

Report of the CIESM Round Table on

HYDROLOGICAL TRENDS

The agenda proposed for the RT (after a call for participation sent on April 27) was accepted. It was agreed:

- i) To devote the first half of the RT to the presentation of recent data sets and to the plans of the experimental teams in attendance (modelling teams invited to the 2002 workshop had not responded to the call for participation this time).
- ii) To continue with a presentation of the initial results of the “Recommended Action” and then have an open discussion on the programme.

C. Millot first gave an overview of the CTD array and briefly mentioned the operations (a) conducted by the LOB team and CIESM in the Strait of Gibraltar, the Channel of Sicily, the Channel of Sardinia and the Provençal sub-basin and (b) scheduled off Egypt. He then presented the results obtained by J.L. Fuda from time series collected along the French coasts which mainly show a positive trend in S, and remarked that such an increase could not be explained by the sole anthropogenic hypothesis (damming of rivers in the eastern basin). Indeed, according to the LOB team, coastal regions are continuously stratified due to the alongslope counterclockwise circulation, so that waters outflowing from the eastern basin, generally expected to be LIW and EOW only, are unable to modify the superficial AW in the western basin.

During his presentation, C. Millot proposed to harmonise the use of terms such as sea, basin, sub-basin, strait and channel, but his proposition did not receive a full consensus. In the report below, these terms (and others as well) are thus reproduced in fairness exactly as used by the various participants.

J. Font indicated that ICM Barcelona deployed a CTD+RCM8 mooring some 70 miles E from Barcelona (depth of 1850 m) set up to be working for two years. The objective is to monitor the deep alongslope flow characteristics downstream the Gulf of Lions, in the same location that was used in 1993-94 to investigate the effects of deep convection. He mentioned that a CTD+RCMs mooring would be installed by IEO Palma in the Ibiza channel over a bottom depth of ~900 m by the end of June 2004 (this is now done) for successive periods of several months (next recovery in March 2005). The objective is to monitor the WIW (~150 m) and LIW (~400 m) characteristics and circulation.

I. Gertman indicated that IOLR has started, in October 2002, a new national program for monitoring the long-term hydrological changes in the southeastern Levantine Basin. Seasonal observations (4 times per year) of physical and chemical parameters are made at 6 stations along a section starting at 10 km (depth of ~50 m) from Haifa as far as 110 km (depth of ~1700 m) northwestwards. Preliminary results can be found at <http://isramar.ocean.org.il>.

A. Theocharis presented results and information about the monitoring of interannual trends in the deep basins of the Aegean Sea. He first showed that since 1993 -- the year of the last massive deep water formation event -- the densities in all the deep Aegean sub-basins have continued to decrease, due mainly to vertical diffusion through mixing with overlaying waters. He then described the planned monitoring activities. The existing Eulerian operational systems (POSEIDON and MFS) will be complemented and strengthened by a “climatic approach” component to monitor deep basins, collect additional meteo data for buoyancy flux estimates and expand to deep biogeochemical measurements. Two Lagrangian floats (PALACE/ARGO) have already been purchased and will be deployed within 2004. Three more are expected to be deployed within the next two years. Ship periodic measurements in the deep basins will be continued and expanded to biogeochemical parameters in the framework of the POSEIDON maintenance cruises.

B. Manca then presented the long-term monitoring of the interannual variations of the marine currents, thermohaline properties and characteristics in the Northwestern Ionian Sea and Southern Adriatic. He recalled that OGS experimental activities have been oriented towards the dense water formation and waters exchanges within the Adriatic-Ionian system through the Strait of Otranto, especially with ADCPs and autonomous CTDs. Such measurements have started in the centre of the Southern Adriatic in cooperation with Bremen University. A project still under evaluation aims at continuously monitoring the flow and hydrographic properties of ADW in the areas of formation (Southern Adriatic) and spreading (Strait of Otranto). The data will fully contribute to the mooring network as specified by the “Recommended Action”, hopefully for a long-term commitment and integration among coastal states.

I. Taupier-Letage presented the TRANSMED project that consists in collecting temperature and salinity data from autonomous instruments set on ferries regularly crossing the sea (additional parameters are foreseen). A prototype provided by the SeaKeepers association is being installed on the SNCM ferry “Le Méditerranée” that will perform weekly trips, alternatively Marseilles-Algiers and Marseilles-Tunis. Although the experiment mainly aims at monitoring the meso-scale and the seasonal variabilities, it will provide in the end information on long-term variations.

M. Crépon presented an EC-project that has not been retained but will be resubmitted. He emphasised that, in order to be considered efficient and realistic now, models need long in situ time series as those that will be provided by the “Recommended Action”.

J. Pascual is continuing the collection of data that were presented during the workshop. He mainly emphasised that trends are observed on a series of parameters (temperature of earth springs, precipitations and atmospheric pressure in spring and summer) that are consistent with trends already observed on air temperature, sea temperature and sea level.

G.P Gasparini mentioned that in the Strait of Sicily two mooring are measuring current and temperature continuously since November 1995 (at ~ 50, 100, 300 and 400m); they are

equipped since November 2002 with a SeaCat and a SBE 39 close to the bottom. In the Corsica Channel, one mooring is measuring current and temperature continuously from 1989 at ~50, 100, 300 and 400m. In the Ligurian Sea (collaboration with CNR – Genova), a meteorological buoy was equipped with thermistors: at ~0, 12, 24, 36m from February 2000 to January 2001; at ~0, 6, 12, 20, 28, 36m (6 and 36m CTD probe) from July 2002; from September 2004 three CTD will be installed at ~6, 20 and 36m.

During the second half of the RT, C. Millot presented the first results of the “Recommended Action” obtained in the Strait of Gibraltar for both the inflow and the outflow. For what concerns the inflow, he developed his hypothesis that AW could encounter long-term changes, a possibility that was excluded by both the anthropogenic and the Mediterranean climatic hypotheses. According to his analysis of the outflow, dramatic changes in the functioning of the sea have been evidenced, validating the strategy of deploying autonomous CTD. This analysis, however, was not shared by the majority of the participants. In any case, observed increases in both temperature and salinity in the strait over ~20 years are about one order of magnitude larger than most trends evidenced within the sea. Heated discussions about the general hydrodynamical features within the strait and the whole sea followed, preventing the scheduled “open discussion about the programme” to take place.

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Moderator