5-20-2014

Buoyant and gravity-driven transport on the Waipaoa shelf

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I. Motivation & Methods

Riverine deposits on continental shelves reflect terrestrial signatures, but are typically modified by the marine environment. Partitioning between various transport mechanisms (dilute suspension vs. gravity-driven) may influence the location and characteristics of these deposits.

II. Deposition from Buoyant and Gravity-Driven Processes

- Transport within the river plume during energetic wave events distributed sediment along-shore, to either side of Poverty Bay.
- Gravity flows transported material to long-term shelf depocenters (50-70 m water depth) and the continental slope during energetic wave events.

III. Model Sensitivity

- Slow settling material was dispersed farther from the river mouth and to deeper depths.
- High erosion rate parameters affected the distribution of sediment within Poverty Bay and the shelf.

Conclusions

- Buoyant transport within ROMS-CSTMS:
  - distributed sediment along-shore, to either side of Poverty Bay.
  - did not extend to water deeper than 50 m.
  - were especially sensitive to settling velocity.
- Wave- and current-driven gravity flows:
  - exported sediment to long-term shelf depocenters (50 – 70 m water depth) and to the continental slope.
  - were sensitive to parameterizations of sediment input.

Implications

- Both buoyant fluxes and gravity flows can be important for modeling shelf deposition.

Acknowledgements

Funding was provided by NSF MARGINS program, VIMS, and NIWA. Data, feedback, and technical assistance were provided by J.P. Walsh, R. Corbett, A. Ogston, A. Orpin, T. Kniskern, A. Bever, R. Hale, J. Kiker, S. Knecht, A. Kettner, S. Stephens, M. Uddstrom and the Meteorological and Wave Science Staff at NIWA, G. Hall, D. Peacock, J. McNinch, NOAA, A. Miller, and D. Weiss.