



Gyre scale deep convection in the subpolar North Atlantic Ocean during winter 2014-2015

Anne Piron (1,4), Virginie Thierry (1), Herlé Mercier (2), and Guy Caniaux (3)

(1) Ifremer, Laboratoire d'Océanographie Physique et Spatiale, Brest, France (vthierry@ifremer.fr), (2) CNRS, Laboratoire d'Océanographie Physique et Spatiale, Brest, France (vthierry@ifremer.fr), (3) Centre National de Recherches Météorologiques, Météo-France, Toulouse, France, (4) ALTRAN, Brest, France

Using Argo floats, we show that a major deep convective activity occurred simultaneously in the Labrador Sea (LAB), South of Cap Farewell (SCF) and the Irminger Sea (IRM) during winter 2014-2015. Convection was driven by exceptional heat loss to the atmosphere (up to 50% higher than the climatological mean). This is the first observation of deep convection over such a widespread area. Mixed layer depths exceptionally reached 1700m in SCF and 1400m in IRM, a depth never observed before. The deep thermocline density gradient limited the mixed layer deepening in the Labrador Sea to 1800m. Potential densities of deep waters were similar in the three basins (27.73-27.74 kg m⁻³), but warmer by 0.3°C and saltier by 0.04 in IRM than in LAB and SCF, meaning that each basin has formed locally its own deep water. The cold anomaly that developed recently in the North-Atlantic Ocean favored this exceptional convection.