



Ocean Circulation Changes Cause the Largest Freshening Event for 120 years in the Subpolar North Atlantic

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From 2012 to 2016 the subpolar North Atlantic ocean (SPNA) underwent a dramatic and very rapid rise in fresh-water content, similar in magnitude to the increase observed in late 1960s (the "Great Salinity Anomaly"). In the course of 4 years, the salinification that had previously took place over a decade (1994-2005) was reversed. In 2015, salinity in the Iceland Basin dropped to values that were the lowest seen in 120 years of observations. The 2012-2016 freshening was a sudden and very large change superimposed on gradual freshening observed since the late 2000s, and was seen in the North Atlantic Current system (NAC) and eastern basins, but not the central Labrador or Irminger Seas. This study makes use of a wide range of observations to show that circulation changes driven by wind forcing led to the reduction in salinity. The changes include: the slowdown of the Meridional Overturning Circulation, a slowdown of the northern branch of the NAC, the speeding up and increased eastward reach of a southern branch of the NAC, and most critically of all, the diversion of Labrador Current water into the NAC system and away from the continental slope near the Grand Banks and Flemish Cap.