

OceanObs'09 - **Community White Paper Proposal**

Title - Moving towards the future of a global array of deep ocean observations

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Description

As the global ocean observing system moves closer towards the goals set in OceanObs '99, one area where improvements are still greatly needed is in the area of deep ocean observations. Most of the components of the present array have been focused on the upper ocean, which is appropriate for climate studies on seasonal to interannual time scales. Deep ocean observations, by contrast, are sparse in space and time in the present observing system. This sparseness is not the result of a lack of effort on the part of the community, but rather is due to both the technical challenges of deploying and maintaining instruments in the deep ocean and the high costs of ship time associated with collecting data and servicing instruments in high seas.

The deep ocean plays a crucial role in aspects of the climate system on longer time-scales including the global heat budget, sea level rise, potential variations in the meridional overturning circulation, and long-term storage of climatically relevant compounds, such as CO₂, among others. Time series observations of adequate length, such as the Denmark Straits overflow measured by the Scandinavian countries and the basin-spanning meridional overturning circulation observations collected through the joint United States-European program at 26°N (RAPID/MOCHA/WBTS), have demonstrated the critical importance of observing the full water column. Recent repeats of hydrographic sections around the globe have shown climatically important abyssal signals in waters with Antarctic origin: warming in the southern Indian, western Atlantic, and entire Pacific Ocean, as well as freshening of these waters near their continental source regions. However the available data along these deep-water corridors is remarkably sparse and the full extent of these anomalies remains virtually unknown.

Expanding the ocean observing system towards being truly global (including adequately measuring the 52% of the ocean volume below 2 km) will require an increased commitment to the design and implementation of technologies for collecting deep ocean data and transmitting that data to shore. This white paper will address different systems for observing the deep ocean (e.g. deep hydrographic, CO₂ and tracer casts, moored sensors, deep Argo floats, etc.). New technologies for transmitting mooring data from an interdisciplinary suite of bottom-mounted instruments back to land in real or near-real time, presently being explored by investigators in the U.S. and Germany will also be addressed. These technologies can be used for a wide range of instruments measuring physical, chemical, geological and biological parameters. We expect to bring a large number of research groups into the discussion to facilitate the exchange ideas and applications.