ONR Agency Interests

Scott Harper, “Arctic and Global Prediction” & “Physical Oceanography”
Dan Eleuterio, “Earth System Prediction Capability” & “Marine Meteorology”
Relevant Agency Mission or Goals

• While not supporting a formal global change research mission, the US Navy continues a history of interest in USGCRP and USCLIVAR through sponsored research in underlying environmental physical processes that concurrently satisfy maritime and expeditionary national security requirements as well as USCLIVAR goals.

• The Navy Task Force Climate Change (TFCC) was established in May 2009 at the direction of the Chief of Naval Operations (CNO) and includes extended range forecast needs.

• Quadrennial Defense Review (QDR, 2010): “Climate change, energy security, and economic security are inextricably linked”. “DOD will work to foster efforts to assess, adapt to, and mitigate the impacts of climate change”

• Naval S&T Strategic Plan (2011): “Match Environmental Predictive Capabilities to Naval Planning Requirements - Fully coupled (ocean-atmosphere-wave-ice) global, regional and local prediction for operational planning at tactical, strategic and climate scales.”
US CLIVAR-Relevant Activities

• Selected **Departmental Research Initiatives** (5-year efforts)
  • Arctic Waves and Sea State (2013-2017, Field effort in 2015)
  • ASIRI/OMM - Bay of Bengal (2012-2016)
  • Marginal Ice Zone (2012-2016, Field effort in 2014)
  • Seasonal Prediction (2012-2016)
  • Unified Parameterizations (2011-2015)
  • Origins of the Kuroshio and Mindanao Current (2011-2015)
  • LASP/DYNAMO (MJO) (2010-2014)
  • ITOP (TC Air-Ocean coupling) (2008-2012)
  • TCS-08/T-PARC (TC genesis, intensification, ET) (2008-2012)

• **CMIP5** Analysis support
• Irreducible Uncertainty **BRC** (2010)
• Extended-Range Environmental Prediction **MURI** (2012)
Climate-Related Research Areas

- Predictability of the earth system on various time and space scales
- Studies of physical processes relevant to Marine Meteorology, Physical Oceanography, Arctic, and Littoral Geosciences
- New observing techniques and technologies
- Quantification of forecast uncertainty
- Diagnostics and model improvement and evaluation (Component and coupled models)
- Unified modeling approach: ocean/ weather/ ice/ space on appropriate time and spatial scales
Climate Research Areas of Priority Interest

- **Integrated Global Prediction**
  - Fully-integrated coupled ocean-wave-ice-atmosphere-stratosphere model systems (towards seamless goal).
  - Provide improved short-term (< 7 days) predictions of the physical environment in support of safe, efficient, and effective naval operations.
  - Provide extended-range predictions (sub-seasonal to annual) for Navy strategic resource decisions.
  - Understand relevant physical processes and sources of predictability to inform longer (decadal+) predictions.

- **Define the limits of predictability for different maritime physical variables and processes**
Climate Research Areas of Priority Interest

- **Arctic Prediction**
  - Improved basic understanding of the physical environment and processes in the Arctic region
  - Development of new Arctic system models for improved prediction in high-latitudes at longer lead times
  - Utilization of satellite SAR data for assimilation into integrated models
  - Exploration of new technologies (platforms, sensors, communications) that will be required for persistent observation and operation in the harsh Arctic environment
Climate Research Areas of Priority Interest

• **Earth System Prediction Capability (ESPC)**
  
  Partnership with NOAA, NASA, DoE, NSF for five demo projects:
  
  – Extreme Weather Events: Predictability of Blocking Events and High Impact Weather at Lead Times of 1-6 Weeks
  
  – Seasonal Tropical Cyclone Threat: Predictability of Tropical Cyclone Likelihood, Mean Track, and Intensity from Weekly to Seasonal Timescales
  
  – Arctic Sea Ice Extent and Seasonal Ice Free Dates: Predictability from Weekly to Seasonal Timescales
  
  – Coastal Seas: Predictability of Circulation, Hypoxia, and Harmful Algal Blooms at Lead Times of 1-6 Weeks
  
  – Open Ocean: Predictability of the Atlantic Meridional Overturning Circulation (AMOC) from Monthly to Decadal Timescales for Improved Weather and Climate Forecasts
Budget History & Outlook

- Funding has been reduced in recent years by Sequestration and other fiscal constraints
- Investments in particular topic areas vary significantly from year to year depending on whether a major initiative (DRI) is underway
- Focus for next several years will be on development of high-resolution coupled system models (ESPC), including improvements in Arctic prediction
How US CLIVAR Can Engage & Provide Value

• Make connections with and provide feedback to ONR-sponsored scientists working on major process studies (DYNAMO, ASIRI, LatMix) via CLIVAR WGs and TFs (e.g., MJO diagnostics)

• Identification of critically important scientific questions, especially in maritime process studies and applications, and the facilities and research required to address them, to foster future research efforts

• Observation and prediction activities, such as common observational tools, datasets, modeling architectures, and coupling standards (e.g., ESMF) that enhance the productivity of investigators

• Providing information and fostering interactions that lead to the submission of stronger research proposals

• Unified taxonomy across related disciplines at the climate/weather interface