloud Phase</td>
</tr>
<tr>
<td>Daily High Cloud Coverage</td>
</tr>
<tr>
<td>Daily Low Cloud Coverage</td>
</tr>
<tr>
<td>Daily Middle Cloud Coverage</td>
</tr>
<tr>
<td>Daily Precipitation Amount</td>
</tr>
</tbody>
</table>
Earth System Data Explorer -

Monthly Aerosol Optical Thickness - July 2019

- **Daily Aerosol Optical Depth** - Students can compare historical daily measurements with GLOBE data when data are available. Major events such as dust storms or fires can also be found in the data.

- **Monthly Aerosol Optical Depth** - Students can compare daily measurements with monthly aerosol optical depth averages. They can examine historical data and seasonal trends.

- GLOBE cloud observations are required with GLOBE aerosol observations. These cloud datasets can be used for comparison with student cloud observations and background research.
  - Daily High Cloud Coverage
  - Daily Low Cloud Coverage
  - Daily Middle Cloud Coverage
  - Daily Total Cloud Coverage
  - Monthly High Cloud Coverage
  - Monthly Low Cloud Coverage
  - Monthly Middle Cloud Coverage
  - Monthly Total Cloud Coverage

**Air Temperature**
These temperature datasets allow students to explore daily and monthly temperature averages, as well as monthly air temperature anomalies to help put their own data in context.

- Daily Mean Surface Air Temperature
- Monthly Surface Air Temperature
- Monthly Surface Air Temperature Anomaly

Barometric Pressure

The Earth System Data Explorer does not have barometric pressure data. However, the temperature and cloud coverage data can provide context for barometric pressure data. Temperature and pressure are inversely related. Pressure is related to warm and cold fronts which are also associated with clouds.

- Daily Mean Surface Air Temperature
- Monthly Surface Air Temperature
- Monthly Surface Air Temperature Anomaly
- Daily High Cloud Coverage
- Daily Low Cloud Coverage
- Daily Middle Cloud Coverage
- Daily Total Cloud Coverage
- Monthly High Cloud Coverage
- Monthly Low Cloud Coverage
- Monthly Middle Cloud Coverage
- Monthly Total Cloud Coverage

Clouds
My NASA Data has activities that help students with cloud observations skills. These include:

- Interactive Weather Observations
- Modeling Cloud Cover
- Sky Color and Visibility

The Earth System Data Explorer includes cloud coverage datasets. In addition, there are data about cloud opacity (how much sunlight clouds absorb) and phase (clouds contain liquid, ice, or mixture of both types). There are also datasets which students can use to compare the net flow of energy towards Earth with and without clouds to see the impact of clouds on the energy budget. Finally, there are precipitation data which can be compared with cloud cover.

- Daily High Cloud Coverage
- Daily Low Cloud Coverage
- Daily Middle Cloud Coverage
- Daily Total Cloud Coverage
- Monthly High Cloud Coverage
- Monthly Low Cloud Coverage
- Monthly Middle Cloud Coverage
- Monthly Total Cloud Coverage
- Monthly Cloud Opacity
- Monthly Cloud Phase
- Monthly Flow of Energy into Surface by Longwave Radiation
- Monthly Flow of Energy into Surface by Shortwave Radiation
- Monthly Flow of Energy out of Surface by Longwave Radiation
- Monthly Water Vapor in the Atmosphere
- Daily Precipitation Amount
- Monthly Average Precipitation Rate

Precipitation
Monthly Precipitation - June 2018

Precipitation data are complemented by cloud data and water vapor data.

- Daily High Cloud Coverage
- Daily Low Cloud Coverage
- Daily Middle Cloud Coverage
- Daily Total Cloud Coverage
- Monthly High Cloud Coverage
- Monthly Low Cloud Coverage
- Monthly Middle Cloud Coverage
- Monthly Total Cloud Coverage
- Monthly Cloud Opacity
- Monthly Cloud Phase
- Monthly Water Vapor in the Atmosphere
- Daily Precipitation Amount
- Monthly Average Precipitation Rate

Relative Humidity

The Earth System Data Explorer includes daily and monthly mean relative humidity data. Other datasets that can be used to complement investigations using relative humidity include atmospheric water vapor and cloud coverage data.

- Daily Mean Relative Humidity
- Monthly Mean Relative Humidity
- Daily High Cloud Coverage
- Daily Low Cloud Coverage
- Daily Middle Cloud Coverage
- Daily Total Cloud Coverage
- Monthly High Cloud Coverage
- Monthly Low Cloud Coverage
- Monthly Middle Cloud Coverage
• Monthly Total Cloud Coverage
• Monthly Cloud Opacity
• Monthly Cloud Phase
• Monthly Water Vapor in the Atmosphere
• Daily Precipitation Amount
• Monthly Average Precipitation Rate

Surface Temperature

Earth System Data Explorer -
Monthly Daytime Skin Temperature - June 2019

Skin temperature is surface temperature. Monthly daytime and nighttime skin temperature can be compared to student measurements.

• Monthly Daytime Surface (Skin) Temperature
• Monthly Nighttime Surface (Skin) Temperature
• Monthly Surface (Skin) Temperature

Wind

Earth System Data Explorer -
Monthly Near-Surface Wind Vectors - December 2018

There are several datasets that show different components of wind. These provide relevant context
for student investigations.

- Monthly Eastward Surface Wind Speed Component (Land + Ocean)
- Monthly Near-Surface Wind Vectors (Land + Ocean)
- Monthly Northward Surface Wind Speed Component (Land + Ocean)

GLOBE Atmosphere Protocol Information

GLOBE Atmosphere protocols can be found on the GLOBE website. Each GLOBE protocol page will have information for the protocol, data sheets, and related learning activities. Online e-Training is available.

GLOBE Protocol Bundles

Protocol bundles are designed to use related protocols from different spheres to investigate different topics. The following protocol bundles include at least one atmosphere protocol. The GLOBE protocol bundles can be found on the GLOBE website.

Visit the following links to explore the Earth System Data Explorer datasets that may be used to support students who are exploring their communities using the GLOBE protocol bundles.

- Air Quality Protocol Bundle
- ENSO Protocol Bundle
- Mosquito Protocol Bundle
- Ocean Protocol Bundle
- Rivers and Lakes Protocol Bundle
- Soil Protocol Bundle
- Urban Protocol Bundle
- Water Cycle related Protocol Bundle
- Water Quality Protocol Bundle
- Weather Protocol Bundle

Document Resources

- Atmosphere Datasets
- All Datasets