

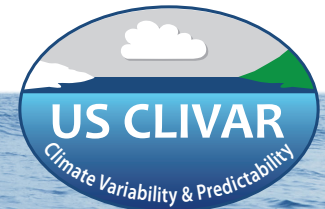
# ONR Agency Interests

**Scott Harper**, “Arctic and Global Prediction” & “Physical Oceanography”  
**Dan Eleuterio**, “Earth System Prediction Capability” & “Marine Meteorology”



# Relevant Agency Mission or Goals

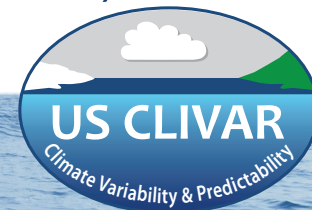
- While not supporting a formal global change research mission, the US Navy continues a history of interest in USGCRP and USCLIVAR through sponsored research in underlying environmental physical processes that concurrently satisfy maritime and expeditionary national security requirements as well as USCLIVAR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

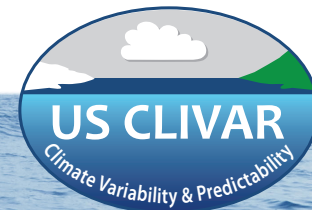
- Selected **Departmental Research Initiatives** (5-year efforts)
  - Arctic Waves and Sea State (2013-2017, Field effort in 2015)
  - ASIRI/OMM - Bay of Bengal (2012-2016)
  - Marginal Ice Zone (2012-2016, Field effort in 2014)
  - Seasonal Prediction (2012-2016)
  - Unified Parameterizations (2011-2015)
  - 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

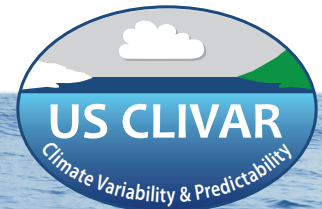
- Predictability of the earth system on various time and space scales
- Studies of physical processes relevant to Marine Meteorology, Physical Oceanography, Arctic, and Littoral Geosciences
- New observing techniques and technologies
- Quantification of forecast uncertainty
- Diagnostics and model improvement 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



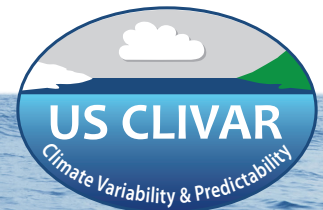


# Climate Research Areas of Priority Interest

- **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

