Glider Observations of Upper Ocean Structure in the Bay of Bengal

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LONG-TERM GOALS

The Bay of Bengal (BoB) is remarkable in that its major currents change directions seasonally with the monsoons, in concert with extremely strong fluxes of fresh water from precipitation and river input. The overarching goal of the proposed effort is to quantify important processes in the fresh water budget of the BoB.

OBJECTIVES

The extreme fresh water input in the BoB poses challenges scientifically and technically, because of the existence of a fresh, light surface layer. We advance a program with two major objectives, one scientific, and one technical:

- Observe the evolution of upper ocean structure in the central Bay of Bengal
- Improve glider technology to overcome fresh, buoyant surface layers

APPROACH

We will use sustained deployments of Spray underwater gliders to resolve simultaneously vertical and submesoscale horizontal structure in the BoB. One glider will be deployed in November 2013 for a 6-month mission occupying a north/south section running the length of the central BoB.

WORK COMPLETED

Year 1 has been devoted to experiment planning. We have participated in several meetings devoted to planning a coherent, collaborative observational effort. The result of this planning has been to focus our glider observations on a long north/south section that crosses the strong salinity gradients in the region (Figure 1). This conclusion is based on analysis of an Argo climatology (Roemmich and Gilson 2009).

Engineering effort has been directed towards improving Spray glider behavior when encountering a buoyant surface layer. First, the glider to be used in the BoB was outfit with a larger bladder that allows for 20% more buoyancy change than our standard bladder. Second, we are developing smarter software to take appropriate actions in case the glider cannot reach the surface. These actions include pumping more oil to increase buoyancy, continuing to profile even without being able to communicate at the surface, and finally heading for a safe waypoint predetermined to be in less buoyant water. Testing of this software is active at this time, with deployment less than two months away.

RESULTS

Results of our analysis of Argo data point to the strength of the salinity gradient during the planned fall and winter months. Anticipated results from the glider mission will include observations of the submesoscale structure in that large-scale gradient.

IMPACT/APPLICATIONS

An anticipated impact of this work will include improved technology for buoyancy-driven platforms in a buoyant surface layer. All temperature and salinity data will be sent to NAVO in real time for assimilation into operational models.

REFERENCES

Roemmich, D. and J. Gilson, 2009: The 2004-2008 mean and annual cycle of temperature, salinity, and steric height in the global ocean from the Argo Program. *Progress in Oceanography*, **82,** 81-100, doi:10.1016/J.Pocean.2009.03.004.

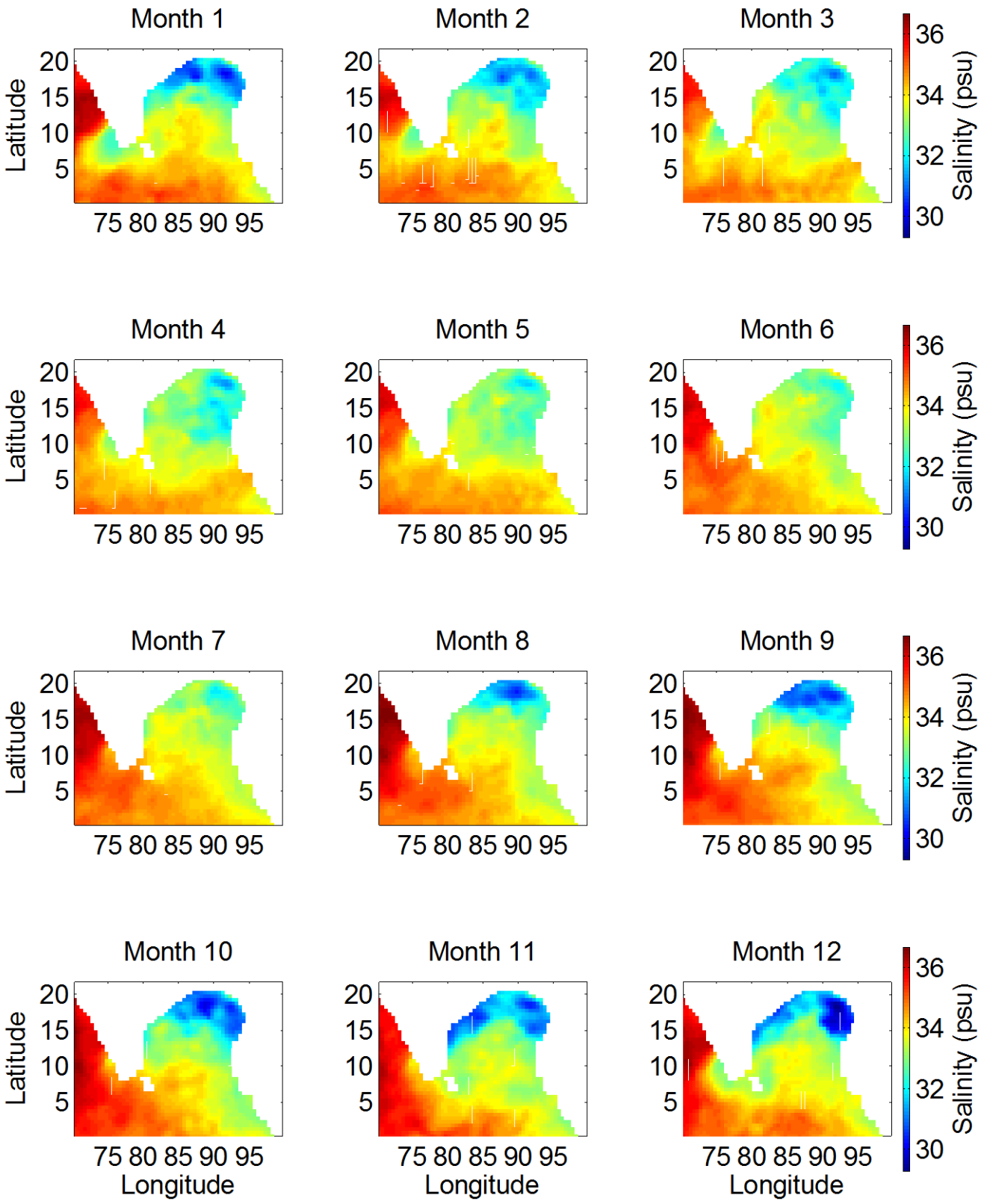

Figure 1. The annual cycle of salinity at 2.5 m from Argo. The strong north/south gradient in the fall and winter is the target of planned glider observations.