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Multidisciplinary Simulation, Estimation, and Assimilation Systems (MSEAS)

OOI Cyberinfrastructure:

Ocean Observation Programs Workshop

Woods Hole

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Mission Tasking

- How do you plan observational programs?
  - Programs are planned through the determination of research goals and objectives and the identification of available assets that will lead to a successful fulfillment of those.
  - Relevant literature is reviewed. The primary features and processes are identified. Results are synthesized into a canonical diagram of the region. Additionally, a region of influence (the region external to the region of primary interest that can significantly impact the primary regions in the time frame of the experiment) is identified.
  - Historical data and simulations for the primary region and region of influence are gathered and reviewed. Synoptical data sets are identified. Real-time and historical sources of forcing (atmospheric, tidal, river, etc) are identified.
  - Proposed sampling schemes are tested in Observation System Simulation Experiments (OSSE).
  - Logistical constraints are a significant component of the planning. The constraints are fed into the OSSEs and used to design/limit the candidate sampling schemes. The constraints are also used to plan a canonical day's work schedule.

Mission Tasking

- Do you modify observational programs while they are executing? Please describe how this is done.
  - Observational programs are modified during execution. This is based on the analysis of data acquired during the execution of the program and the determination of prioritized need for future observations. This prioritized need is be based on: limitations on data already acquired (logistical problems, holes, intercalibration, etc.); verification of predicted dynamical evolution; identification of oceanographic structures or features of interest; reduction of forecast uncertainty; etc.
  - Modification via adaptive sampling – predicting the types and locations of observations that are expected to be most useful, based on given estimation objectives and the constraints of the available assets. Adaptive sampling can be heuristic or determined quantitatively (ESSE, genetic algorithms, path planning, etc.). Adaptive sampling usually progresses sequentially, as data are collected. Observations are then optimized for a future period, from the immediate future to the remaining duration of a sampling program.
  - Modification via adaptive modeling – a modeling approach that allows the definition, functionals and parameters of the model to quantitatively learn from observations and evolve with data as they are collected. Based on model-data misfits, model properties that need to be improved are identified and the improvements estimated.

Mission Tasking

- How do you find results from prior observation programs? Pls describe how data and metadata from them are accessed.
  - Data and results from prior observation programs in an area of interest are generally found through careful and comprehensive web searches. These searches identify: data repositories with data of interest; web sites which present results from prior programs; and, literature which describes the results from the prior programs.
  - Data (and metadata) are normally downloaded via ftp or http from data repositories to local storage for local analysis and utilization.
- How do you store/quality control/visualize the results from observational programs?
  - Results from observational programs are stored on local computer systems in native format and local common formats (ascii, netcdf) for redundancy
  - Results from observational programs are quality controlled in real-time as the information is received through: visual inspection, cross-validation amongst platforms, and comparison with historical norms.
  - Results from observational programs are quality controlled after the completion of the program through cross-validation with data not available in real-time.
  - Results of observational programs are visualized through 2-d and 3-d plots of data, analyses and simulations using Matlab, NCAR graphics, etc.

Security, Privacy, Policy

- Please explain the relevant security and policy guarantees that you and/or your organization require. This includes authentication mechanisms, authorization (access control) and resource access policy strategies, privacy needs, intellectual property issues, etc.
  - Authentication via username/password for data access when required by sponsors
  - Authentication via username/password for access to derived products (analyzed data, model results, etc.) when required by sponsors
  - Right of first use of data in publications is generally guaranteed to data providers
  - Second-party publication of results using data gathered by data providers can be an issue

Education and Outreach

- How do education and outreach concerns affect your observation programs and the presentation of the results?
  - Scientific research concerns drive observation programs – education and outreach concerns are secondary
- How do you make observation program results available for education and outreach purposes?
  - Results for the general public are made available via open web sites
- What would make these tasks easier?
  - Minimizing security restrictions on access to our products