Different sources of errors and uncertainties in the visual wave estimates

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Different sources of errors and uncertainties in visual wave observations are estimates on the basis of visual wave data from the COADS collection of marine variables. Visually observed wind wave heights and periods were extracted from COADS for the 50-year period from 1950s onwards. These data were used for the development of a global climatology of wave variables. Significant wave height has been derived from separate sea and swell estimates by different methods. Uncertainty in estimation of SWH with respect to the directions of propagation of sea and swell is estimated. Some regional recommendations for a proper estimation of SWH were derived. Special algorithms of corrections were applied to minimize some biases, inherent in visual wave data. Particularly, we corrected overestimation of small seas, underestimation of periods, and also analysed separation between sea and swell. Further analysis included estimation of random observational errors, day minus night biases and sampling errors on the basis of buoy observations and model data. Estimates of random observational errors show that for most of the locations observational uncertainties are within 20% of mean values. The highest sampling biases are observed in the South Ocean, where wave height may be underestimated by 1-1.5 m due to poor sampling, primarily associated with a fair-weather bias of ship routing and observation. Elimination of sampling bias allows for an accurate comparison of VOS wave data and model wave hindcasts.