

# Minutes of ADAMS meeting

Sevastopol  
April 4th-11th, 2008

1. Summary of the workprogram for 2008:
  - ⇒ Task1: Definition of the models currently available within the partners and of the external models which would be possibly relevant to ADAMS objectives. Development of a limited number of models: NEMO at 10km resolution (MOISE) and 2km resolution shallow-water model.
  - ⇒ Task2: Investigation of new types of data: MODIS, METEOSAT, *etc.* Development of a database according to different criteria (availability of *in situ* measures, observed phenomena, ...).
  - ⇒ Task3: Investigation of image assimilation procedures with two main frameworks: direct assimilation (Moise) and assimilation in two steps by using an Image Model (Clime and MHI). Development of methods.
  - ⇒ Task4: Investigation on assimilation of Lagrangian data.
  - ⇒ Task5: Uncertainty estimation.
  - ⇒ Tasks 6 to 9 require obtaining first results on the previous tasks.
  
2. List of people involved in the project (real people involved with a high percentage):
  - ⇒ CLIME: I. Herlin, E. Huot;
  - ⇒ MOISE: I. Souopgui, O. Titaud, A. Vidard;
  - ⇒ MHI: G. Korotaev, A. Mizyuk, E. Plotenikov;
  - ⇒ INM: E. Parmuzin, V. Shutaev;
  - ⇒ NIG: D. Demetrashvili, A. Kordzadze.
  
3. April 7<sup>th</sup> morning.
  - ⇒ Task 1: description of available models. The following models are currently available at MHI:
    - HBS (Hydrodynamic Black Sea model) is a 3D model at 5 kilometres of resolution (basin scale) and at local scale for 0.5° or 1km.
    - POM model at 7 kilometres resolution and a nested model for the Crimean region (future installation for the Georgian region).NIG has also a basin scale model, which has to be described.
  - ⇒ Task 1: proposition of models development. During ADAMS, it is planned to develop a configuration of the following models for the Black Sea:
    - NEMO: A. Vidard,
    - 2km resolution shallow-water: MHI.
  
  - ⇒ Task 2: discussion on data sensors, time period and location.
    - 2 locations are possible for being studied in ADAMS: Ukraine and Georgia. Currently MHI has a NOAA/AVHRR receiving station and has archives of data.
    - MODIS data can be downloaded but access is not direct (ordering DVDs), METEOSAT data should be investigated for defining their potential to visualize interesting structures.

- For determining the studied periods different criteria must be satisfied: interesting oceanic events visualised on image data, availability of expertise and validation data such as buoys trajectories, availability of the data from different sensors for results comparisons (different physical measures and different resolutions).  
Remark: winter time seems to be more interesting for the dynamic processes and involves a global circulation level and different local scales while summer time includes a smaller scales range (see figure below).

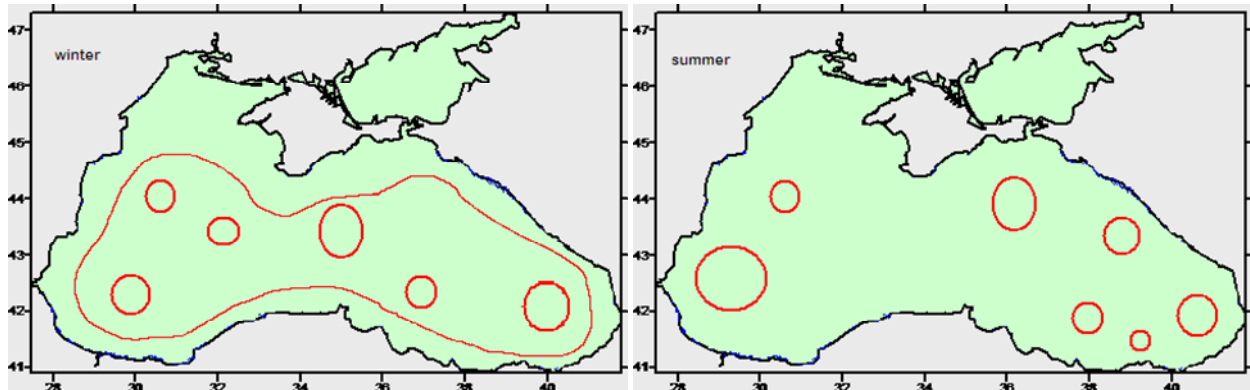


Figure 1 - Comparison of the Black Sea circulation between winter (left) and summer (right).

4. April 7<sup>th</sup> afternoon.

Discussion on the *extended Image Model*. The *extended Image Model* is in fact a simplified shallow-water model completed to an advection-diffusion of temperature according to the following equations:

$$\left\{ \begin{array}{l} \frac{\partial T}{\partial t} + \nabla T \cdot \mathbf{v} = K_T \Delta T \\ \frac{du}{dt} - fv = g' \frac{\partial h}{\partial x} + K_v \Delta u \\ \frac{dv}{dt} + fu = g' \frac{\partial h}{\partial y} + K_v \Delta v \\ \frac{\partial h}{\partial t} + \frac{\partial(uh)}{\partial x} + \frac{\partial(vh)}{\partial y} = 0 \end{array} \right.$$

The extended Image Model is making use of the temperature, the two components of the velocity and the thickness. The functional  $J$ , to be minimized during the data assimilation process, only involves the observation term measuring the discrepancy between the simulated and observed temperatures.

$$J(U) = \frac{1}{2} \int_{\Omega, t} (H(X) - Y)^T \mathbf{R}^{-1} (H(X) - Y) = \frac{1}{2} \int_{\Omega, t} \|T - T_{obs}\|^2.$$

$J$  has to be minimized for determining the initial conditions  $U = (T_0, u_0, v_0, h_0)$ .

- Ideas to solve convergence problems have been defined.
- Discussions have also been made on decreasing the computing time.

5. April 8<sup>th</sup>. Visit to the different departments. Presentation of the 3D model, of the remote sensing department and of the potential of data acquired by different sensors, presentation of the operational forecasting systems, and presentation of the drifting buoys methodologies. Slides of the presentations are available on the ADAMS web site (<http://www-rocq.inria.fr/clime/EA>).
6. April 9<sup>th</sup>. Visit to the MHI branch in Yalta. Information about the marine platform.
7. April 10<sup>th</sup>. Discussions on organisation of 2008 workplan. Proposal of a one-week meeting in September. To be discussed with the partners.