Calibration of Model Waves with Satellites

The charts on the next page illustrate the impact of calibrating WaveWatchIII model waves with satellites.

Satellite samples 1992-2011 were collocated within a 25km radius around each model grid point. From each pass, the nearest satellite sample was selected and model values were interpolated in time to find sample pairs. For each grid point, a straight line was fitted to the sample pairs to find scale and intercept to correct model wave height (or wind speed).

Further notes on the automated calibration performed by waveclimate.com:

- Calibration of waves with satellites not only removes the systematic model-satellite error but also significantly reduces (by about 2%) the model-buoy error. See for example table 3 of the model validation report.
- Auto-calibration focuses on the correction of the ambient offshore wind and wave climate. In general, this also improves above average values. For consultancy projects, we calibrate each point manually to pay extra attention to extremes, nearshore effects and the influence of tropical storms and squall-like events.
- Waveclimate.com directly calibrates model wave height and wave periods. For consultancy, we calibrate wave spectra and re-compute all wave parameters from the corrected wave spectra.
- Waveclimate.com corrects model wave periods with the square root of the ratio of calibrated and raw wave height (so that wave steepness will be kept constant).

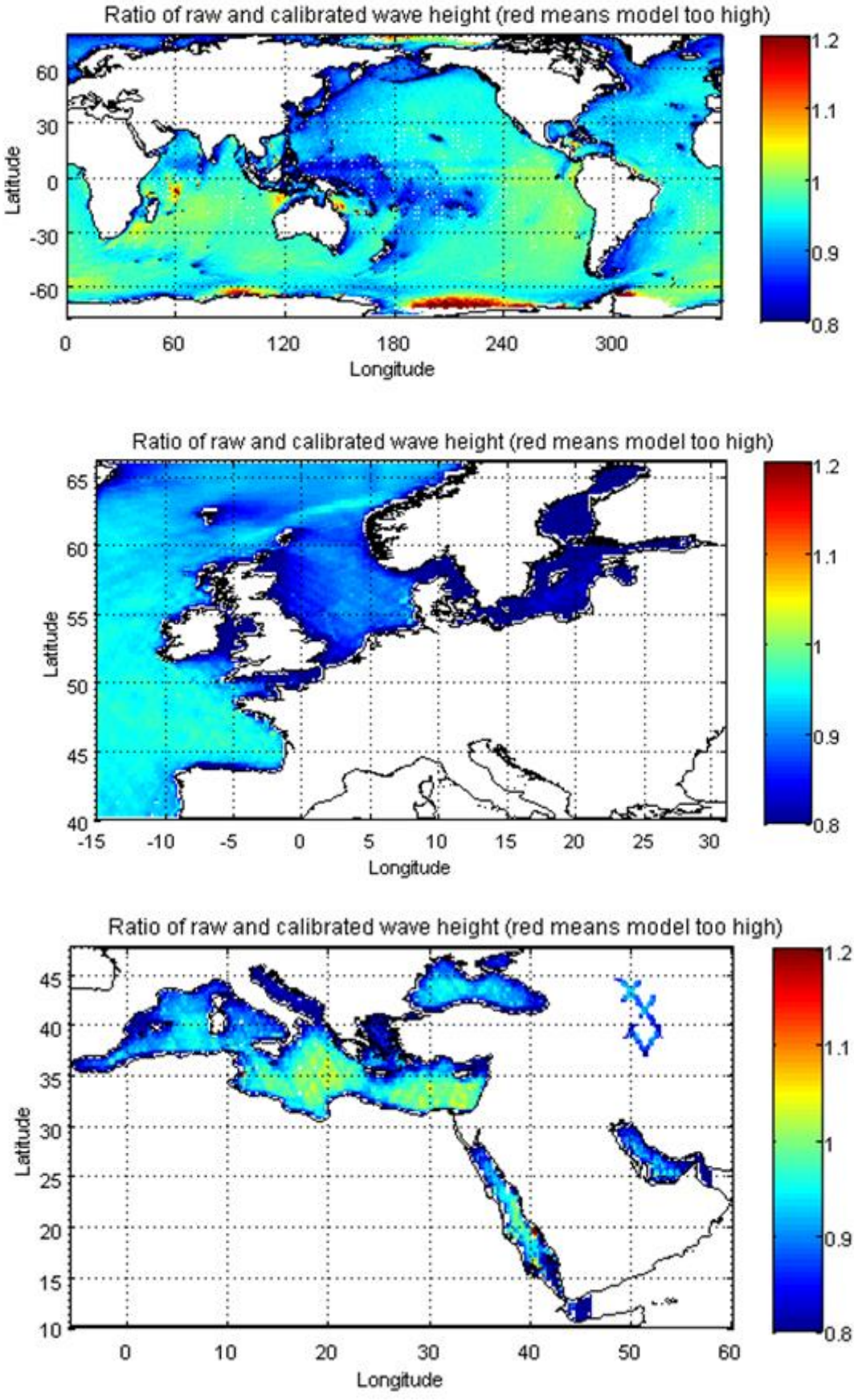
The charts below show the location-specific ratio of the un-calibrated (also referred to as raw) mean of model significant wave height and the calibrated mean of model significant wave height. Averaging of model wave height (and wind speed) was done over the set of model samples collocated with satellite samples (1992-2011). Note that this is a small subset of the 3-hourly model records 1992-2016 currently available through waveclimate.com.

Charts are provided for the global grid and for the two regional grids underpinning waveclimate.com, i.e.

- The global grid with spatial resolution 1/2x1/2 degree. Waveclimate.com provides full resolution in coastal zones (of about 200 km wide); on open sea resolution is 1 degree.
- The EU-shelf grid with spatial resolution 1/6x1/6 degree. This grid covers part of the northern Atlantic, the North Sea and the Baltic Sea. Waveclimate.com provides full resolution in coastal zones; on open sea resolution is 0.5 degree.
- The Mediterranean grid with spatial resolution 1/4x1/4 degree. This grid covers the Mediterranean, the Red Sea, the Black Sea, the Persian Gulf and most of the Caspian Sea. Waveclimate.com provides full resolution in coastal zones; on open sea resolution is 0.5 degree.

From the plots on the next page it is seen that, without calibration, the wave model tends to

- Underestimate waves in fetch-limited areas (blue)
- Overestimate waves in swell dominated regions (red)



Ratio of raw and calibrated mean model wave height for the global grid (upper), the EU-shelf grid (middle) and the Mediterranean grid (lower)