



Wind work on the geostrophic ocean circulation: an observational study of the effect of small scales in the wind stress

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We use QuikSCAT scatterometer data, together with geostrophic surface currents calculated from a combination of satellite altimetry, gravity and drifter data, to investigate the rate of work done on the geostrophic circulation by wind stress. In particular, we test the suggestion that accounting for ocean currents in the calculation of stress from 10 m winds can result in a reduction of 35% in the wind work, compared with an approximate calculation in which currents are not accounted for. We calculate the predicted effect of accounting for ocean currents to be a reduction in power of about 0.19 TW, and a total power input from observations which include this effect to be 0.76 TW, smaller than earlier estimates by about the right amount. By recalculating the power input using smoothed wind stresses or currents, we demonstrate that the effect of ocean currents is visible in the midlatitude data, and close to the predicted value. Proof that the data are adequate to resolve the effect in the tropics, however, is lacking, suggesting that additional processes may also be important in this region.