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The relationship between sea-level and bottom pressure variability in an eddy permitting ocean model

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We investigate the relationship between sea-level (after application of an inverse-barometer correction) and ocean bottom pressure, in an eddy-permitting ocean model. We find the presence of eddies can disrupt this relationship even on timescales as short as 10–20 days, but only in the regions of most energetic eddy variability. Away from eddies, the relationship is similar to that seen in a coarser-resolution model, with a tight relationship between sea-level and bottom pressure at high frequencies, but with significant correlations between sea-level and bottom pressure at interannual timescales seen only in shelf sea regions. In the deep ocean, regions where sea-level and bottom pressure remain related out to the longest timescales are in the Arctic Ocean and regions of the Southern Ocean, where particularly large amplitude barotropic fluctuations are found but where the mesoscale signal is weak.