Storm Tilo over Europe in November, 2007:
Meteorology and impacts on societal and energy infrastructure.

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Abstract:

Storm Tilo on 8-9 November 2007 ranks among the serious winter storms in northern Europe over the past 20 years. Its low pressure centre passed across the northern North Sea, and this led to a cold air outbreak in northwest Europe. Strong north winds across the North Sea contributed to a high storm surge that was particularly serious for coastal regions in eastern England, the Netherlands and Germany. There were reports of unusually high waves that were linked to shipping accidents and damage to some offshore energy infrastructure. This report presents an overview of the meteorological conditions and traces the progress of the storm surge around the North Sea using data from the national tide gauge networks. A spectral analysis of the tide gauge data is used to isolate the high frequency component of water level variation and investigate possible correspondence with wave-related accident reports. A literature survey is presented for information on storm impacts on societal and energy infrastructure. The storm surge for Tilo is compared with other serious regional storms of recent decades.

Storm Overview & Impacts on Societal Infrastructure

Fig. 1. AVHRR thermal infrared satellite image 09 November 2007, 03:20GMT

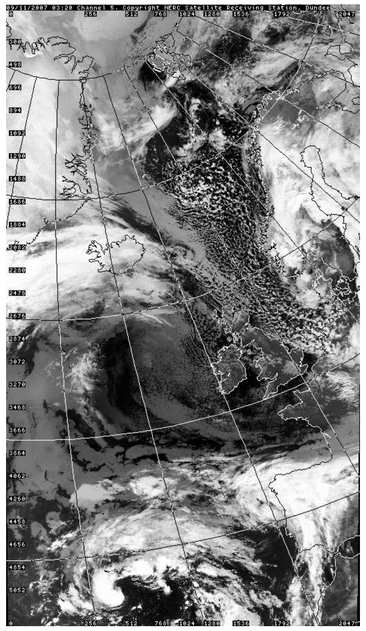


Fig. 2. Wind speed & significant wave height from Ekofisk in the northern North Sea.

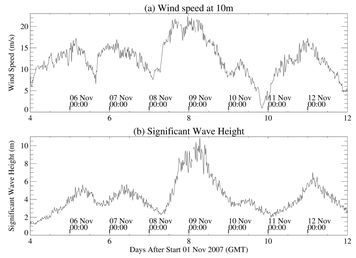
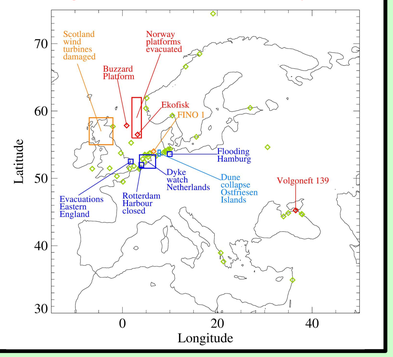


Fig. 3. Events & infrastructure impacts.



Source Data: Tide Gauge Records and Offshore Events from Media Reports.

Fig. 4. Locations of 76 water level stations used in this study.

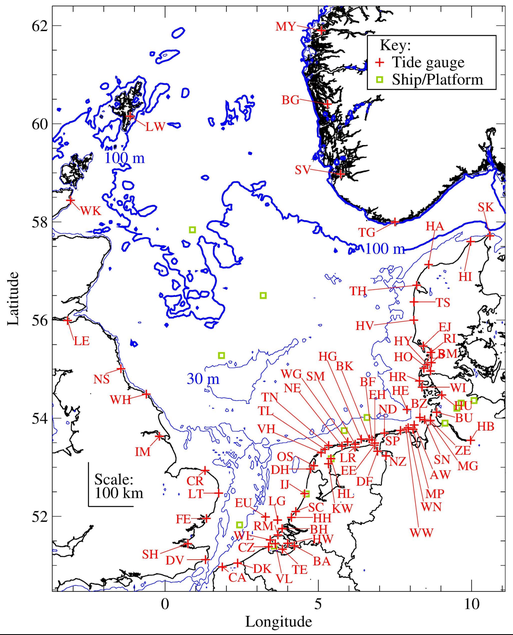
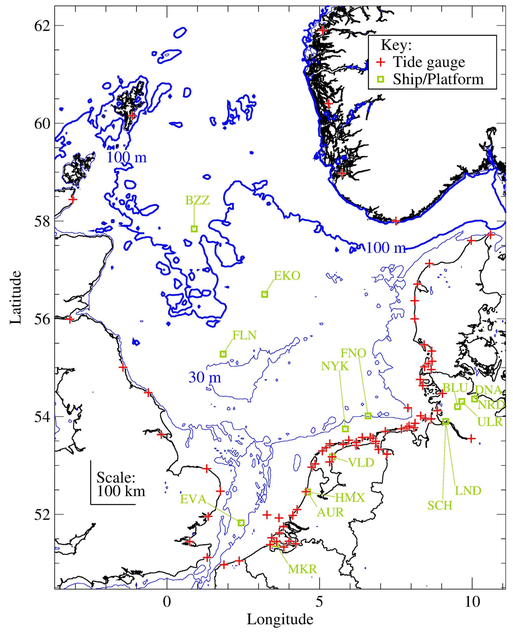


Fig. 5. Locations of 16 North Sea shipping and platform events.



Results: Storm Surge and Wave Events Across the North Sea

Fig. 8. Skew surge at different locations around the North Sea for Storm Tilo (2007) and Storm Britta (2006)

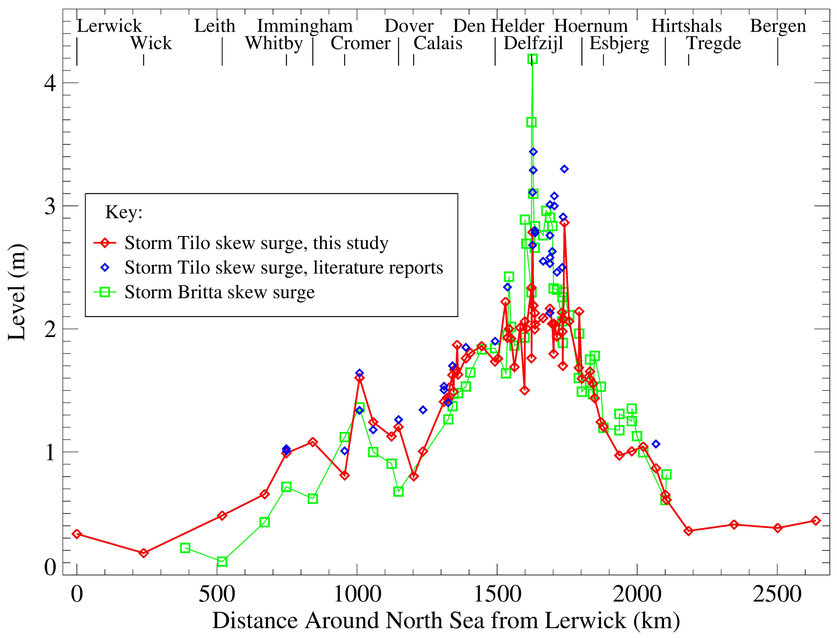


Fig. 9. Progression of the tidal maxima and surge.

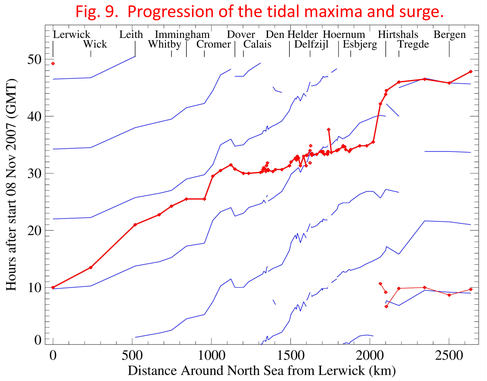
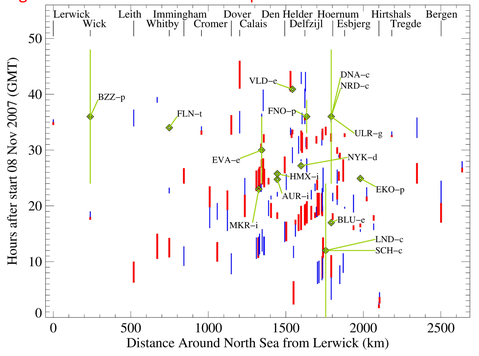


Fig. 10. Offshore events & short period water level oscillations.



Methods: Spectral Analysis

Fig. 6. Sample spectra for Lerwick and Dover.

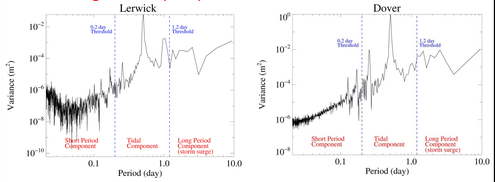


Fig. 7. Original water level time series & component elements.