The SWAN model is a third-generation spectral wave prediction model developed by Delft University of Technology. Since its initial release in 1998 this model has become a widely used and reliable tool for offshore and near shore wave predictions. Its main field of application is the coastal zone where, by virtue of its implicit numerical scheme, it can be considered as a very efficient tool for high resolution coastal applications. Besides this field of application it is also appropriate for open ocean conditions.

The source code of SWAN is published, well documented and web served (www.swan.tudelft.nl). Delft University simultaneously develops and improves SWAN with the support of U.S. Office of Naval Research and Dutch Ministry of Public Works. New features and improved physics are regularly added. This poster provides an overview.

**Physics and model features**

Wind drag and bottom friction
An alternative to the well-known Wu (1982) wind drag parameterization is added. It is based on a review of a large number of more recent observations, and will gives lower drag values for relatively high wind speeds; see Figure 1. This parameterization has been published in Zijlma et al. (2012). In addition, we recommend the use of the lower value of the bottom friction coefficient based on the JONSWAP formulation for both wind seas and swell waves, C_D = 0.005. This formulation applied the new wind drag parameterization is applied. Using this lower value has also improved the estimates of wave growth in shallow water and of low-frequency wave decay in a tidal inlet, independent of the wind drag.

**White capping**
It has been known for a long time that SWAN underestimates structurally the peak and mean wave periods. Investigations of Rogers et al. (2003) showed that adjusting a specific parameter in the white capping term of WAM Cycle III (i.e. exponent of the mean wave number) leads to an improved prediction of the wave energy at lower frequencies which, in turn, improved the wave periods. This adjustment has led to a new default value in SWAN.

**Depth-induced wave breaking**
To improve model performance of wave breaking in the depth-limited regions, including bottom slopes, reefs and horizontal flats, a literature study was carried out. This is summarized in Figure 2.

**Unstructured grids**
For many coastal applications the use of unstructured grids provides a huge modeling flexibility to have high resolution where needed. Mesh spacings are varied within the application domain using a single, unstructured mesh. This approach is economical, but it can cause accuracy errors in regions where the bathymetry is under-resolved. In particular, excessive directional turning can occur on coarsely-resolved mesh. CFL-limiters have been proposed for the spectral propagation velocities in SWAN (Dietrich et al., 2012b). These limiters are not required for model stability, but they improve accuracy by reducing local errors that would otherwise spread throughout the domain.

**SWAN-ADCIRC coupling**
At present, coupling spectral wave models with circulation models is a major step forward for wave climate studies and real-time forecasting of waves and storm surge. The tightly-coupled SWAN-ADCIRC model has become a mature tool for realistic high-resolution wave-current predictions in basin scale and inlet scale systems. The combined codes use identical grids and are highly scalable on petascale computers (Dietrich et al., 2012a). At Delft University we shall apply this model to the North Sea and Dutch Wadden Sea under extreme storm conditions for the near future. An example is depicted in Figure 5.