



# CLIMATE PROGRAM OFFICE

## Climate Monitoring

**Can we detect the direction, magnitude, and rate of global and regional climate change?**

**Can we provide data sets that accurately quantify the nature and scope of climate variations and trends?**

The Climate Monitoring program ensures that data sets that researchers need to understand the climate system are available for analysis. The program documents variations in climate on time scales ranging from days to a century, and longer. The program also supports data and information development for national and international climate assessment products.

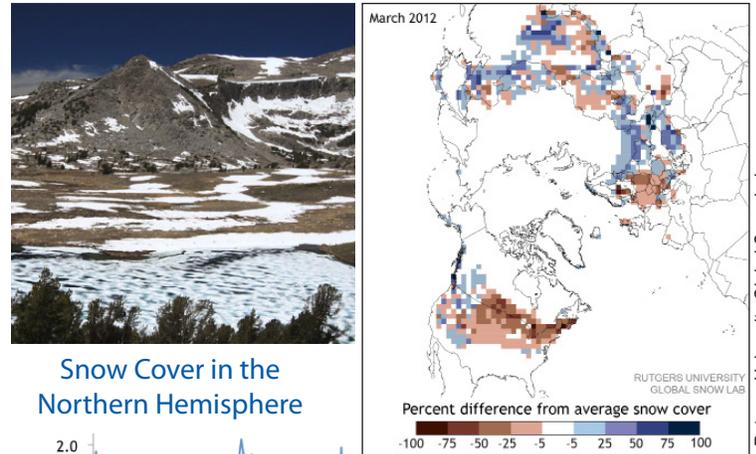
### Objectives

- Provide data and information development support for national and international climate programs and cross-cutting science.
- Quantify and document observed climate variations and changes.

### Approaches

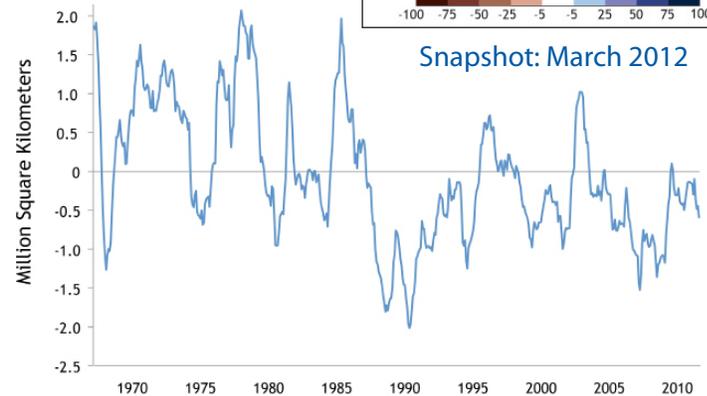
The Climate Monitoring program supports continuing, focused activities at universities and collaborates with research groups at NOAA laboratories to:

- Develop and analyze climate data sets, addressing uncertainties that result from factors such as physical and instrumental changes at observation stations.
- Provide solutions to inadequate spatial or temporal resolution and coverage, or biases in existing data sets.



Snow Cover in the Northern Hemisphere

Snapshot: March 2012



Change Over Time: 1967-2011

The Climate Monitoring program supports work to sustain records of key climate variables such as the area covered by snow each year. The map shows how snow cover in March 2012 compared to average snow cover from 1971-2000 (e.g., -25% signifies that the number of snow-covered days is 25% less than the long-term average). The graph shows 12-month running anomalies of monthly snow cover extent over Northern Hemisphere land masses between November 1966 and December 2011. Values show the difference from the 1971-2000 average. Although snow cover varies from year to year, the graph reveals a decreasing trend since 1967.

- Use techniques of climate change detection to demonstrate whether an observed change in climate is large relative to estimates of expected climate variability.
- Document the historical and projected variability and changes in phenomena that impact society, such as floods, droughts, and other extreme events.

**Climate Monitoring**

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## Contributions

Projects supported by the Climate Monitoring program produce a range of data sets that are essential to national and international climate assessments. Specifically, these data sets support the Intergovernmental Panel on Climate Change (IPCC) assessments and the U.S. National Climate Assessment.

Examples of data sets contributing to these efforts include atmospheric temperature, sea surface temperature, ocean heat content, tropical and extratropical storms, precipitation, droughts, snow and ice extent, atmospheric water vapor, and clouds.

Additionally, the Climate Monitoring program advances climate science by supporting projects that:

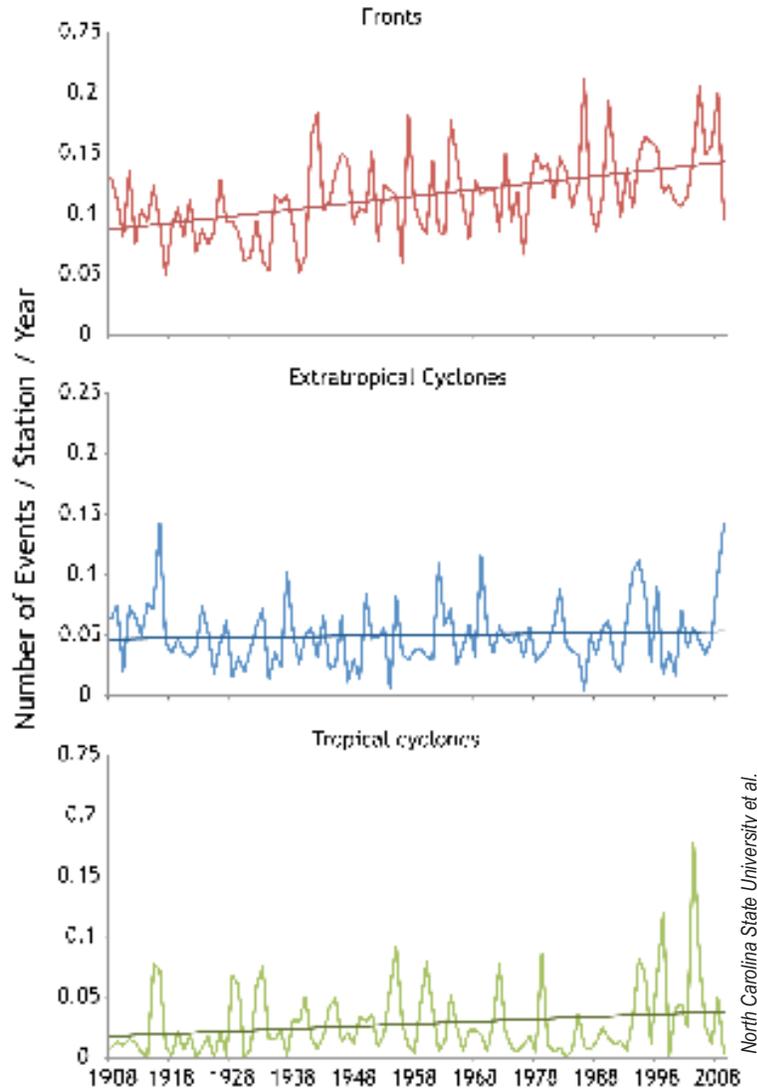
- Identify and research possible changes in the characteristics of extreme weather events including tropical and extratropical storms, heavy downpours, floods, droughts, heat waves, tornadoes, lightning, and wildfires.
- Improve regional climate forecasts through studies at continental and smaller scales.
- Encourage multiple-model approaches and model/observation intercomparisons that increase the validity of research results.
- Compile high-quality climate time series, blending data from different observing systems and sensors.



NOAA

A typical observing station from the U.S. National Weather Service's Cooperative Observer network is shown in the photo above.

## Monitoring Changes in Extreme Events



North Carolina State University et al.

The Climate Monitoring program monitors and identifies changes in the characteristics of extreme events. These graphs show annual time series of the number of extreme precipitation events per station per year caused by fronts (red line), extratropical cyclones (blue line), and tropical cyclones (green line). Daily extreme precipitation events for the period 1908-2009 were identified from a network of 935 U.S. National Weather Service Cooperative Observer stations. For this study, an extreme is defined as an event exceeding the threshold for a one in five year occurrence.