

Scientific efforts within the department of Physical Oceanography (FYS) are organized under the following main themes:

1. Ocean circulation and hydrography
2. Processes near continental slopes, internal waves and mixing
3. Tidal and morphodynamics of coastal zones

Within the first theme ocean research with a significant seagoing component is performed. It has a strong emphasis on subjects relevant to climate, and is mainly focused on large-scale circulation and hydrography. Presently, research programmes are carried out in the framework of the international programme CLIVAR.

In 2002 the focus was on the analysis of the data obtained during the MARE and ACSEX programmes in the Southern Atlantic and South West Indian ocean. A large proposal for investments in Long-term Ocean Climate Observations (LOCO) received funding in the middle of 2002. This funding will be used to deploy long-term (5 years) sub-surface moorings in different parts of the ocean as a follow-up on previous work in the North Atlantic (Irminger Sea) and Indian Ocean (Mozambique Channel and Indonesian throughflow). The preparation of these future activities took much effort.

Under the second theme theoretical, laboratory and observational studies of the interaction between internal waves in a stratified ocean and topographic features are performed. Results from a PhD study combining these research methods are discussed in detail below. Both in the theoretical and laboratory experiments bands of high energy in the interior of the fluid related to the presence of inertial wave attractors, were found. A similar analysis was performed using data from long term current meters in the Mozambique Channel. It appeared that the complexity of the real ocean combined with the strong temporal and spatial variability of internal wave rays makes it difficult to detect these features from relatively few long term single point current meters. A seagoing study was performed in Rockall Channel to study mixing by internal waves and the consequences for redistribution of fine sediments near continental slopes.

The third theme consists of studies in the relatively shallow coastal zone using both field and laboratory observations and theoretical modelling. A detailed analysis of ongoing ferry observations on currents and suspended sediments in the Marsdiep inlet forms an important part of this research programme. A PhD student and a PostDoc have been appointed to study the transport of sand (PhD) and fine-grained sediments through the Marsdiep inlet (PostDoc) in great detail. First analysis focussed on secondary circulation in the Marsdiep inlet due to the curvature of the tidal channel. This secondary circulation causes a turning of the near bottom tidal current which is reflected also in the propagation direction of sand waves in the inlet (see below). A scale model of a tidal embayment was used to obtain detailed laboratory observations on non-linear aspects of tidal motions in coastal embayments.

Most of the studies are part of these departmental themes. Other activities like the application of marine optics in oceanography, are mainly carried out in collaboration with other departments and/or institutes (and often made possible by the availability of external funds).

Apart from the scientific activities the department supports national seagoing research programmes with hydrographic observations, satellite data and overall data-management. For these national tasks the Data Management Group acts as a separate group within the department.