Suggested use of altimetry in Storm Surge Forecasting connected with Tropical Cyclones.

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Abstract.
Storm surges connected with landfalls of Tropical Cyclones are perhaps the most dramatic, damaging and suddenly occurring between natural disasters. Up to half a million people are believed to have perished only through one night with a storm surge hitting Bangladesh. The prominent drivers of extreme storm surges in the tropics are the tropical cyclones and their wind fields. These are intensive atmospheric cyclones, with sustained wind speeds even beyond 100kts, and propagating rapidly over large distances. Conventional forecasting of cyclone developments seeks to predict the intensity and movement track of the cyclone, with a rough parameterization of the wind/pressure fields around the eye of the cyclone. Wind/pressure fields are necessary forcing fields for the numerical models to predict storm surges. The state-of-art leaves much to be improved regarding the quality of such forecasting. This document suggests the inclusion of global tropical altimetry, and, optionally scatterometry, to improve the accuracy of storm surge forecasting.

Possible inclusion of altimetry and scatterometry.
The operational mode of a storm surge forecasting model has the following phasing:

1. Initialization, which normally means using the prognostic fields from a previous prognosis or a 'warming up' of the model with analytical wind/pressure fields.
2. Provision of forcing fields for wind/pressure, normally from a large responsible computer center such as the Japan Meteorological Agency.
3. Ocean Model operation 2 – 5 days, predicting future development of sea level including tides in a region such as the South China Sea.
4. Performing verification statistics by comparison with tidal gauges etc.

It is strongly believed that inclusion of altimetry (and scatterometry) becomes beneficial under phase 1 and 4, perhaps in phase 2 as well. Much of the lack of accuracy in sea level forecasting is due to inadequate initialization, as well as a too rough description of the acting wind fields.

Altimetry/scatterometry products that may help in storm surge forecasting.
Near real time gridded sea level and wind fields could be 'sold' to responsible centers in the Tropical Cyclone Programme, or to regional/national forecasting agencies in closer contact with disaster mitigation mechanisms. These would again be used to update the corresponding numerical fields, and thereby have a positive impact on the forecasting accuracy.