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Forced and chaotic variability of interannual variability of regional sea level and its causes scale over 1993-2015

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Since the early 1990s, satellite altimetry has become the main observing system for continuously measuring the sea level variations with a near global coverage. Satellite altimetry has revealed a global mean sea level rise of 3.3 mm/yr since 1993 with large regional sea level variability that differs from the mean estimate. These measurements highlight complex structures especially for the western boundary currents or the Antarctic Circumpolar Current. A recent study shows that the chaotic ocean variability may mask atmospherically-forced regional sea level trends over 38% of the global ocean area from 1993 to 2015. The chaotic variability is large for the western boundary currents and in the Southern Ocean. The present study aims to complement this previous work in focusing on the interannual variability of regional sea level. A global ¼° ocean/sea-ice 50-member ensemble simulation is considered to disentangle the imprints of the atmospheric forcing and the chaotic ocean variability on the interannual variability of regional sea level over 1993-2015. We investigate the forced (i.e., ensemble mean) versus the chaotic variability (i.e., ensemble standard deviation) for the interannual variability of regional sea level and its causes (i.e., steric sea level and manometric sea level contribution). We complement our investigations by partitioning the steric component into thermosteric sea level (i.e., temperature change only) and halosteric sea level (i.e., salinity change only). One of the goals of the study is to highlight the hot spots region of large chaotic variability for regional sea level and its different components.