



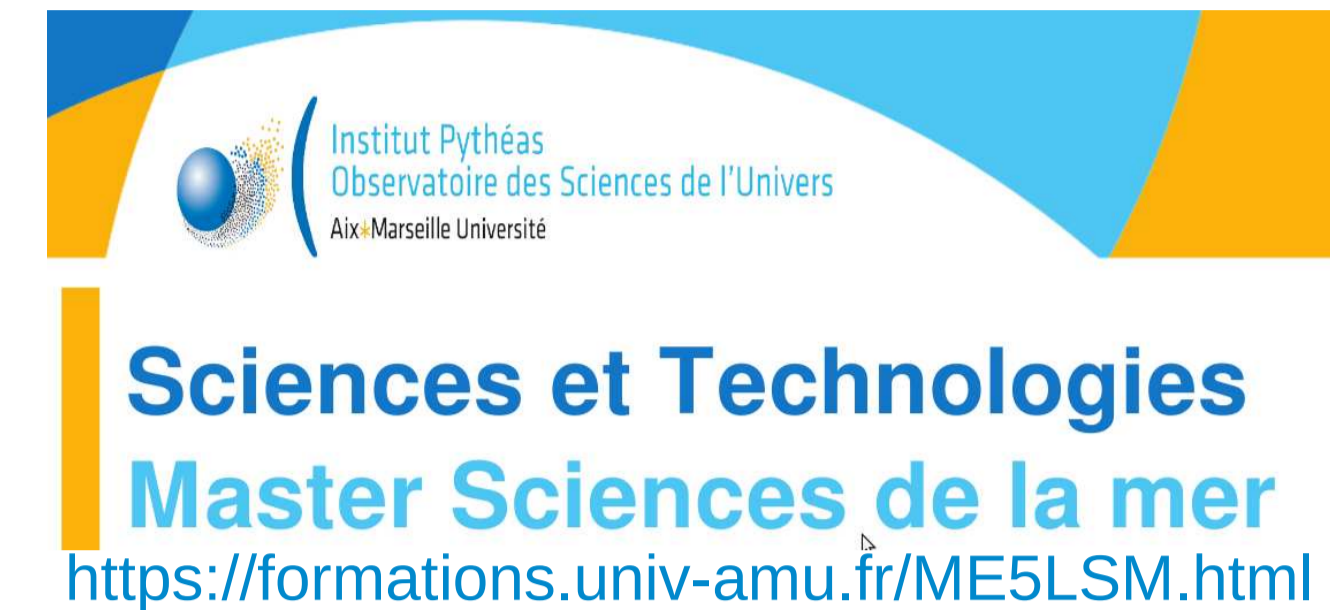
Teaching with CROCO

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Since 2007, the course entitled "Ocean 3D Modeling" is offered to the students of the **Master of Marine Sciences** (former Master of Oceanography) at the *Institut Pythéas* Observatory of the **University of Aix-Marseille** during the second term of the first year [Doglioli, A.M., 2019].



The general goal of the course is **for student to implement a realistic ocean circulation model and to interpret its output correctly.**

Classroom lectures

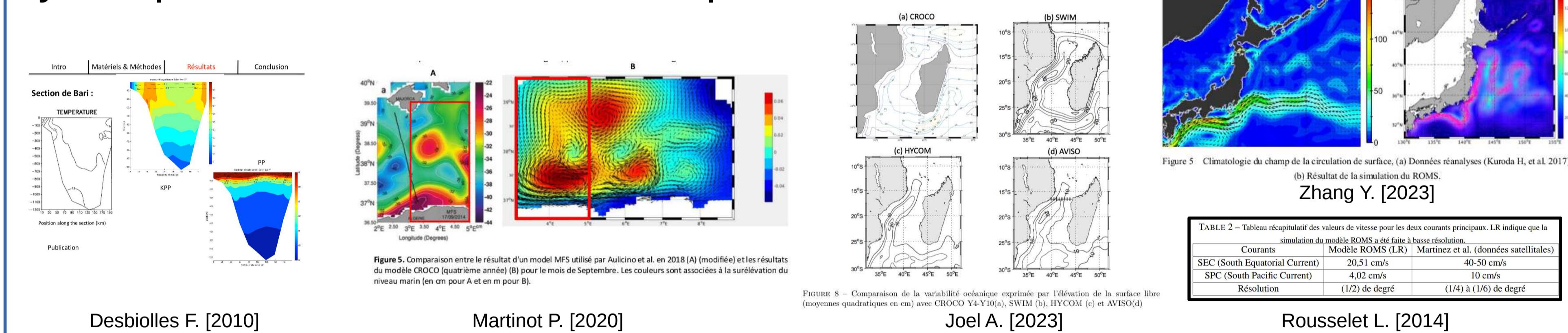
- 1) an historical review of the atmospheric and oceanographic numerical modeling;
- 2) a recall of the different stages of simplification to derive the primitive equations from the Navier-Stokes equations;
- 3) a short review of the different turbulence closure schemes;
- 4) an introduction to the techniques for numerically solving the ocean circulation equations (horizontal and vertical grids, temporal schemes, initial and open-boundary conditions).

Practical exercises

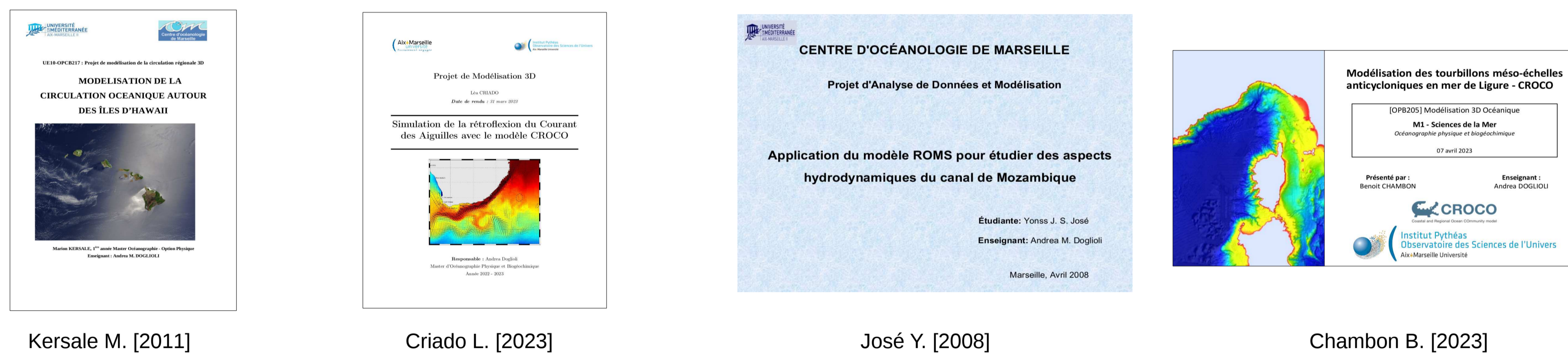
- based on the CROCO model and CROCOTools (former ROMS and ROMSTools)
- 1) training to download and use of community software and public datasets;
 - 2) running the software demo under the supervision of the teacher ;
 - 3) self-implementation of a model for a chosen ocean region.

Scientific analysis

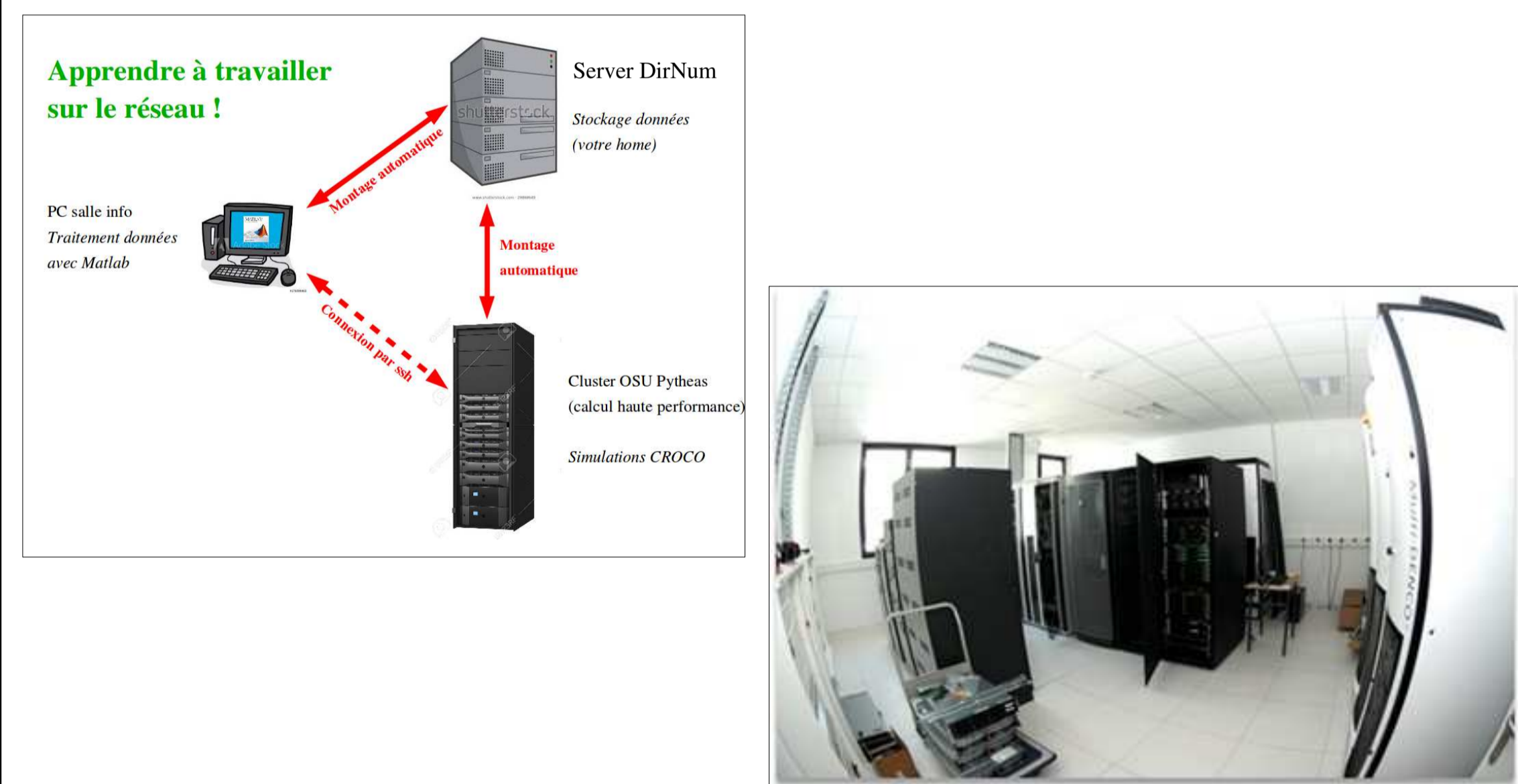
A detailed analysis of the simulated data and a critical discussion of the results by comparison with literature are required.



Each student writes a report about his/her work, gives a presentation to the class and publishes both of them on his/her institutional personal web page.



The simulations are performed at the **High Performance Computing Facility of the Institut Pythéas**



In this way the students are also **initiated to remote cluster computing.**

<https://www.mio.osupytheas.fr/fr/plateformes-de-recherche/ptf-cluster-de-calcul-intensif-hpc>

Thanks to its **friendliness, CROCO and the CROCOTools revealed particularly adapted for teaching activity.**
More than 100 students was trained, some of whom are now ocean modelers in both fundamental and applied research.

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The PDF file cited above (and all the other student works) are freely downloadable from the course web page: https://people.mio.osupytheas.fr/~doglioli/teaching_OPB205.htm

Acknowledgements

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