WCRP
World Climate Research Programme

World Climate Research Programme
Plans and Priorities

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Mission & Objectives

World Climate Research Programme supports climate-related decision making and adaptation and mitigation planning by coordinating research required to improve

(1) climate predictions and

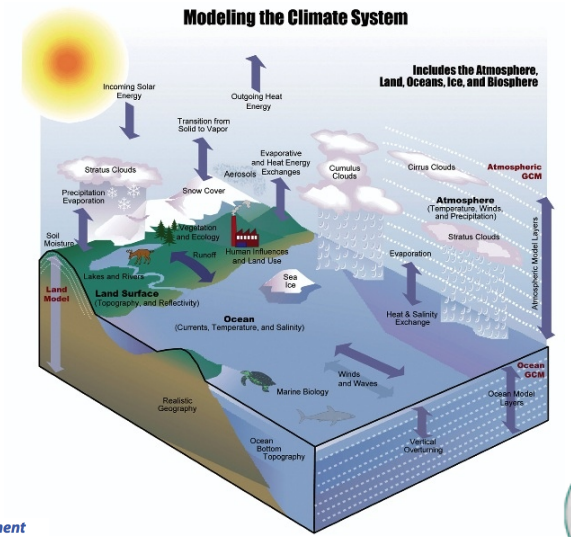
(2) understanding of human influence on climate

"for use in an increasing range of practical applications of direct relevance, benefit and value to society" (WCRP Strategic Framework 2005-2015).

Projects & Activities

WCRP Core Projects on climate and...

Cryosphere



Stratospheric Processes

Energy & Water Cycle

Ocean

WCRP flexible responseto recent thrusts & research needs: Cross-Cutting Activities

- Extremes
- Monsoons
- Sea Level
- Seasonal & Decadal Prediction
- Regional Modeling,

(WCRP Strategic Framework 2005-2015)

Earth System Science Partnership

The Earth System Science Partnership is a partnership of four international global environmental change (GEC) research programme for the integrated study of the Earth System, the changes that are occurring to the system and the implications of these changes for global and regional sustainability.

DIVERSITAS

GLOBAL IGBP CHANGE

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IHDP

Intermediate and Long-Term Plans

- 2008-2013: WCRP activities and core projects implementing the Strategic Framework COPES (Coordinated Observation and Prediction of the Earth System)
- Post-2013: to achieve a more effective interface with the users of climate informational products, a new WCRP structure will be needed

Intermediate Plan: Pre-2013

- Major scientific challenges at the interface of physical components of the climate system: the oceans, the cryosphere, the water and energy cycle and the atmosphere. The complex interactions within and among them.
- Highlights activities that WCRP will implement to reach its goal of delivering science in support of societal needs
- Major thrusts: Decadal Prediction, Sea-level variability and change, climate extremes, and atmospheric chemistry – climate interactions.
- Ongoing areas of investigation: climate change projections, seasonal predictions, monsoons

Intermediate Plan: Pre-2013

Activities in support of WCRP Integrating Themes:

- Climate-quality datasets and analysis: capacity for gathering, processing and sharing observational data for model evaluation and initialization. Observations
- New generation of climate system models: seamless prediction, higher-spatial resolution, better representation of earth system processes. Models, Computers, Network
- Next generation of climate experts: building capacity regionally and globally. Leadership
- Building partnership with relevant GEC programmes and GCOS, WWRP, GEO, World Bank, START. Institutions

Future Directions

- WCRP should maintain the rigor of its science and remained focused on core physical science, addressing new science areas in partnerships with others - don't drop key issues but maintain flexibility to respond to emerging science priorities

- The function of WCRP should be to provide the science that underpins understanding and predicting of climate leading to societal benefits. Communication and capacity building are also key issue, ref. COPES document

- An emerging demand is a need to move to regional scales whilst from a science perspective recognize the importance of getting the global scales right. WCRP needs to have the capability to enable climate prediction from seasonal to century, and global to regional scales.

Future Directions

Looking to the future:

- The vision post 2013 is strongly influenced by the evolution of climate science, research, and education in the 1980's, 1990's, 2000+ across the atmosphere, ocean, land, and cryopshere.

- Looking to the future, a major envisioned challenge and opportunity at the intersection of WCRP+IGBP is the basic and applied research in support of the:

  ***Prediction* of the Earth System**.

WCRP/WWRP/IGBP Vision Papers

A special Issue of Bulletin of Am. Meteorol. Society:

- An Earth-System Prediction Initiative for the 21st Century
- Addressing the Complexity of the Earth System
- Towards a New Generation of World Climate Research and Computing Facilities
- Collaboration of the Weather and Climate Communities to Advance Sub-Seasonal to Seasonal Prediction
- The Multi-scale Organization of Tropical Convection and its Interaction with the Global Circulation

Role of WCRP in Observations

- Advocate **improved observations and analysis** suitable for climate (satisfying the GCOS Climate Monitoring Principles to ensure continuity of record). This especially includes those from space.

- **Data set development**: evaluating observations and promoting global reprocessing and reanalysis. Develop new products and datasets, analytical and diagnostic techniques, high level derived products: for use in understanding and analyzing climate variability and change, and for evaluating models.

- Mechanisms and modes of variability in climate anomalies; operational **attribution, numerical experimentation** in near real time to allow reliable statements to be made not only about what the state of the climate is, but also why it is the way it is and the mechanisms involved.

Role of WCRP in Observations

- **Data assimilation and analysis**: initializing of coupled models for prediction.

- Provide advice on **best datasets** for various purposes (climatologies and time series) and their merits and limitations. (Error bars are greatly needed.)

- High priority needs are to have assessments of **datasets for use in evaluating climate models**, and specifically those used in the AR5 IPCC report that will participate in the CMIP5 activity

Role of WCRP in Observations

- Help improve and promote sound **data stewardship**, including data archiving, management, and access. This includes making sure that climate-related data variables are reaching data archives, and that standards are set for archiving new types of data.

- Help make data **accessible** and available e.g., through the internet. Promote shared efforts for data quality control.

WCRP Needs Observations/GURAN

- Study of key atmospheric/climate processes
- Develop and evaluate climate/Earth system models
- Calibration, validation and benchmark observations
- Analysis, re-analysis of long-term trends
- Assessment of geo-engineering scenarios/options
- …

WCRP-GCOS Co-Sponsored Activities

- Atmospheric Observations Panel (AOPC)
- Ocean Observations Panel (OOPC)
- Terrestrial Observations Panel (GTOS)
- Panel on Obs. & Assimilation (WOAP)
- Baseline Radiation Netwrok (BSRN)

Example: SPARC Temperature Trends Group

Activities of the SPARC Temperature Trends Group
(led by Bill Randel and Keith Shine)

Current Foci:

- extension of middle/upper stratosphere time series and trends (combine SSU and AMSU data)
- analyses and comparisons of new homogenized radiosonde data sets
- other data sets (such as GPS radio occultation)
- synthesis and outstanding questions from CCMval model – data comparisons

Example: SPARC Temperature Trends Group

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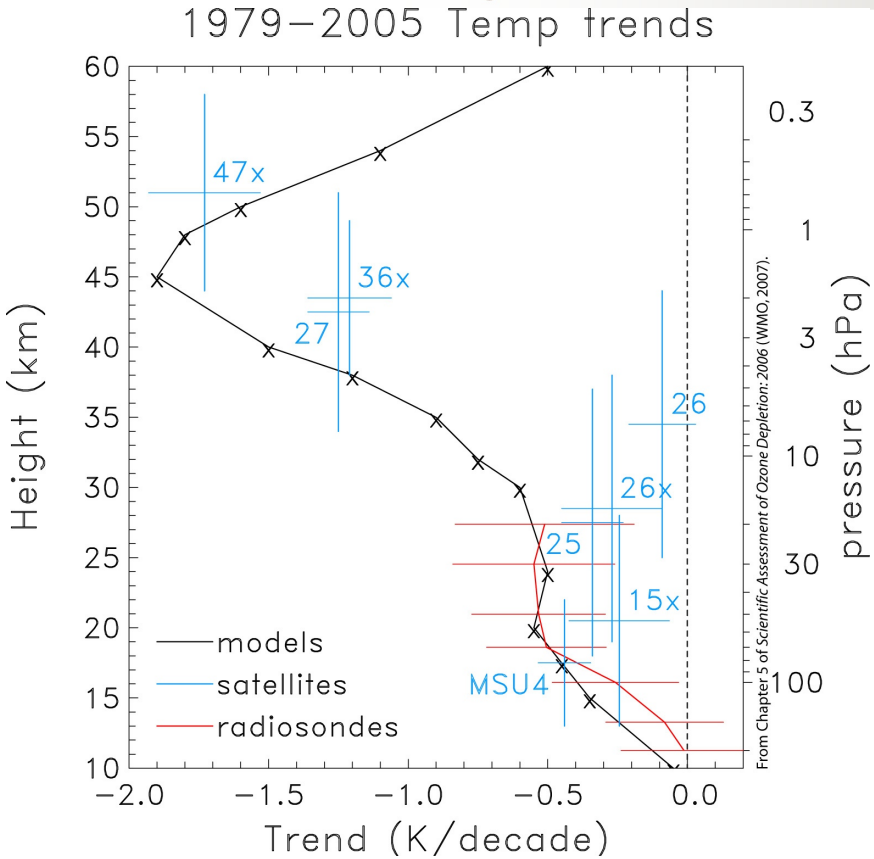
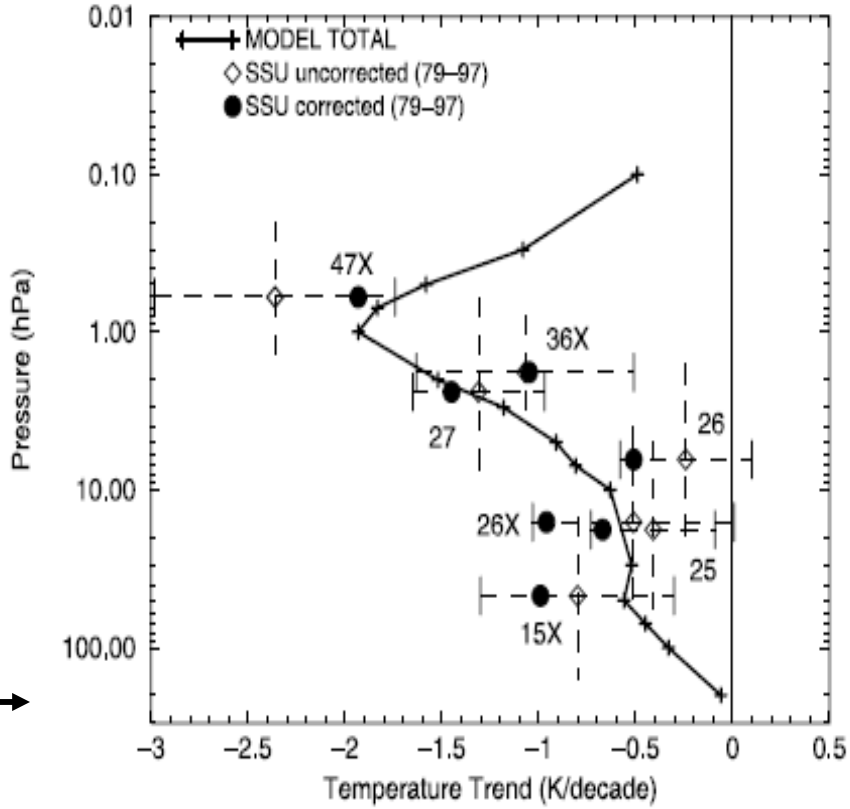


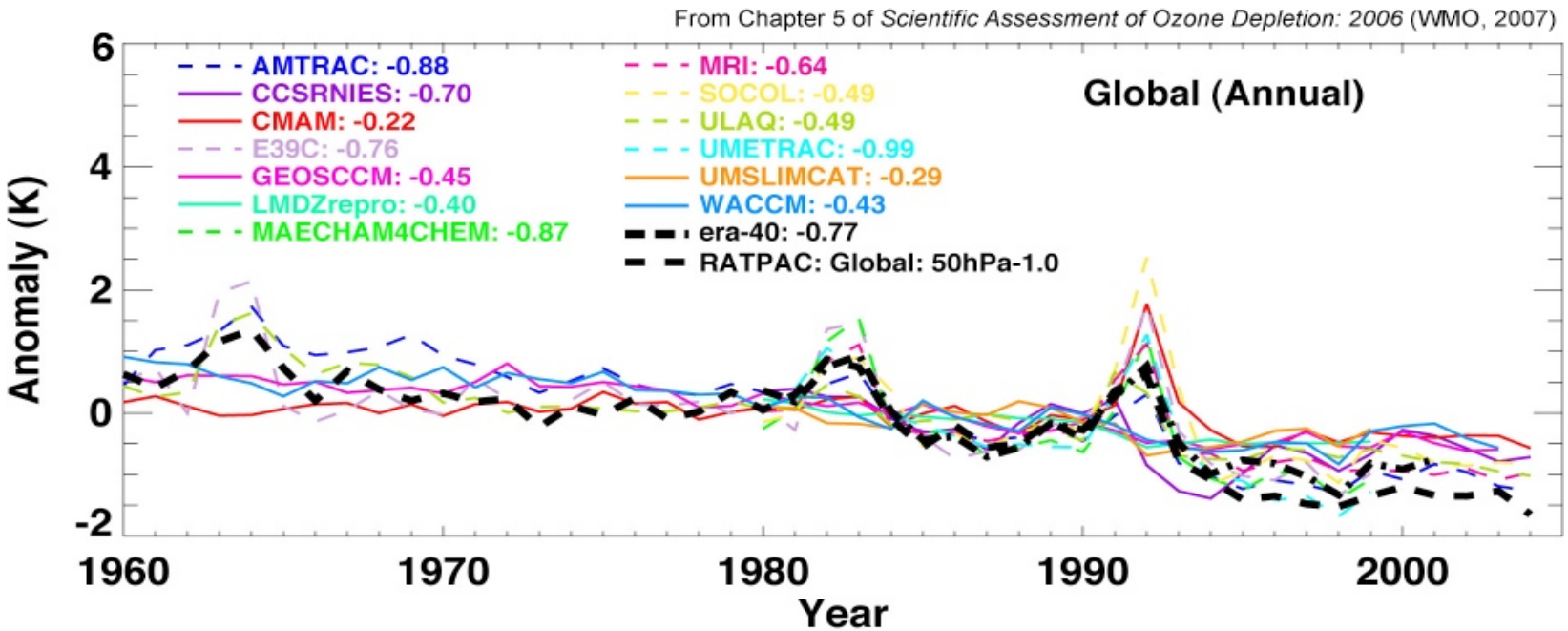
WMO, 2006 Ozone Assessment Temperature trends derived from satellite and radiosonde data (60°N-60°S; 1979-2005) and a synthesis of model results from Shine et al. (2003)



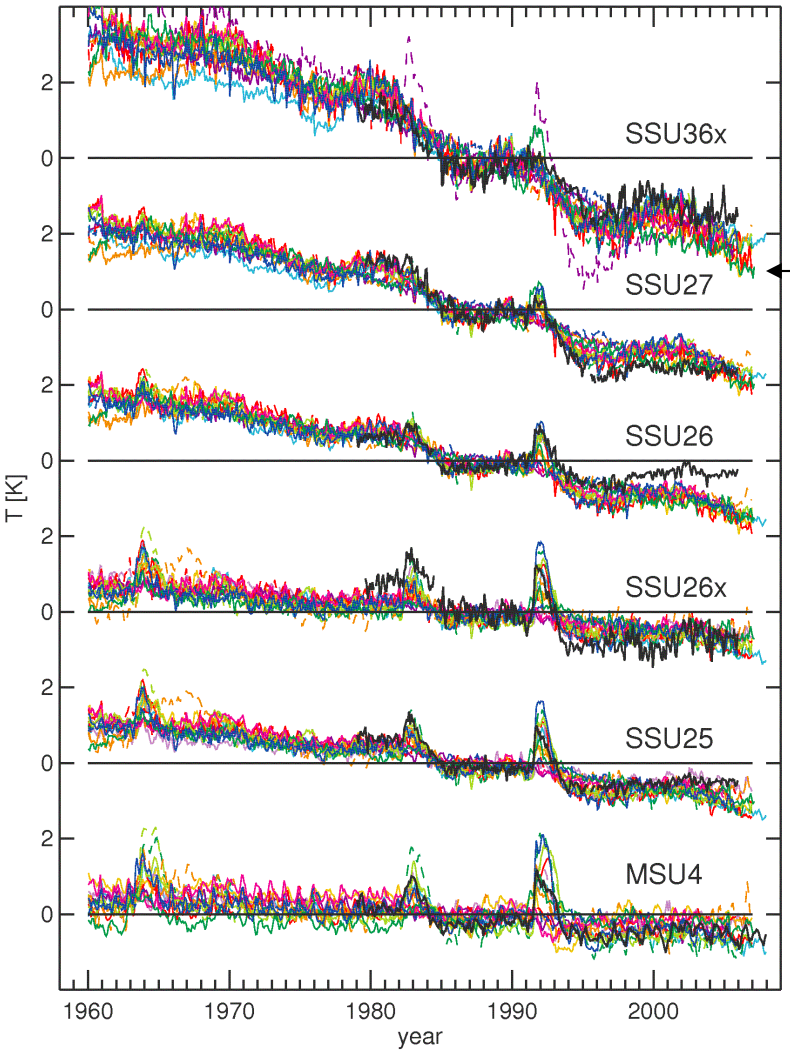
Updated Temperature trends derived from Stratospheric Sounding Unit radiances: The effect of increasing CO2 on the weighting function (Shine et al, 2008)

http://wcr

Example: Globally Averaged Temperature Trends in the Lower Stratosphere



Example: Confronting Models with Observations



Need to have an independent group to look into the SSU data sets.

Example of temperature time series comparisons with CCMval models.

Black lines show global temperature anomalies from SSU and MSU satellite data for 1979-2005; colored lines are corresponding model results.

Example: SPARC Water Vapor Assessment, WaVAs-2

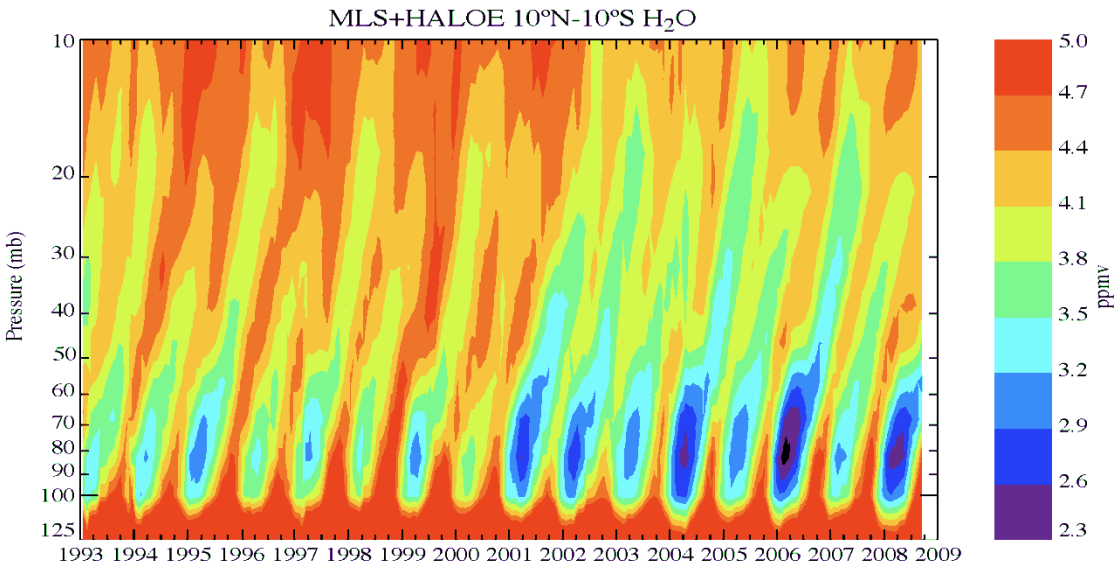
New SPARC Report

chairs: Cornelius Schiller, Tom Peter, Karen Rosenlof

1. Introduction
2. Data Quality
3. Supersaturation
4. UTS climatology and trends
5. Synthesis

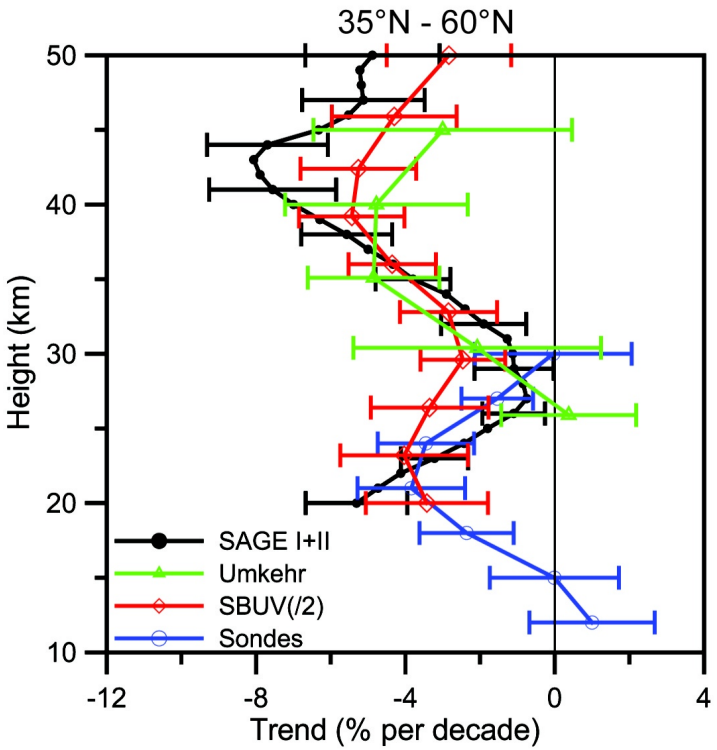
Sep '08	Kick-off, Bologna
Oct '08	Informal mtg, Hawaii
Mar '09	Author mtg, Toronto
Sept '09	Planning mtg, Corsica
Now	Open SPARC data base
Now	Chapter writing
Mid '10	Chapter meetings
End '10	Review
Mid '11	Report completed

Trends before and after 2000



Example: Ozone Profiles

- Need to provide a near global, long-term data set
- Ongoing, authenticated measurements of ozone profiles required
- Consistent altitude ranges, sampling times/periods, resolution
- Demise of SAGE II:
  lost ability to obtain such a data
- Problem needs to be addressed
  if the recovery of ozone is to be tracked
- Ground-based networks have
  improved (e.g. SHADOZ) but
  not helpful in the lower stratosphere
- Profiles of ozone trends



The Way Forward

- The need for “reference” stations as benchmark for other measurements. This is as more important as having a record from the stations themselves.
- It is vital to provide some form of insurance for the climate records should there be a major satellite launch delay/failure, e.g. ozone profile.
- It is vital to help anchor re-analyses records.
- There should be some consideration of how the GRUAN relates to measurements from other networks such as the ozone-sonde, the flux-net stations, the Reference stations in CEOP, BSRN, etc.
- Recognizing that funding for all of these activities is limited, the extent to which they can be coordinated to gain greater efficiencies and benefits from the whole will help us in securing support for their maintenance and continuity.
- We have a great opportunity to demonstrate the value of these principles through GRUAN, as we embark on this very exciting initiative.
- WCRP supports the implementation of GURAN, as an urgent priority for climate observations, research and analysis.

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2011 WCRP Open Science Conference

Climate Research in Service to Society

Conference Objective

•The aim of WCRP is to facilitate analysis and prediction of Earth's climate system variability and change for use in an increasing range of practical applications of direct relevance, benefit and value to society.

• The Open Science Conference will thus assemble the scientific community working to advance our ability to understand and predict variability and change of the Earth's climate system on all time and space scales.

•Through this synthesis of research findings and knowledge, WCRP will better inform assessments and prediction science practitioners on the state of climate science research, describe the challenges of the future, and chart pathways forward for WCRP.

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2011 WCRP Open Science Conference

Climate Research in Service to Society

- **Monday: The Climate System Components and Their Interactions**
- **Tuesday: Observation and Analysis of the Climate System**
- **Wednesday: Improving Predictive Capabilities**
- **Thursday: Environmental Assessments**
- **Friday (early a.m.): Regional Climate**
  Friday (late a.m.): Challenges and the Future