Storm Surges Congress, Hamburg, Germany
13–17 September 2010
SSC2010-67

Extreme wind waves from the visual VOS observations worldwide

V. Grigorieva (1) and S. Gulev (2)

(1) P.P. Shirshov Institute of Oceanology RAS, Moscow, Russia, vika@sail.msk.ru, (2) P.P. Shirshov Institute of Oceanology RAS, Moscow, Russia, gul@sail.msk.ru

We analyse extreme wind waves using VOS collection of visual wind wave observations assembled in ICAODS archive and covering the period from 1880 onwards. In order to estimate characteristics of extreme wind waves we used individual wave reports for the space grid cells from 2º×2º degrees to 10º ×10º degrees. Wind wave height, swell height and the derived significant wave height were taken at the actual time of sampling. Then for every calendar season we estimated characteristics of extreme waves using both initial value distribution and peak over threshold methods. In order to apply extreme value statistics to heavily and inhomogeneously undersampled VOS data, we used 6-hourly snapshots of wave characteristics from ERA-40-WAM hindcast covering the period from 1960 to 2002. These model data were subsampled in order to simulate VOS sampling density. Analysis of probability distributions shows that VOS-like subsampled wind sea and SWH demonstrate regionally significantly different modal values compared to those reported by WAM. The largest deviations of probability distributions were found for the wind sea. Comparison of statistical characteristics of the fully sampled WAM data with the VOS-like undersampled subset allowed for estimation of the effect of sampling on probability distributions. Being armed with estimates of all types of biases in PDF, we estimated corrected extreme wind wave characteristics. Corrections in poorly sampled regions may be quite high and may even imply the change of sign of linear trends in extreme waves. Then we estimate long-term tendencies and characteristics of interannual variability in extreme wave parameters. During the last 50 years extreme waves in both North Atlantic and North Pacific experience slight increase, which is, however, superimposed with the pronounced decadal-scale variability.