TASK 3.1: PROFILING FLOATS

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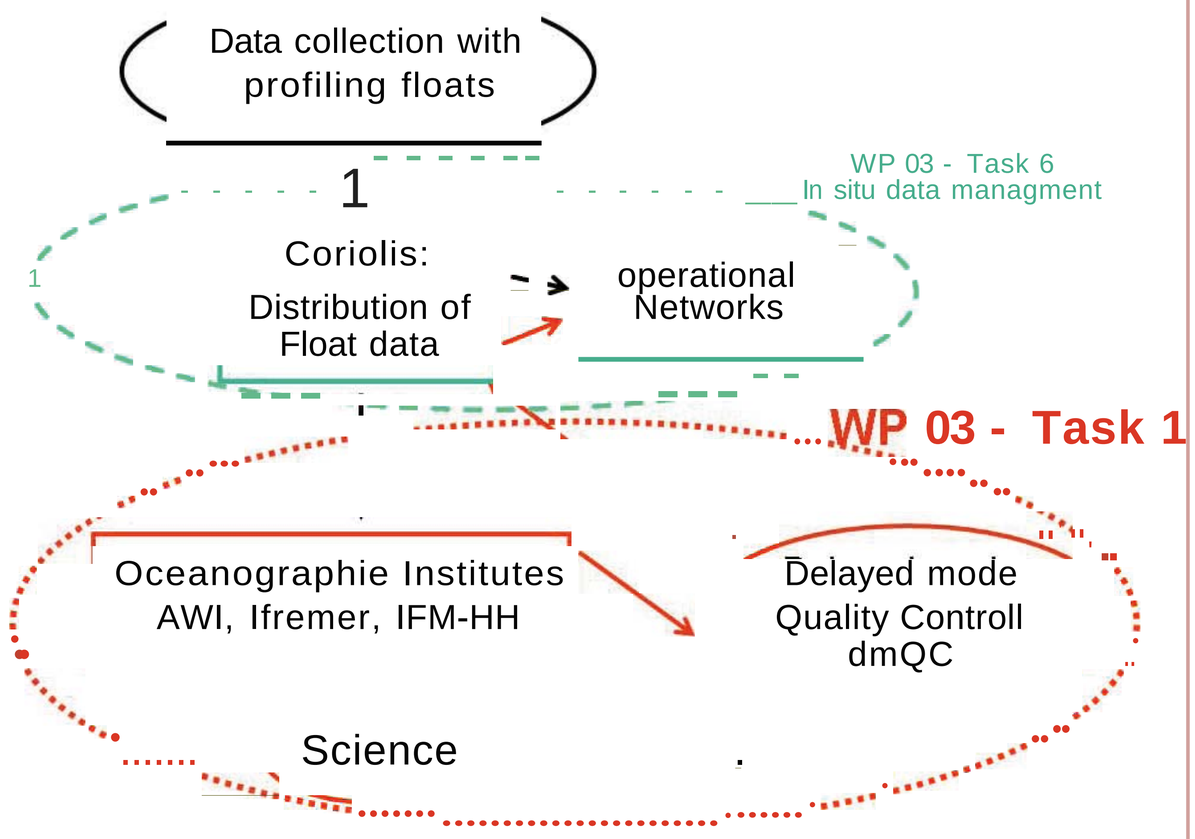
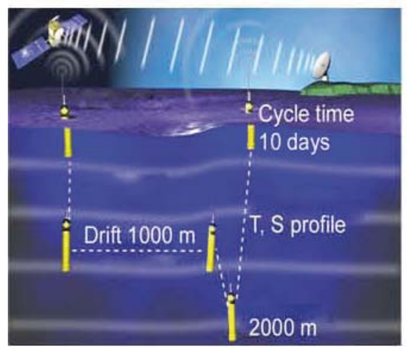
MOTIVATION: Any space-based observation and forecasting system is critically dependent upon in-situ ocean data, since satellites can only sense ocean properties at or very near the sea surface. In contrast, in-situ platforms such as Argo Floats provide the inside view of the ocean. However, despite the impressive increase in the number of temperature and salinity profiles from the Argo array, in-situ data still undersample the temporal and spatial variability of the ocean thermohaline structure. Mersea will contribute to the Argo program by filling this gap…

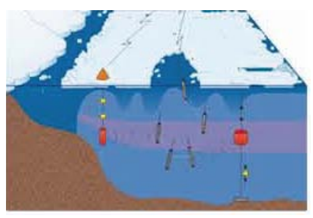


DATA COLLECTION

The floats have a mission cycle of 10 days. For more than 9 days they drift at their park depth, then descend te their largest depth, rise te the surface, taking temperature, conductivity and pressure measurements. At the surface the data are transmitted ashore via ARGOS satellites. Argos distributes the data te the Coriolis Data Centre and te the institutes. After transmission the floats descend ta the park depth again.



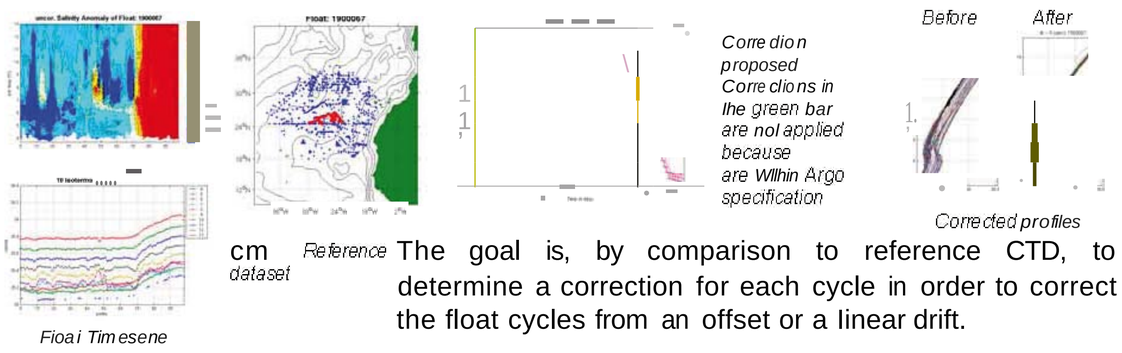
Part of the floats are equiped with additional Oxygen and fluorescence sensors.



Because the Wedell Sea is ice-covered in winter the floats for this region are equiped with an Ice sensing algorithm. If the temperature in the upper 50 m is near freezing the ascent will be aborted. In this way the floats are prevented to be demaged by the ice. With Rafos floats data sampling is possible even when the sea surface is ice covered.

QUALITY CONTROL

In coherence with the Argo project, the partners will adapt the Argo quality control procedures for real time distribution and delayed mode validation, to their area of deployment. High-quality hydrographie data sets are assembled for each region. The Argo observations will be calibrated against these. The hydrographie data sets will be exchanged between each component and regional ARGO data centers, for the purpose of developing a unique world wide reference data set.
The delayed mode OC is made using statistical analysis that compare the float data to high quality reference CTD data. Those comparisons are made on deep isotherms and assume that the temperature sensor of the float is stable and that salinity on deep isotherms is steady and uniform. The calibrated historical hydrographie data are interpolated at the float profile position by an objective analysis method .



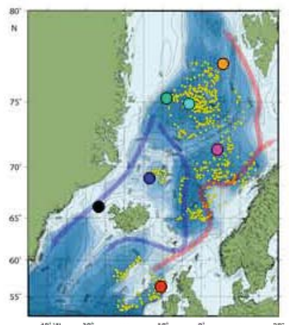
The goal is, by comparison to reference CTD, to determine a correction for each cycle in order to correct the float cycles from an offset or a linear drift.

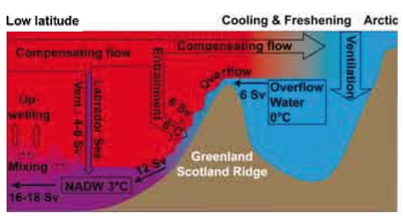
NORDIC SEAS

How is Nordic Overflow Water formed?

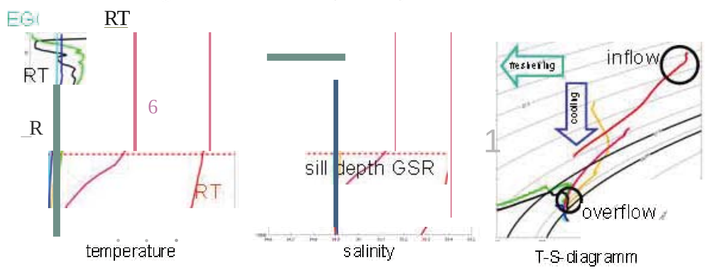
Since autumn 2004 ARGO floats were deployed in the Nordic Seas and the southern inflow region.

Programs: MERSEA WP 3.1 (12 floats), SFB512-E2 (Germany) (13 floats).





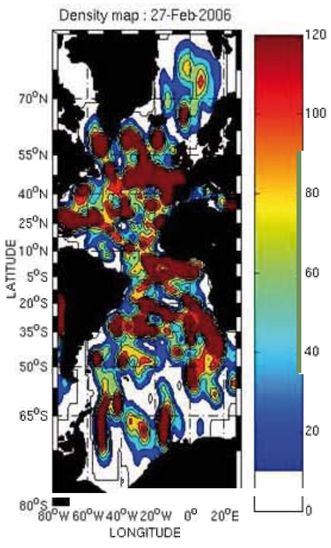
Warm and saline Atlantic water enters the Nordic Seas across the Greenland-Scotland-Ridge (GSR). Cooling and freshening transforms this water into a dense water mass (overflow) that spills over the GSR and feeds the lower branch of the Meridional Overturning Circulation (MOC).



Profiles from the different regions of the Nordic Seas illustrate the water mass transformation in the boundary current - from the inflow near Scotland to the deep overflow across the ridge. The important processes are cooling through heat fluxes to the atmosphere, freshening through precipitation, river run-off and ice melt, and mixing with waters from the deep convective gyres.

ATLANTIC OCEAN

The Atlantic Ocean has been rapidly sampled by the Argo program because it's an ocean very important for global circulation monitoring with the outflow of Mediterranean water, the Gulf Stream, the overturning circulation in North Atlantic. The monitoring of the North-Atlantic started in 2000 but a large number of floats were deployed in 2002 as part of the Gyroscope project and most of those floats have reached the end oftheir life.



Argo Float Density of 2006 Plan: Atlantic Ocean

Although additional floats have been deployed since that time, it is necessary to deploy new floats to ensure continuity in the monitoring of the water masses properties in the North-Atlantic and to maintain a uniform coverage.

Thus, 16 floats will be deployed in the North-Atlantic in 2006 during the OVIDE cruise. Exact location will be fixed later in the year according to the ARGO distribution and the cruise plans

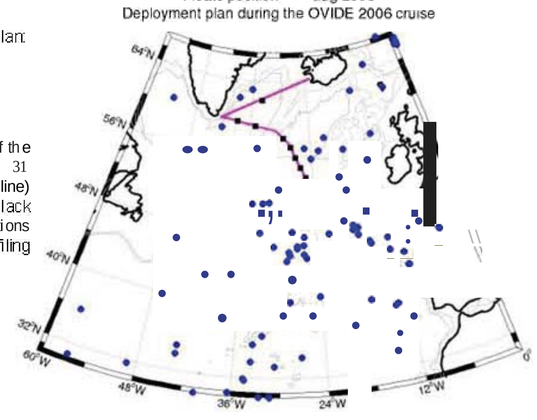
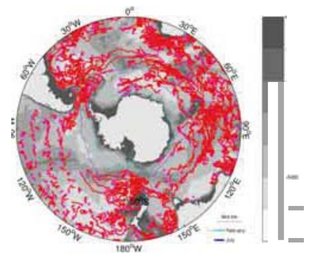


Fig 2 (Blue dots) Position of the active ARGO noals the 31 August 2005 (Magenta line) The OVIDE cruise (Black squares) Deployment positions for the 16 ARGO profiling floats

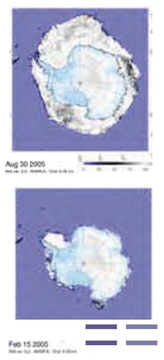
SOUTHERN OCEAN

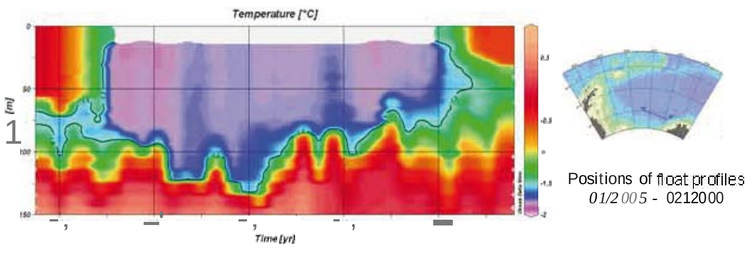
The Weddell Sea is the primary source region of Antarctic Bottom Water and thus a key region for the global thermohaline circulation. However, while the float coverage in low and mid latitudes is already moderate to good, deployments in high latitudes remained marginal until 2005.



The aim of MERSEA task 3.1 is to increase the oceanic database in Undersampled critical area. Therefore, between January and March 2005 9 MERSEA floats were deployed amongst others into the Weddell Sea.

Due to the presence of sea ice, in almost the entire Weddell Sea surfacing is impossible during the winter. Therefore, part of the floats were equipped with the newly developed istore-feature, which allows the interim storage and later transmission of float profiles. Although this is inconsistent with the ARGO spirit of real-time data it delivered valuable information about the undisturbed temperature and salinity distributions under sea ice.





The temporal warming events in the winterly mixed layer are generated due to upwelling of Warm Deep Water.

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