

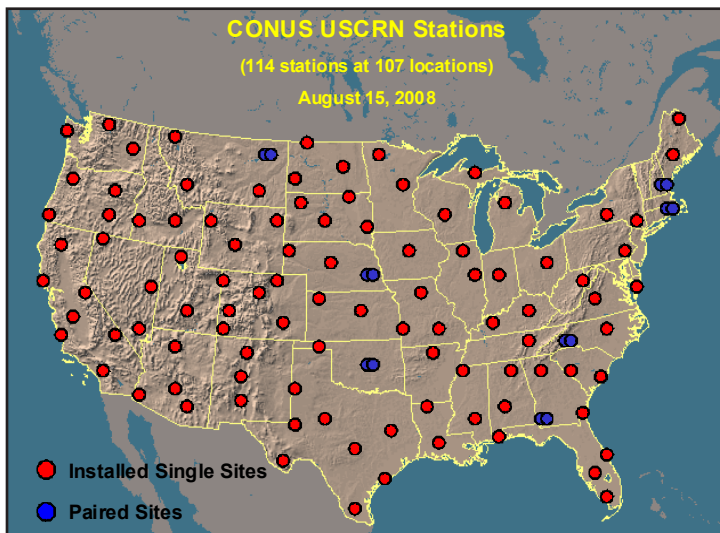


Air Resources Laboratory

Climate Research and Development

What We Do

The Air Resources Laboratory (ARL) provides essential information and tools for decision-makers to understand how and why climate has changed and what changes might occur in the future. ARL's climate research and development concentrates on observations, climate variability and change analysis, and assessment of regional climate impacts. The focus of ARL's efforts is in situ measurements, although our climate analysis includes comparison with satellite-based observations and with model results.



Map of the Continental U.S.
US Climate Reference Network (USCRN)

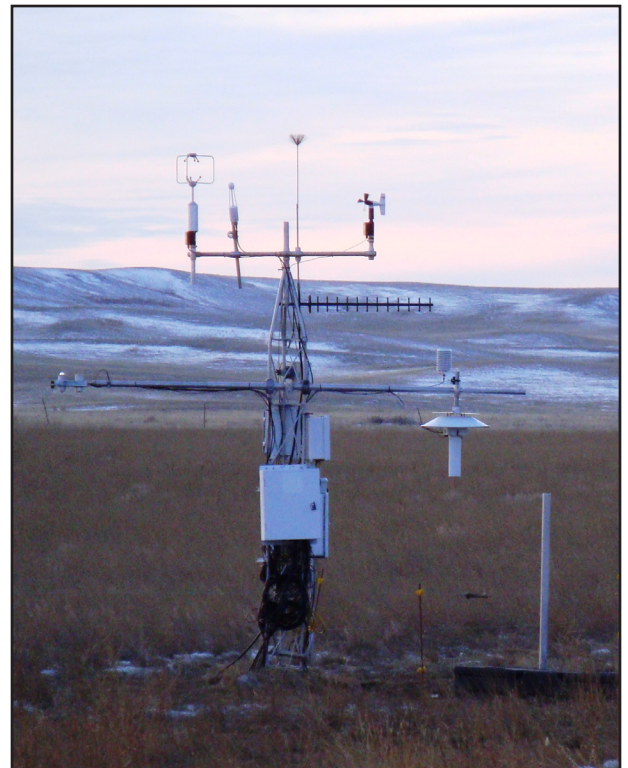
ARL scientists also use their state-of-the-art micrometeorological measurement techniques to monitor the components of the surface energy budget. Currently, there are seven sites, representing ecosystems in the major climate zones of the U.S. These observations are needed to understand how the various regional surface types (e.g., forest, grasslands, crops, deserts, water) absorb and/or reflect the solar and infrared radiant energy and how that energy is partitioned into sensible, latent and ground heat fluxes. Observing these fundamental processes will provide a predictive understanding of the role of land-surface feedbacks in the global climate system and will guide regional and global modeling activities

Climate Variability and Change Analysis

ARL analyzes daily to multi-decadal atmospheric variations measured by many types of climate observation systems, with a special emphasis on radiosonde (weather balloon)

Climate Observations

ARL contributes to two land-based climate reference networks: the U.S. Climate Reference Network and the Regional U.S. Climate Reference Network, through the design, establishment, operation, maintenance, and analysis of these observing systems. ARL also has been in the forefront of calls for the establishment of an upper air climate reference network. This network is the newly formed Global Climate Observing System Reference Upper-Air Network. ARL's focus is on providing scientific leadership and research for this network.



A Surface Energy Budget station at Ft. Peck, MT
(Photo: NOAA)

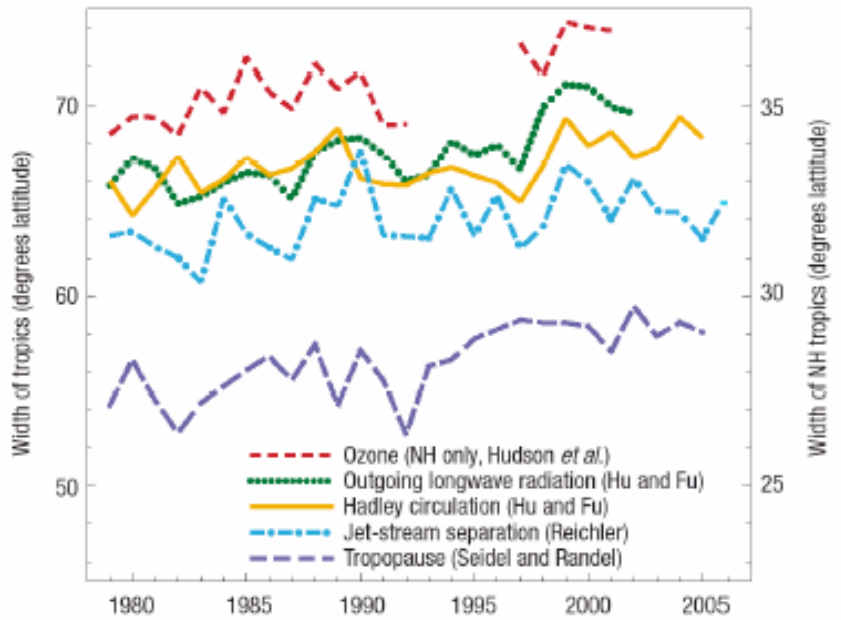
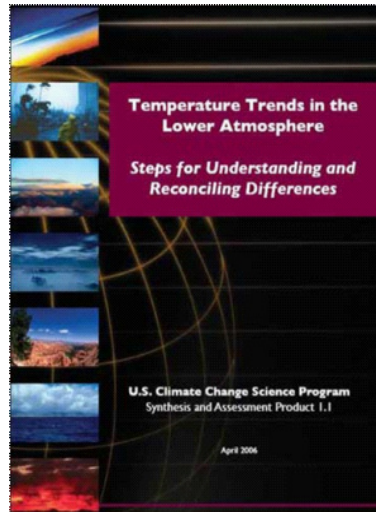
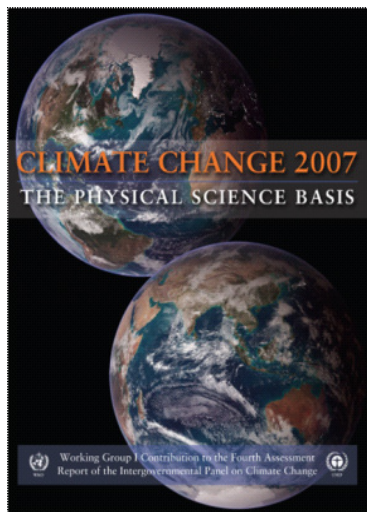
data. ARL's radiosonde research has identified important data problems and produced new, improved datasets by removing artificial, non-physical signals from weather observations. ARL uses these and other datasets to identify and characterize climate variability and trends. Through collaboration with climate modeling groups, ARL's datasets are used to evaluate global climate models.

Assessment of Regional Climate Impacts

ARL supports and coordinates development of the climate extension of the Weather Research and Forecasting model so it can be used to study regional climate issues. Applications of the model include examining water resources and extreme weather events in potential future climates.

Why It Is Important

ARL's Climate Research and Development provides essential observations and analyses for monitoring climate changes and understanding why they are occurring. National and international climate scientists and decision-makers use this information to understand climate trends and the need for mitigating and adapting to climate change. ARL's research has contributed to a number of climate change assessments, including the work of the Intergovernmental Panel on Climate Change and the U.S Climate Change Science Program.



Estimates of the width of the tropics from multiple techniques. All show widening over several decades, which is occurring faster than has been predicted by climate models. Such changes could significantly affect weather patterns. (Nature Geoscience, Seidel et al., 2008)

ARL's science has also contributed to models that can be used to project weather patterns that would be associated with climate change. For instance, models may show how water availability, air quality, and severe weather would be affected by climate change, information that regional managers need to make informed decisions.

For More Information:

Climate Reference Network

<http://www.atdd.noaa.gov>

Climate Variability & Change Analysis

www.arl.noaa.gov/CVCAAnalysis.php

Air Resources Laboratory

www.arl.noaa.gov

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