

Using satellite altimetry and tide gauges for storm surge warning

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Abstract The combination of the coarse temporal sampling by satellite altimeters in the deep ocean with the high temporal sampling at sparsely located tide gauges along the coast has been used to improve the forecast of high water for the North Sea along the Danish Coast and for the northeast coast of Australia. For both locations we have tried to investigate the possibilities and limitations of the use of satellite altimetry to capture high frequency signals (surges) using data from the past 20 years. The two regions are chosen to represent extra-tropical and tropical storm surge conditions. We have selected several representative high water events on the two continents based on tide gauge recordings and investigated the capability of satellite altimetry to capture these events in the sea surface height data. Due to the lack of recent surges in the North Sea we focused on general high water level and found that in the presence of two or more satellites we could capture more than 90% of the high water sea level events. In the Great Barrier Reef section of the northeast Australian coast, we have investigated several large tropical cyclones; one of these being Cyclone Larry, which hit the Queensland coast in March 2006 and caused both loss of lives as well as huge devastation. Here we demonstrate the importance of integrating tide gauges with satellite altimetry for forecasting high water at the city of Townsville in northeast Australia.

Key words satellite altimetry; sea level; storm surges.