Geophysical Research Abstracts,
Vol. 11, EGU2009-318, 2009
EGU General Assembly 2009


# Impact of wind and waves on suspended particulate matter fluxes in the East Frisian Wadden Sea (southern North Sea)

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Suspended particulate matter (SPM) fluxes and dynamics are investigated in the East-Frisian Wadden Sea using a coupled modelling system based on a hydrodynamical model (the General Estuarine Transport Model GETM), a third-generation wave model (Simulating WAves Nearshore, SWAN) and a SPM module attached to GETM. Based on sedimentological evidence that finer fractions of the sediments are squeezed out of the Wadden Sea, possibly due to the effects of diking and sea level rise, a series of numerical experiments was conducted to understand/discriminate the effects of normal tidal currents, wind-enhanced currents and surface gravity waves under various forcing scenarios. Starting with a simple tidal forcing the scenarios are designed to increase the realism step by step including moderate and strong winds, waves and finally encompass the full effects of one of the strongest storm floods in the last hundred years (Storm 'Britta' in November 2006).

The results presented here indicate that moderate weather conditions with winds up to 6 Bft lead to a net import of SPM into the East-Frisian Wadden Sea. Waves do not play a big role during these conditions. Once the system is stirred by stronger winds that lead to storm surges waves have a significant impact on SPM dynamics.

Under storm conditions, sediments are eroded in front of the barrier islands by wave action and are transported into the region by the currents. Furthermore, sediment erosion due to waves is significantly enhanced on the tidal flats. The eroded sediments (especially the finer sediment fractions) are transported out of the tidal basin area.