



High resolution ice-ocean simulation of the Storfjorden polynya in Svalbard

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Owing to the predicted and already observed dramatic impact of climate warming in the Arctic, there is a great need for monitoring this region not only to assess the magnitude of changes but also to understand the physical processes governing heat, salt and dynamical exchanges between ocean, ice and atmosphere, with improvement of climate models predictability as a challenging perspective. OPTIMISM (Observing dynamical and thermodynamical Processes impacting The sea-Ice Mass balance from In Situ Measurements) is a 4-year ANR/IPEV-funded project (2009-2013) involving 5 French laboratories . A backbone aspect of this project is the development of an autonomous instrument (“Ice-T” buoy + “BEAR” meteo mast), providing a comprehensive observation of the relevant parameters driving the sea ice mass balance. Processes are investigated from observations collected at two main sites: the central Arctic, and a coastal polynya of the Svalbard archipelago. A complementary approach , yet an ongoing task, is to build up a high resolution (<2 km) ice-ocean modelisation of the Svalbard area to simulate physical processes in an Arctic coastal polynya. These spatially-limited regions have been recently known to contribute significantly to the dense water formation of the Northern Hemisphere. The simulation is based on the most recent ice and ocean models (LIM3 – NEMO 3.4). It runs over a period long enough to study interannual variability but it also includes high frequency dynamics such as tides, which partly drive turbulent mixing and thus control ice melting and dense water formation. Achievements and perspectives will be presented.