Project: **1102**
Project title: **SFB-Transregio (TRR181)**
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The aims of the subproject W2 of TRR 181 are to quantify the generation and propagation of internal waves in the global ocean, study the pathways of radiated low mode internal waves including processes operating along the pathways, identify regions of sources and sinks, and to quantify the contribution to local dissipation and identify the involved processes. For these purposes we have (I) performed a dedicated run based on MPIOM TP6M/L40 forced by the full luni-solar tidal potential and 6 hourly surface forcing derived from NCEP (STORMTIDE2, under the MPI account 256), (ii) used observations of internal wave energy fluxes along paths where satellite altimetry shows beams of converging low mode internal waves, and (iii) combined the model simulations with the available observations to produce the best estimate of the global distributions of sources and sinks needed for energetically consistent representation of the diapycnal diffusivity induced by breaking of internal waves (i.e. IDEMIX). The STORMTIDE2 simulation was performed in November – December 2018 by Zhuhua Li and analyzed and compared with observations by Zhuhua together with Janna Köhler and Jonas Löb from University Bremen, who are members of subproject W2 of TRR181 co-lead by Monica Rhein and Jin-Song von Storch. The STORMTIDE2 simulation was achieved by first spinning up MPIOM TP6ML40 with tides using OMIP forcing over 33 years and then using the 6 hourly NCEP forcing over the period from 1981 to 2012.

A preliminary evaluation (Köhler et al., 2019) shows that the barotropic tides are overestimated and the internal tides are underestimated in STORMTIDE2. The underestimation indicates too strong dissipation in MPIOM. These results suggest that the MPIOM setup needs to be further improved for realistically representing internal tides. The work combining the STORMTIDE and STORMTIDE2 simulations with observations is still on-going. The analyses combining STORMTIDE and observations are still ongoing.

Main results from the STORMTIDE2 simulation consider M2-internal tide generation (Li and von Storch, 2019). Internal-tide generation is described by two different concepts. Once concentrates on the pressure work. As a barotropic tide impinges on a topographic obstacle, it induces high bottom pressure on the windward and low bottom pressure on the leeward of the obstacle. The obstacle exerts the same pressure on the overlying stratified fluid, whereby generating internal tide. The other one concentrates on the energy converted from the barotropic to the baroclinic motions, and equals the internal-tide generation with the rate of the conversion. The M2-internal-tide generation in STORMTIDE2 reveals the characteristics predicted by the first concept. It is also shown that the tidal velocity plays a more dominant role for internal-tide generation than the obstacle slope. Crucial for this dominance is the strong increase in tidal velocity over high obstacles, a feature whose representation demands high resolution.

References

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