FIELD PROJECT FACT SHEET #1
HIPPO :: HIAPER Pole-to-Pole Observations

SCIENCE MISSION

In order to know what kind of changes are occurring to the Earth's atmosphere, an in-depth and detailed study of greenhouse gases is needed in order to understand the current conditions. The climate is always changing and scientists can more accurately see changes as they occur.

ABOUT HIPPO

Scientists need to sample well-mixed air (air that has been mixed by the wind) from over the ocean so pockets of pollutants would not contaminate the collected samples. In the future, scientists can use this baseline data to understand new changes to the atmosphere.

HIPPO will measure profiles of atmospheric gas and particle concentrations approximately pole-to-pole, from the surface to the tropopause, five times during different seasons over a three year period. A comprehensive group of atmospheric gases and particles needed to understand the Carbon Cycle will be measured. The project will provide the first comprehensive, global survey of atmospheric gases and particles, covering the full troposphere in all seasons and multiple years, from 2009-2011.

The main goal of this program is to determine the global distribution of carbon dioxide and other atmospheric gases by analyzing air samples at various altitudes and latitudes in the Pacific Basin.

The scientific questions motivating HIPPO focus on:

1. Understanding the global sources (producers) and sinks (storage) for CO_2, CH_4, and other carbon cycle gases
2. Determining large-scale rates of how and where chemicals are transported in the atmosphere around the globe

High-flying Research Aircraft

Research scientist monitoring data collection

Flying back from the North Pole by Mt. McKinley

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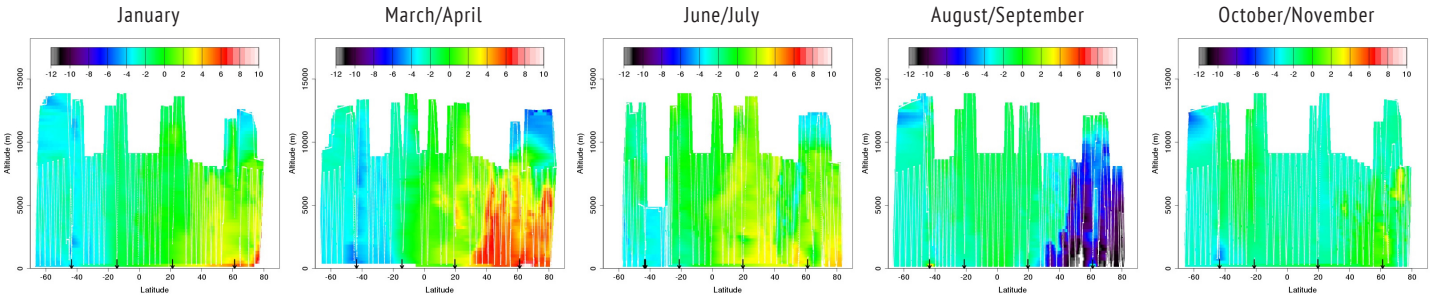
INSTRUMENTS & PLATFORMS

- High-flying Research Aircraft
- Dropsonde
- Greenhouse Gas Sensor
- Cloud Droplet Sensor
- Particle Sensor

SAMPLE DATA FROM HIPPO

Seasonal variations of CO_2 from HIPPO missions 1-5

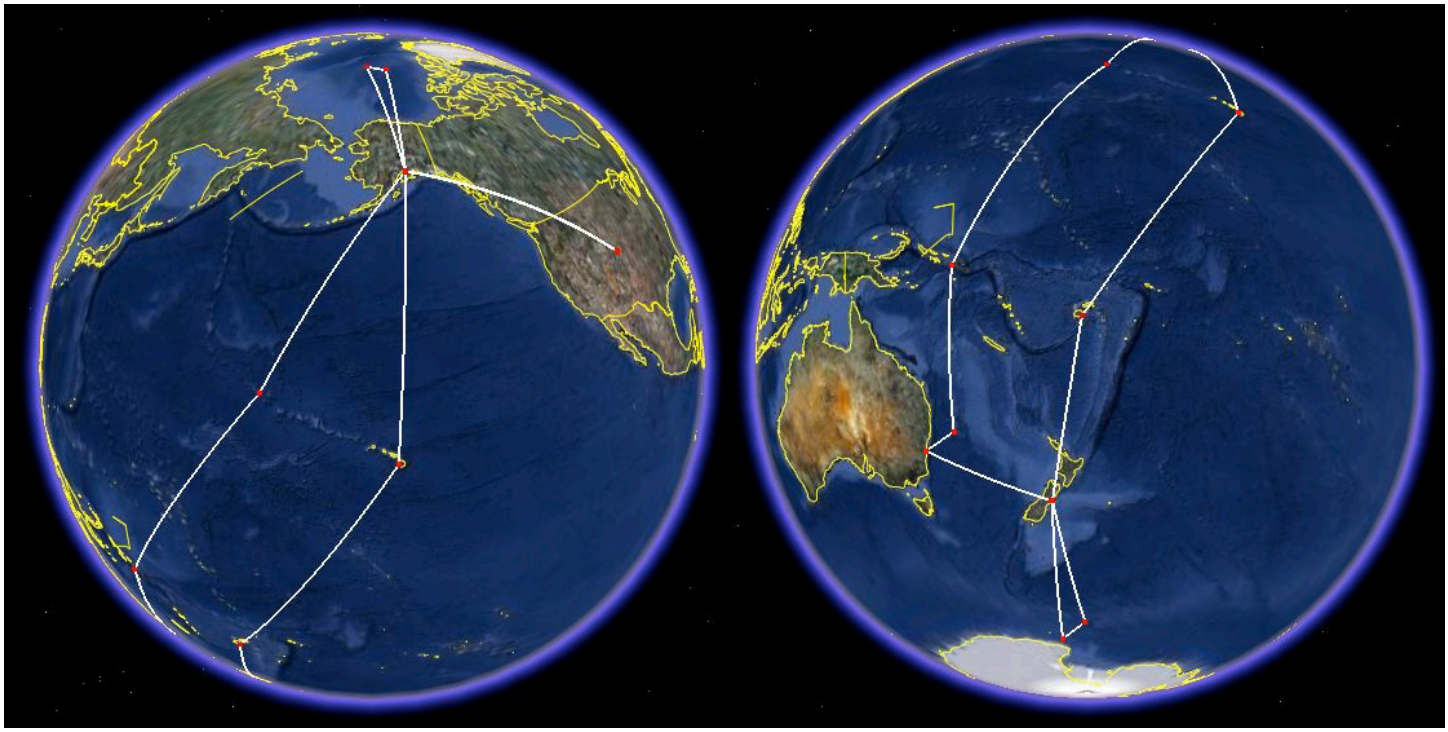


A sample of HIPPO data. Each graph represents latitude on the x-axis, with zero being the equator, to the left is towards the South Pole and to the right is towards the North Pole. The y-axis represents altitude, from about 500 feet to 50,000 feet. Each graph represents a "slice of the atmosphere". Dark blue and purple represent low concentrations, red represents high concentrations. Notice the concentration of CO_2 is much higher in the Northern Hemisphere in the Spring (March/April) and there are very low concentrations of CO_2 in the Northern Hemisphere in late-summer (August/September).

Data Discussion Questions

1. What global seasonal process do you think causes the change in CO_2 concentration in the Northern Hemisphere?
2. What do you think there are similar levels of CO_2 in lower latitudes year-round?
   (Hint: What major producer of CO_2 is not prevalent in Antarctica?)
3. What do you think there is a constant mid-level concentration (green) of CO_2 near the equator, or 0 on the x-axis?
   (Hint: think about the type of vegetation found in the tropics)

MORE ABOUT HIPPO



Typical flight path over the Pacific Basin for each of the five HIPPO missions:

- Colorado to Alaska
- Alaska to northern polar regions & back
- Alaska to Hawaii
- Hawaii to Cook Islands
- Cook Islands to New Zealand
- New Zealand to southern polar regions & back
- New Zealand to Solomon Islands
- Solomon Islands to Hawaii
- Hawaii to Alaska
- Alaska to northern polar regions & back
- Alaska to Colorado

RESEARCH SUMMARY OF HIPPO

This comprehensive data set provides the first high-resolution vertical profile measurements of over 90 unique atmospheric chemical species from nearly pole-to-pole over the Pacific Ocean across all seasons. The suite of atmospheric gases and aerosols is needed to understand the carbon cycle and challenging global climate models. This data set will provide opportunities for research across a wide-variety of Earth sciences, including those analyzing how greenhouse gases affect global climate at different locations around the globe and at different seasons.

It can take up to five to ten years to organize, analyze, and examine the relationships, patterns, trends, etc of these millions of data points that are collected during this huge field project. Scientists are still in the process of analyzing the data from this research project.