

US CLIVAR Program Update

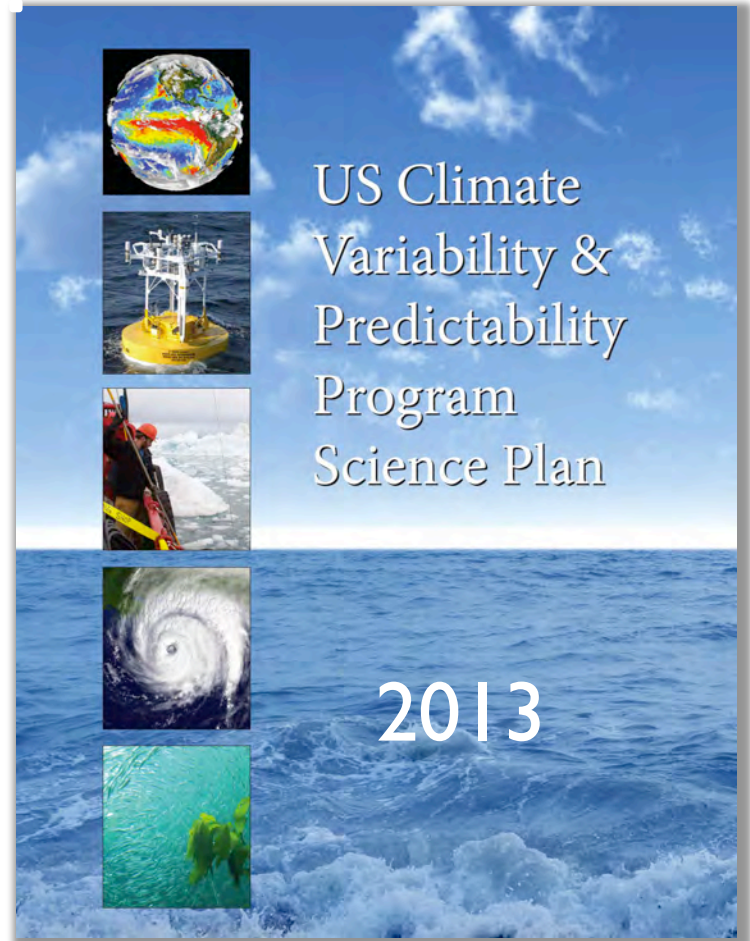
Mike Patterson
US CLIVAR Director

Context – US CLIVAR Goals and Research Challenges
2017 Progress and 2018 Plans – Through Panels, Working
Groups, & Workshops

US CLIVAR Mission

To foster **understanding and prediction of climate variability and change** on intraseasonal-to-centennial timescales, through observations and modeling with emphasis on the **role of the ocean and its interaction** with other elements of the Earth system, and to serve the climate community and society through the **coordination and facilitation** of research on outstanding climate questions.

- ➔ US contribution to International CLIVAR
- ➔ Ocean's role component of USGCRP



US CLIVAR Goals

- 1) Understand the **role of the oceans** in climate variability on different time scales.
- 2) Understand the **processes** that contribute to climate change and variability in the past, present, and future.
- 3) Better **quantify uncertainties** in the observations, simulations, predictions and projections of climate variability and change.
- 4) Improve the **development and evaluation of climate simulations and predictions.**
- 5) **Collaborate with research and operational communities** that develop and use climate information.

1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010

Research Challenges

Decadal Variability & Predictability

- Decadal modes (e.g., AMV, PDO)
- Overturning circulation (e.g., AMOC)
- Warming hiatus
- Expanding tropics
- Initialized predictions

Climate & Extreme Events

- Tropical Cyclones
- Heavy waves/storm surge
- Heat waves/cold outbreaks
- Drought
- Heavy precip/floods

Polar Climate Changes

- Arctic-subpolar gyre exchanges
- SO/ACC stratif. & transport
- Ocean-ice sheet & ocean-sea ice interactions
- Arctic-midlatitude atmos. connections

Climate & Carbon/ Biogeochemistry

- Carbon cycle sensitivity
- Coupled physical & biogeochemical processes
- Marine ecosystem and fisheries response to climate variability & change



2017 US CLIVAR Summit 8-10 August, 2017 Baltimore, Maryland



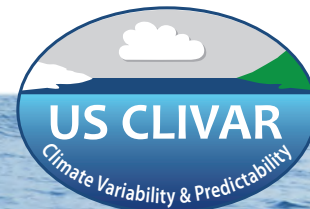
2017 US CLIVAR Summit Report

August 8-10, 2017
Baltimore, Maryland

GEWEX SSG Meeting

Washington, DC

January 31, 2018



Near Term Panel Action Items

Phenomena, Observations, and Synthesis (POS) Panel

- Organize multi-disciplinary workshop on **coastal sea level** of US East Coast
- Explore establishing NSF Research Coordination Network on **ecological forecasts** along US West Coast
- Provide inputs to reviews of **Indian Ocean and Atlantic Ocean observing systems**
- Organize external evaluation of the **US GO-SHIP** program (with Ocean Carbon BGC Program)
- Organize a small meeting on **observational uncertainty metrics**

Near Term Panel Action Items

Process Studies & Model Improvement (PSMI) Panel

- Develop best practices white paper on **data management and sharing**
- Evaluate and provide **feedback on 8 process studies** through webinar series
- Consider process studies focused on **processes impacting decadal timescales** (e.g., related to AMOC, PDO, Southern Ocean overturning)
- Emphasize exploration of **high-resolution modeling** when evaluating process studies, especially in Southern Ocean and western boundary current regions

Near Term Panel Action Items

Predictability, Predictions, and Applications Interface (PPAI) Panel

- Coordinate with WCRP on planning of **subseasonal to decadal prediction** conference
- Develop journal article(s) on **communication of climate model outputs for applications**
- Examine modeling outcomes from Arctic Mid-latitude Working Group for **linkage to extreme events**
- Organize *Variations* edition on **forecast uncertainty** focused on the climate science community

2017-18 US CLIVAR Activities

Arctic-Midlatitude Working Group

Chairs: Judah Cohen (AER) & Xiangdong Zhang (U Alaska)

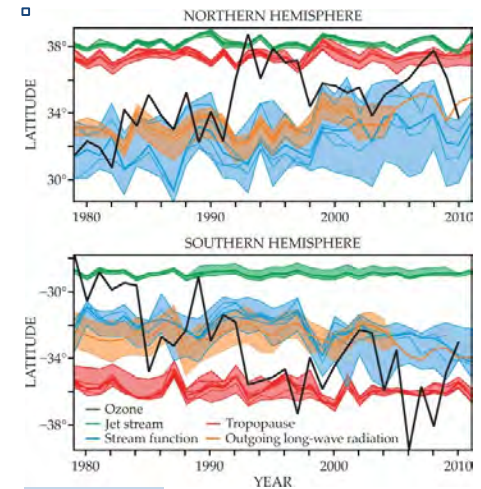


- Held workshop in Feb 2017, bringing together experts to review understanding of Arctic Amplification and its relationship to mid-latitude weather and climate variability and extremes
- Completing White Paper outlining metrics, analysis techniques, leading pathways, and modeling experiments (Arctic MIP)
- Contributing articles to *Nature* Special Collection

2017-18 US CLIVAR Activities

Widening of the Tropical Belt Working Group Chairs: Kevin Grise (U Virginia) & Paul Staten (Indiana U)

- Held meeting in Sep 2017 to draft three papers on
 - metrics to quantify impacts of observed expansion in width of tropics
 - how anthropogenic forcing and natural ocean-atmosphere variability contribute
 - how tropical widening manifests through regional-scale impacts (e.g., drought and desertification, tropical cyclone and extratropical storm tracks, monsoon systems)



Birner et al. 2015

Two New Working Groups

Water Isotopes Working Group

Chairs: Kim Cobb (Georgia Tech) & David Noone (Oregon State U)

- Water isotope observations and reconstructions have been useful for:
 - Evaluating climate of the past and elucidating atmospheric pathways of water vapor in the modern
 - Assessing accuracy of ocean/atmosphere circulation patterns, atmospheric convection and cloud physics, land surface hydrology, and the global water budget in coupled climate models
 - Providing another degree of freedom (in addition to temp, precip, ocean salinity) to constrain fluxes of heat and moisture
- Organize open community workshop to engage paleo and modern climate scientists to share findings and assess opportunities for using water isotopes to understand climate variability and the global water cycle
- Establish water isotope ratios as an essential climate variable to be routinely measured on established observational platforms (meteorological stations, ships, buoy arrays, airplanes, satellites) and make accessible through an archive

Two New Working Groups

Large Ensembles Working Group

Chairs: Clara Deser (NCAR) & Keith Rogers (Princeton U)

- Large Ensembles have been useful for addressing a range of science questions:
 - Separation of forced response from internal variability on regional scales & timescales < 50 yrs
 - Quantifying uncertainties/risks of anthropogenic climate change including extreme events
 - Emergent constraints, observing system design, benchmarking models, ...
- Organize open community workshop to review analysis of LEs across disciplines
- Design protocols for an LE-MIP

2018 Meetings, Workshops, and Conferences

SSC Meeting

22-23 January 2018 in Washington, DC

Town Hall at Ocean Sciences Meeting: CLIVAR's Course – plus 20th Anniversary Celebration

15 February 2018 in Portland, Oregon

Ocean Mesoscale Eddy Interactions with the Atmosphere Workshop

17-18 February 2018 in Portland, Oregon

Bridging Sustained Obs & Data Assimilation in Advance of Next Generation TPOS Workshop

1-3 May 2018 in Boulder, Colorado

International AMOC Science Meeting

24-27 July 2018 in Miami/Coconut Grove, Florida

US CLIVAR Panel Meetings

August 2018 in Atlanta, Monterey, and Washington

International Subseasonal to Decadal Prediction Conferences

17-24 September 2018 in Boulder, Colorado

International ENSO in a Warmer Climate Conference

16-18 October 2018 in Guayaquil, Ecuador

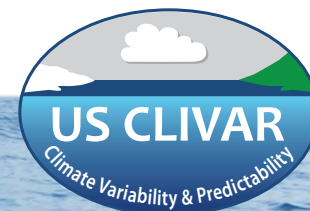
International CLIVAR SSG Meeting

Oct/Nov 2018, Washington, DC

GEWEX SSG Meeting

Washington, DC

January 31, 2018



International Conferences on Subseasonal to Decadal Prediction

17–21 September 2018 | NCAR, Boulder, CO, USA

Organizing Committee

Gokhan Danabasoglu, NCAR, US (co-chair)

Frederic Vitart, ECMWF (co-chair)

Caio Augusto dos Santos Coelho, INPE, Brazil

Francisco J. Doblas-Reyes, BSC, Spain

Arun Kumar, NOAA NCEP, US

William Merryfield, CCCMA, Canada

Michel Rixen, WMO, Switzerland

Andrew Robertson, Colombia Univ., US

Doug Smith, Met Office, UK

Aims and Objectives

- Foster knowledge exchange among scientists, producers, and users of S2S and S2D predictions towards development of seamless cross-timescale predictions
- Highlight current level of progress and accomplishments in S2S and S2D prediction research
- Review results from prediction experiments (SubX, CMIP6/DCPP)
- Evaluate current ability to make skill forecast on timescale of interest
- Identify challenges for transitioning S2S and S2D prediction research efforts into operations

Format (open, ~300 participants)

- 4.5-day meeting plenary & poster sessions
- Day 1-3: Parallel S2S and S2D breakouts
- Day 4-5: Joint conference

Relevance to US CLIVAR

- Links to all five of the US CLIVAR science goals, particularly *collaborate with research and operational communities that develop and use climate information*
- Links to Decadal, Extremes, and Polar research challenges
- Entrain PPAI Panel interests

Deliverables

- Interaction and info exchange across S2S and S2D communities
- WCRP meeting report
- BAMS article summarizing major outcomes/ accomplishments and future directions

Budget

- \$46K from US CLIVAR
- \$36K-\$41K from S2S Trust Fund; \$31K from WCRP
- \$9K from NCAR for reception
- \$45K from registration fees



Thank You

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