

Regional Rates of Sand Supply to the New South Wales Coast: Southeastern Australia

Authors : Marta Ribo, Ian D. Goodwin, Thomas Mortlock, Phil O'Brien

Abstract : Coastal behavior is best investigated using a sediment budget approach, based on the identification of sediment sources and sinks. Grain size distribution over the New South Wales (NSW) continental shelf has been widely characterized since the 1970's. Coarser sediment has generally accumulated on the outer shelf, and/or nearshore zones, with the latter related to the presence of nearshore reef and bedrocks. The central part of the NSW shelf is characterized by the presence of fine sediments distributed parallel to the coastline. This study presents new grain size distribution maps along the NSW continental shelf, built using all available NSW and Commonwealth Government holdings. All available seabed bathymetric data from prior projects, single and multibeam sonar, and aerial LiDAR surveys were integrated into a single bathymetric surface for the NSW continental shelf. Grain size information was extracted from the sediment sample data collected in more than 30 studies. The information extracted from the sediment collections varied between reports. Thus, given the inconsistency of the grain size data, a common grain size classification was here defined using the phi scale. The new sediment distribution maps produced, together with new detailed seabed bathymetric data enabled us to revise the delineation of sediment compartments to more accurately reflect the true nature of sediment movement on the inner shelf and nearshore. Accordingly, nine primary mega coastal compartments were delineated along the NSW coast and shelf. The sediment compartments are bounded by prominent nearshore headlands and reefs, and major river and estuarine inlets that act as sediment sources and/or sinks. The new sediment grain size distribution was used as an input in the morphological modelling to quantify the sediment transport patterns (and indicative rates of transport), used to investigate sand supply rates and processes from the lower shoreface to the NSW coast. The rate of sand supply to the NSW coast from deep water is a major uncertainty in projecting future coastal response to sea-level rise. Offshore transport of sand is generally expected as beaches respond to rising sea levels but an onshore supply from the lower shoreface has the potential to offset some of the impacts of sea-level rise, such as coastline recession. Sediment exchange between the lower shoreface and sub-aerial beach has been modelled across the south, central, mid-north and far-north coast of NSW. Our model approach is that high-energy storm events are the primary agents of sand transport in deep water, while non-storm conditions are responsible for re-distributing sand within the beach and surf zone.

Keywords : New South Wales coast, off-shore transport, sand supply, sediment distribution maps

Conference Title : ICCER 2017 : International Conference on Coastal Erosion

Conference Location : Barcelona, Spain

Conference Dates : July 27-28, 2017