Dynamics of turbidity currents influenced by tidal flows

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Turbidity currents are flows lead by gravity and occur generally in the deep-sea floor in contrast to tidal flows that are known to be present in shallow marine regions. Thus, tidal influence on the dynamics of turbidity currents has been regarded as practically non-existent. However, cyclic oscillations in the grain-size distribution have been occasionally observed in turbidites, and in-situ measurements in turbidity currents have shown oscillations of flows velocity with periodicity of several hours. To understand these periodic oscillations in turbidity currents, we propose a hypothesis that the tidal flows in submarine canyon influence turbidity currents by causing the internal waves at the interface of the two flows. They could interacts each other by the mixing and entrainment processes inside submarine canyons. Firstly, this hypothesis will be tested by numerical experiments. Also, data analysis of in-situ measurements of turbidity currents will be conducted to search the presence of tidal influence. If this hypothesis is verified, that could shed light on the large disparity of the turbidity current presence in submarine canyon. In addition, due to the link between the global sea-level and the tide, the internal tides could be the bridge between global sea-level change and developments of submarine fans.

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