

## **The Accuracy of Voluntary Observing Ships' Marine Meteorological Observations**

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### **Abstract**

Typically the merchant ships of the Voluntary Observing Ships scheme are recruited by a Port Meteorological Officer at a port which the ship frequently visits. The observing practises and meteorological instruments provided depend on the recruiting country and are often very basic. Indeed, the VOS system was primarily designed to aid weather forecasting, while climate change studies require higher quality data. A better understanding of the error characteristics of the VOS data is now needed for both data assimilation and climate studies.

Using sea and air temperatures as an example, this talk will show how the large random errors present in the data can be quantified. Determining the smaller, systematic biases is more difficult because correlations exist between the different variables and their respective errors. For example, the error in SST data measured using buckets is likely to depend on the air - sea temperature difference, and hence on both sea and air temperatures. Surprisingly the scatter in the air temperature data seems to vary with how the SST is measured, probably because the observing practises strongly depend on recruiting country. By transforming the data to form new variables which are uncorrelated, the systematic errors can be properly estimated and then transformed back in terms of the observed quantities. The results suggest that, while SST data from engine room intake (ERI) thermometers are very scattered, any mean bias is small. In contrast, while bucket SST data is less scattered, it is biased cold in regions of high heat flux. Previously it had been assumed that ERI data were biased warm. A report detailing the preliminary results of these studies can be downloaded from: <http://www.soc.soton.ac.uk/JRD/MET/PDF/goa.pdf>

Improving the quality of future VOS data requires fuller information on instrumentation and observing techniques, and the implementation of good observing practises. These are goals of the WMO sponsored VOS subset for climate (VOSCLIM). Eventually it is hoped to introduce better instrumentation. For example, hull contact SST sensors installed with acoustic data transmission rather than cables. The IMET project at Woods Hole Oceanographic Institute and the AutoFlux system (developed by SOC with European partners) are prototypes for future VOS instrumentation systems.