F105am13z[001-008]: Tidal inlet Ameland 2013

Purpose

The aim is to assess the SWAN model performance in stationary mode for the Sinterklaasstorm (December 5/6, 2013) which is one of the most severe storms (in terms of water levels and wind velocities) for which proper wave observations are available in the Wadden Sea. Hereto the starting point is the model set up as applied in WTI. Furthermore, the sensitivity of various model settings is assessed. The areas to be considered are the 'tidal inlet of Ameland' (cases f105am13z) and the 'eastern Wadden Sea' (cases f151ow13z). The focus will be on wave penetration of North Sea waves into the Wadden Sea.

Case selection – December 2013 storm

For the tidal inlet of Ameland, t1 and t2 are high water situations at Nes, with growing wind speed and off shore boundary conditions. Moment t3 is a low tide situation but with the large surges it is still quite high (NAP+1.68 m at Nes). The large significant wave heights at AZB32 are the reason to select t4, without being disturbed by the unrealistic peak at AZB22 a few moments later. Moment t5 is again a high water situation (NAP+3.2 m at Nes), with also maximum significant wave heights at the Wadden Sea locations. t6 and t7 have both strong ebb currents in the channel. Also the off shore wave conditions and the wind speed are alike. Large difference is the water level which is about 1 m lower at t7. t8 is included as low water case with lower wind speed and less offshore waves.

	time on 5/6 Dec 2013 [GMT]	charac-terization	current speed [m/s]	current dir [from°N]	obs wind speed [m/s]	observed wind dir [from °N]	observed sign. wave height H_{m0} [m]	observed wave period T_p [s]	observed water level [m+NAP]
			near AZB32	near AZB32	AWG platform	AWG platform	AZB11	AZB11	Nes
t1	22:00	HW slack	0.5	171	22.9	322	6.77	10.7	3.20
t2	00:00	HW ebb	1.1	168	24.6	303	6.94	11.9	3.26
t3	06:00	LW flood	0.3	314	21.5	306	7.24	11.6	1.68
t4	08:00	FLOOD	0.7	346	20.7	299	6.67	11.6	2.64
t5	10:00	HW slack	0.3	167	21.3	310	6.81	12.1	3.20
t6	13:00	ebb	1.5	160	18.6	296	7.17	12.8	2.21
t7	15:00	EBB	1.7	161	18.1	310	7.32	12.2	1.30
t8	18:00	LW ebb	0.7	165	15.0	305	6.31	12.5	0.26

Cases t1, …, t8 correspond to f105am13z001, …, f105am13z008.

Model setup

The following model settings are employed for this case. Note that they are different from the setting used in Deltares (2014).

```
GEN3 KOMEN
WCAP KOMEN cds2=2.36e-05    stpm=3.02e-03    powst=2.    delta=1.
QUAD       iquad=2          lambda=0.25      Cnl4=3.0e+07
LIMITER    ursell=10.0      qb=1.0
```

```
FRIC JONSWAP            cfjon=0.038
BREA CON   alpha=1      gamma=0.73
TRIAD      trfac=0.10   cutfr=2.5
```
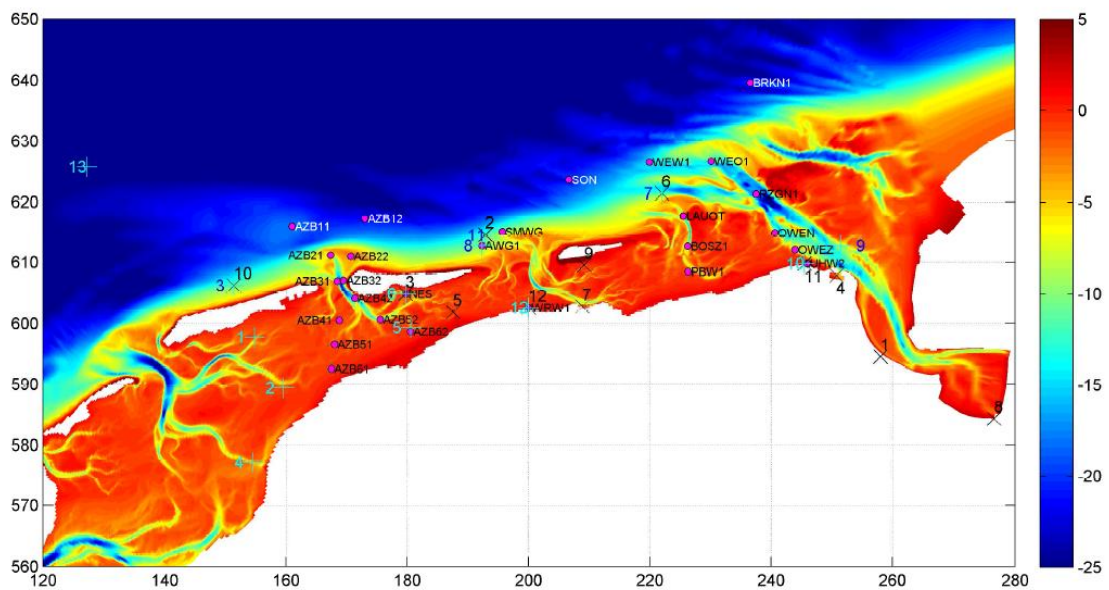
References

Deltares (2014). SWAN hindcasts Wadden Sea, December 2013. Tidal inlet of Ameland and eastern Wadden Sea. Deltares report 1209433-007-HYE-0005, Version 2, date 23 October 2014.

Acknowledgements

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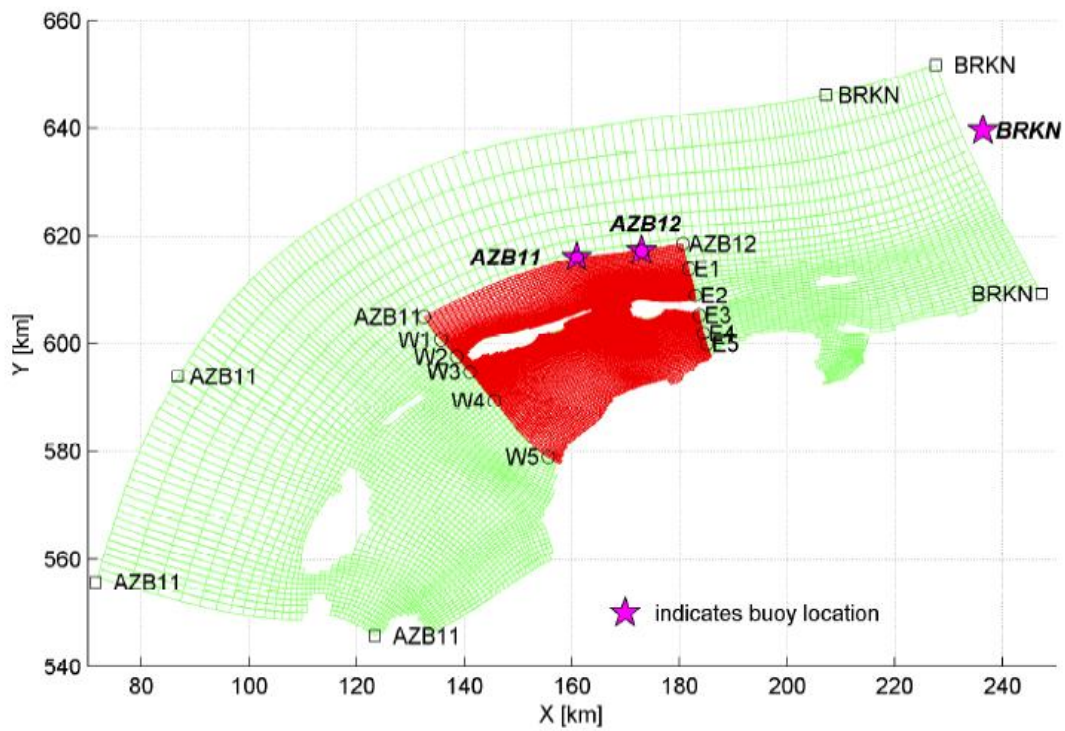
Figure

W1= (135693.334; 600756.578)   E1=(181690.734; 613917.952)

W2= (138618.049; 597658.294)   E2=(182900.00; 608910.000)

W3= (141066.000; 594787.564)   E3=(183667.926; 605360.905)

W4= (145542.769; 589433.963)   E4=(184490.219; 601989.921)

W5= (155602.247; 579002.129)   E5=(185080.354; 599929.380)

Figure. December 2013 SWAN model