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M2 internal-tide generation in STORMTIDE2

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Internal-tide generation has been quantified using both pressure work and energy conversion. When calculating the pressure work from simulated or observed data, the internal-tide pressure has to be decomposed from the full pressure, for which various options exist. We show that the conversion, that has to be derived from the depth-integrated energy equations, contains the work done by both the form drag at the bottom and that at the surface, with the latter being about 1% of the former. For calculating the pressure work, the internal-tide pressure identified as the deviation from the depth-averaged pressure perturbation has to be used.

We analyzed the work done by the bottom form drag in STORMTIDE2, a concurrent simulation of circulations and tides. As expected, the identified internal-tide pressure reveals the characteristic pressure drop from the windward to the leeward side of an obstacle. The M2 internal-tide generation in STORMTIDE2 is more strongly controlled by the barotropic tide than by the topographic slope, partly because the tidal velocity can change up to one order of magnitude from the top to the foot of a high ridge within a short distance, a feature only produced by a high-resolution model. Consequently, the intense generation maps the immediate proximities of the summits of high ridges, making the global generation to be strongest near 1200 m and decreasing drastically below 3000 m. The depth structure of the generation differs in different basins, which could impact differently for the diapycnal mixing and the circulation in different basins.

Do you need an official invitation letter?

No

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