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Low-Frequency Ocean Bottom Pressure Variations in the North Pacific in Response to Time-Variable Surface Winds

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One decade of time-variable gravity field observations from the GRACE satellite mission reveals low-frequency ocean bottom pressure (OBP) variability of up to 2.5 hPa in the subpolar gyre of the North Pacific. From a 145 year-long simulation with a coupled chemistry climate model, OBP variability is found to be related to the prevailing surface pressure and surface wind conditions in the larger North Pacific area. The dominating atmospheric pressure patterns obtained from the climate model run allow in combination with ERA-Interim surface fields a reconstruction of the OBP variability in the North Pacific from atmospheric model data only, which correlates favourably (r=0.7) with GRACE ocean bottom pressure observations. The regression results indicate that GRACE-based OBP observations are indeed sensitive to changes in the prevailing surface pressure and thus wind conditions in the North Pacific, thereby opening opportunities to constrain atmospheric models from satellite gravity observations over the oceans.