

An Extreme Sea Level Rise Event along the Northeast Coast of North America in 2009-2010

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By analyzing long-term tide gauge (TG) records, we find an extreme sea level rise (SLR) event during 2009-2010 along the Northeast Coast of North America. Within a two-year period, the coastal sea level north of New York City (NYC) jumped by up to 128 mm. Despite significant year-to-year fluctuation, this magnitude of SLR is unprecedented during the entire history of the TG records. We show that this extreme SLR event is associated with an observed 30% downturn of the Atlantic meridional overturning circulation (AMOC) from April 2009 to March 2010. Regression analysis based on the observational data indicates that for every 1 Sverdrup of AMOC weakening, coastal sea level rises by ~13 mm in the region north of NYC. The unique nature of the 2009 SLR event suggests that such a significant downturn of the AMOC has not occurred in the 20th century, and may be an early sign of its long-term change under external forcing.