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# On the Upper Ocean Response to Tropical Cyclones: Satellite Observations and Model Simulations

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We present results of investigation of response of the upper ocean to passage of three tropical cyclones (TC)- Ignacio, Jimena and Kilo, which simultaneously travel over the central and eastern parts of the Pacific Ocean in late August - early September 2015. Wind fields for these TCs were derived from synergy of three microwave radiometers - SMOS, SMAP and AMSR-2. As the SST field the satellite product MW OISST is used and the sea surface level anomalies are taken from the satellite altimeter products. Satellite observations were supplemented with the Best Track data, and characteristics of the ocean vertical stratification available from WORLD OCEAN ATLAS 2013 version 2. SST anomalies generated by each of the TCs are defined as difference of the successive daily averaged SST field. Characteristics of the SST and sea surface level anomalies (SSL), - magnitude of depressions, their width, shift from the TC track, are then analyzed as a function of TC parameters (maximal wind speed and its radius, translation velocity) and environmental conditions, - local latitude of TC location and the background ocean stratification below TC. Empirical dependencies of SST and SSL anomalies on TC parameters and environmental conditions are established and parameterized.
Simplified analytical model describing ocean response to TC, - the SST wake caused by the thermocline erosion, and the barotropic and the baroclinic wave-wakes, is suggested. The model is used to simulate satellite observations of the SST and SSL wakes generated by the TCs. The wind field derived from microwave observations, the best track data, and the background ocean stratification are used as the input parameters to provide model simulations of the TC's surface wakes. As found the model is consistent with satellite observations on quantitative level, providing adequate reproduction of the SST- and SSL-wakes, their space-time variations and trends related to variability of TCs parameters and changes of the environmental conditions. The model is further used to interpret impact of Amazon-Orinoco River Plume on TCs SST wakes reported by Reul et al. (2014).