

By courtesy of „Forschungsstelle Küste
Betriebsstelle Norden-Norderney“



Niedersächsischer Landesbetrieb für
Wasserwirtschaft, Küsten- und Naturschutz

Northsea Wave and Level Measuring Station

In the operation of the research centre coast of the NLWKN-Norden-Norderney

Apart from the coastal engineering, the coastal surveying and morphology, the storm tide warning service of the NLWKN-Norden-Norderney belong to the specific questions and tasks of the coastal area.

The German Wadden Sea and the estuary regions are affected by dynamic changes of tides and swell. A recording and an evaluation of the occurring processes are of great importance as a basis for the environmental precaution and the coastal protection. For these reasons a tide/wave measuring station of the company General Acoustics GmbH was installed on a measuring dolphin between the islands of Norderney and Juist.

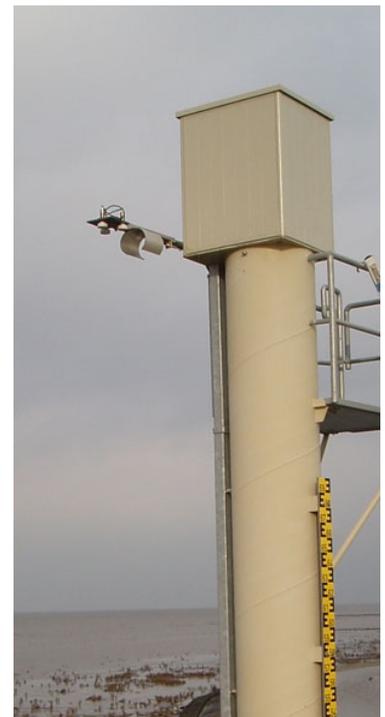


Fig. 1: The location of the measuring station close to Norderney

The System

The system is called LOG_aLevel, which measures the wave contours by means of ultrasonic sensor technology in resolution of a millimetre range. The data are internally stored on a Data logger with memory card. The measured wave/level data are also directly transferred via GPRS modem in real time to the research centre. The installed LOG_aLevel system works absolutely independent concerning energy due to the use of a connected wind generator. The positive effect of the ultrasonic technology is, that it consumes only approx. a tenth of the energy, as e.g. commercial radar systems. Thus the effort for generation of energy and the capacity of the buffer battery can be reduced to the most necessary.

One of the benefits of the efficient ultrasonic sensors, which only have a beam angle of approx. 3° as well as emitting a high sound pressure, is the light weight of only 250 gram. This is the reason why the sensor only needs a short bracket of approx. 1.5 meters for the mounting.

User oriented technology concept

Because of the bi-directional communication between the system and the LOG_aLevel software all operating parameters of the station can be set from the distance. Possibilities are a multi-event control, definition of the measuring regime of the continuous mode to the periodic mode, alerting, etc.

Data examples

The following first data examples will give an impression of the efficiency of LOG_aLevel Tide and Wave station. See in fig. 2-4:

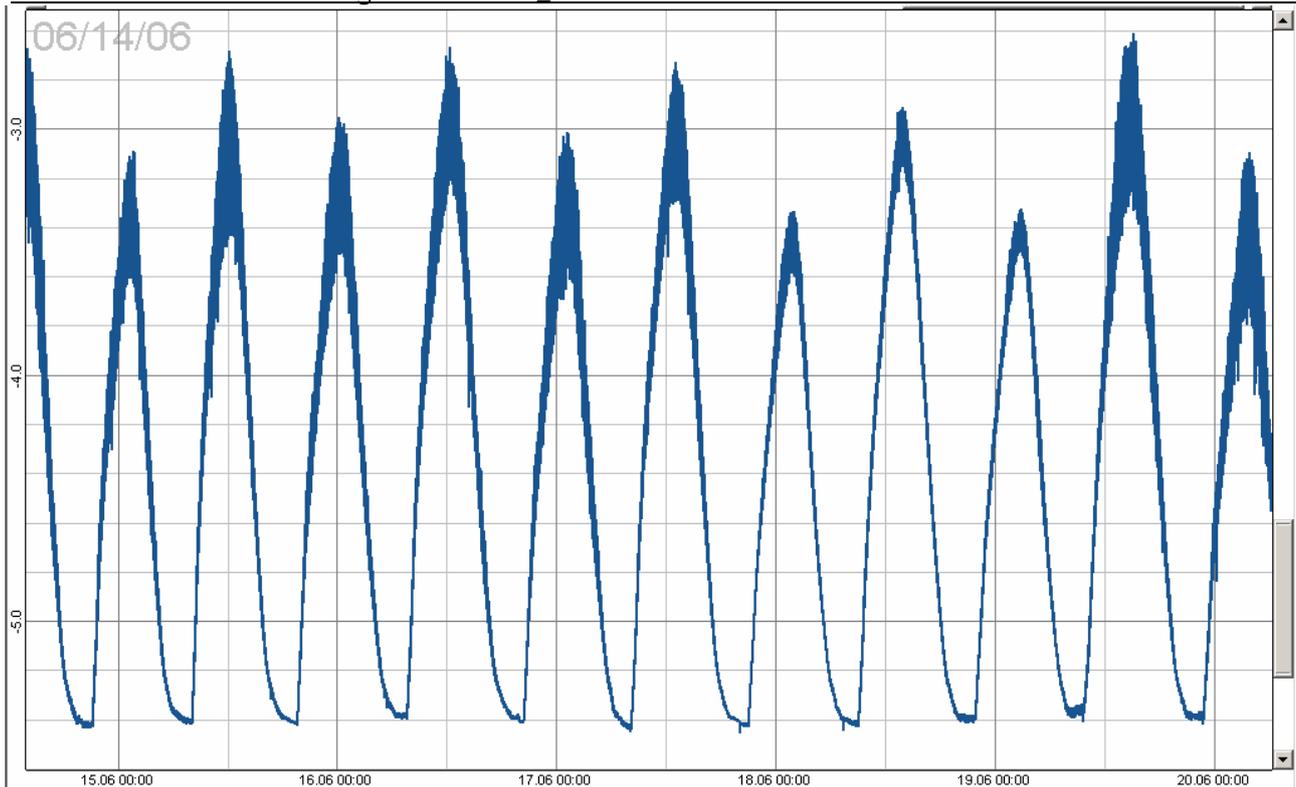


Fig. 2: The wave measurement of the tide curve from 15. to 20 June 2006

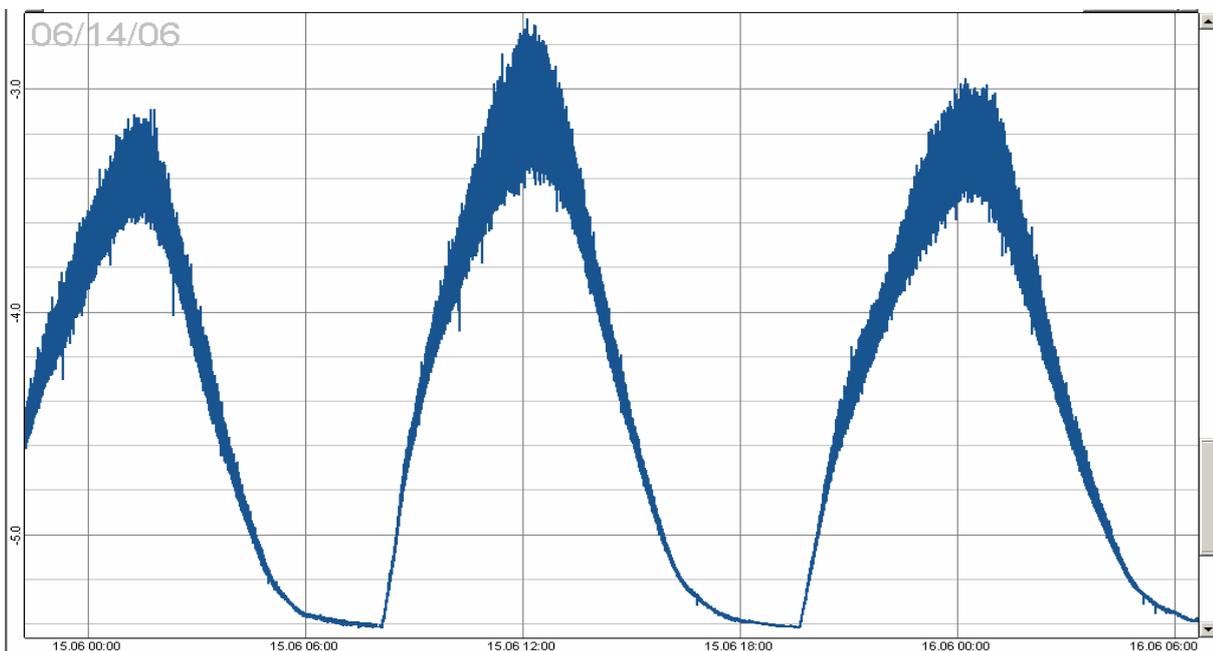


Fig. 3: Zoom of the tide curve (15. - 16 June 2006)

If you look at the tide curve in fig. 2 + 3 you clearly see that the wave height increases in relation of the depth of water. Furthermore it shows that during the low-tide the tide effects are uncoupled and an additional factor shows its influence: the slowed down discharge on the almost dry seabed. Result: a saw tooth pattern.

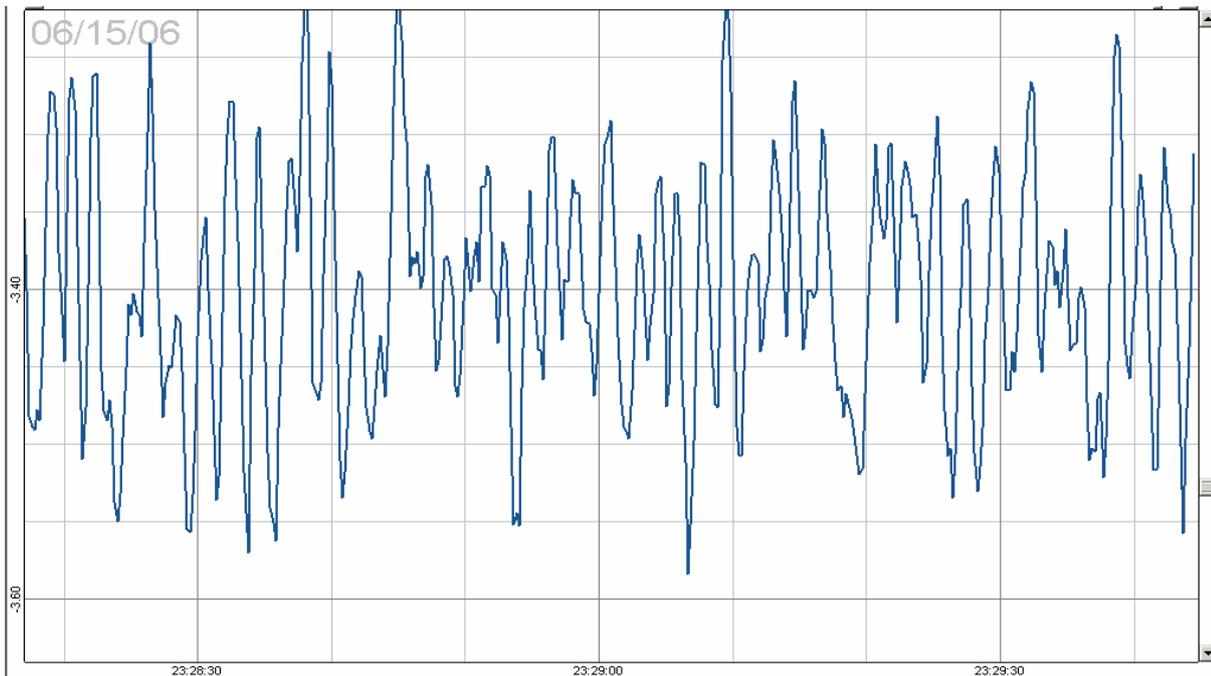


Fig. 4: The contour of the single waves (15 June 2006)

Summary

Due to the high absolute accuracies of far below a centimetre, all wave valleys and crests as well as all flanks can be measured. So all the data can be considered for averaging of the level. All in this way produced data, in minutes and/or 15-minute averages, are always available under the heaviest weather conditions. LOG_aLevel contributes an important part to improve the level accuracy and the quality of data. Additional the system reduces maintenance costs, since the contact free measuring procedure does not need any maintenance.