Cook Inlet Ocean Modeling Plan in support of AOOS 5-year proposal

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The components of the 5-year Cook Inlet modeling plan should include the following tasks in a prioritized order:

Task	**Deliverable**	**Year 1-3 Budget (per year)**	**Year 4-5 Budget (per year)**
Observational Data	A streamlined observational database	$0	$0
ROMS-NOAA	Real-time forecast without data assimilation	$0	$0
Trajectory Product	Web-based drifter trajectory tool for practical users	$50K	$50K
ROMS-JPL	Add data assimilation to ROMS-NOAA to enable better forecast	$100K	$50K
Skill Assessment	Quantitative uncertainties associated with model nowcast/forecast fields.	$50K	$50K
FVCOM-UMass	Real-time forecast without data assimilation	$100K	$50K
FVCOM-JPL	Add data assimilation to FVCOM-UMass to enable better forecast	$50K	$100K

Background and justifications for these proposed tasks are described below:

1. Observational data for data assimilation and evaluation (Musgrave/Holderied)

There is a need to obtain and organize existing observational data sets of potential use to the proposed modeling efforts. This includes defining standard data sets for the model domain (e.g. bathymetry); developing climatologies for model spin-up; and identifying data sets that can be used for data assimilation and evaluation of hindcast simulations. Existing data sets will need to be checked for quality control, possibly combined to obtain climatologies, and likely re-gridded to match model

resolution. It is expected that a close collaboration with the AOOS data providers and the DMAC team is needed; no separate budget is requested for this task.

Deliverable: A streamlined observational database for modeling

2. Model-based products and tools (Chao/Holderied), $50K/year

Both the Cook Inlet modeling workshop and the following conference calls are calling for a user-friendly tool that can be used to compute drifting trajectories without the need to have local computing power, download huge amount of 3D velocity data and programming code to calculate the trajectory.

Deliverable: A web-based virtual drifter trajectory tool

3. Circulation modeling with data assimilation and forecast capabilities (Rich Patchen, NOAA/NOS/Office of Coastal Survey/Coastal Survey Development Lab or CSDL; Changsheng Chen, UMass-Dartmouth; Yi Chao, JPL)

CSDL has identified two modeling systems (ROMS, FVCOM) as candidates for the NOAA real time operational models that would be run at NCEP. The large-scale boundary condition will be obtained from the national effort such as HYCOM run at NAVO and NCEP.

3.1 ROMS modeling, data assimilation and real-time forecasting (Patchen/Chao), $100K/year for year 1-3, and $50K for year 4-5

The ROMS forward model has been funded by NOS/CFDL (Rich Patchen's group) during FY2011-13. AOOS should build upon this funded effort and include the data assimilation capability to enable forecasting beyond tides (that can be done with the forward model alone). Budget to add the 3DVAR data assimilation to enable better forecast will be requested.

Deliverable: Real-time ocean circulation forecasts by ROMS with data assimilation

3.2 FVCOM modeling, data assimilation and real-time forecasting (Chen/Chao), $150K/year

There is advantage to bring in the second model in order to estimate the model error and produce multi-model ensembles. With CSDL's selection of FVCOM as their operational modeling framework, there are advantages for AOOS to adopt the ROMS and FVCOM combination as well. The FVCOM model development and evaluation will be done by Chen ($100K/year for year 1-3, $50K for year 4-5), while the data assimilation and real-time forecasting will be done by Chao ($50K for year 1-3, $100K for year 4-5).

Deliverable: Real-time ocean circulation forecasts by FVCOM with data assimilation

4. Assessment of model veracity and errors (Musgrave/Ohlmann), $50K/year

A quantitative effort to evaluate the veracity of model nowcast/forecast fields is necessary once AOOS begins producing real-time model solutions for Cook Inlet. This requires periodic data collection for model assessment during the various seasons, and over a range of events/conditions within each season. The model assessment component will thus be ongoing with intermittent periods of data collection. Observations to be collected should include profiles of T and S for evaluation of model physics, and surface current trajectories for evaluation of the model trajectory product described below. Model assessment results obtained during the 2009 Prince William Sound experiment can help guide this component in Cook Inlet.

Deliverable: Quantitative uncertainties associated with model nowcast/forecast fields.