

# **A GUIDE TO MAKING CLIMATE QUALITY METEOROLOGICAL AND FLUX MEASUREMENTS AT SEA**

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# Introduction

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- **Purpose:** To provide practical guidance to persons responsible for installing and maintaining meteorological instrumentation on ships
- **Goal:** To create “climate quality” observations that can be used to achieve a range of research and operational objectives
- Guide is a joint production of the WCRP Working Group on Surface Fluxes and the SAMOS Initiative.
- Development is supported by the NOAA Office of Climate Observations and CSIRO Division of Land and Water.

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**SAMOS**

Shipboard Automated Meteorological and Oceanographic System

<http://samos.coaps.fsu.edu>

# Target Audience

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- Intended for very broad readership
  - Seagoing scientists
  - Ship technical staff
  - Project PIs (Chief Scientists)
  - Oceanographers
  - Meteorologists
  - Modelers
  - Students

# Contents

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BACKGROUND

QUICK REFERENCE

FLUX MEASUREMENTS FROM SHIPS AND BUOYS

1. The air-sea fluxes
2. Basic variables input to bulk algorithms
3. Bulk-flux meteorological sensors
4. Measurement systems
5. Particular problems on ships and buoys
6. Location of instruments
7. Instrument calibration
8. Intercomparisons
9. Documentation (metadata)
10. Securing the data
11. Bulk flux algorithms

APPENDICES

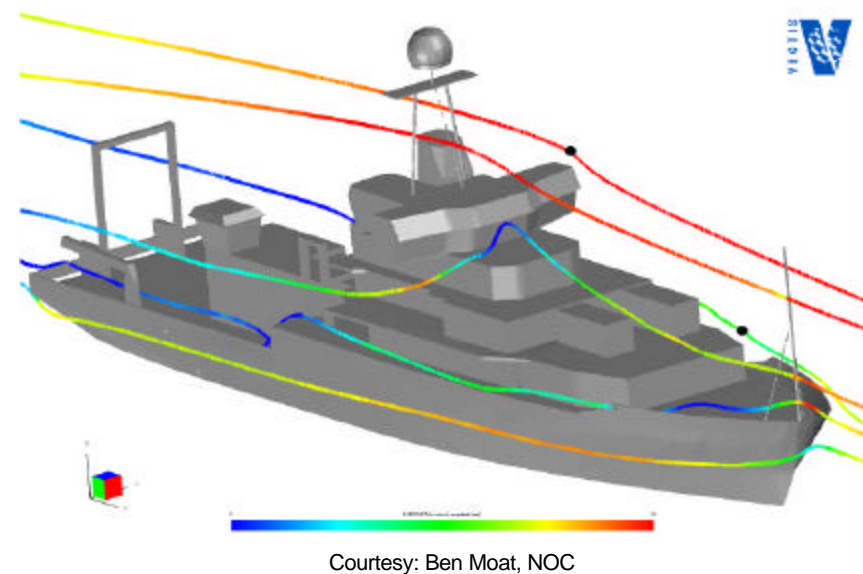
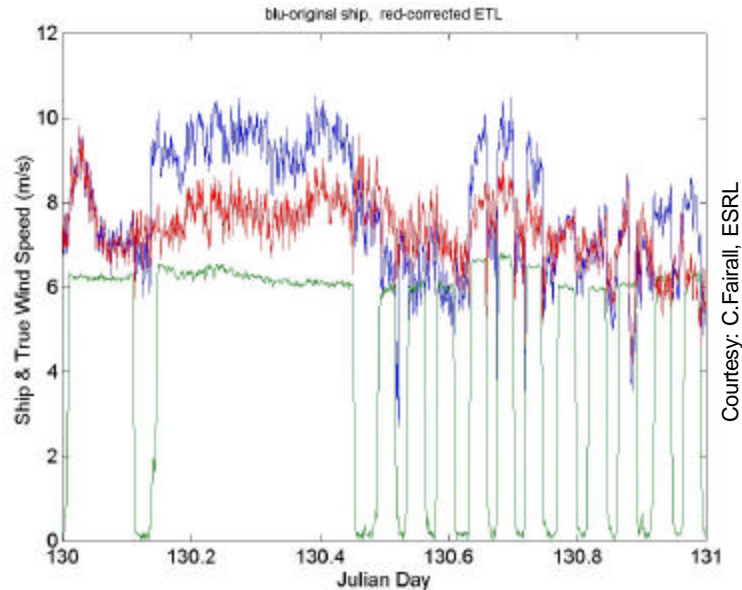
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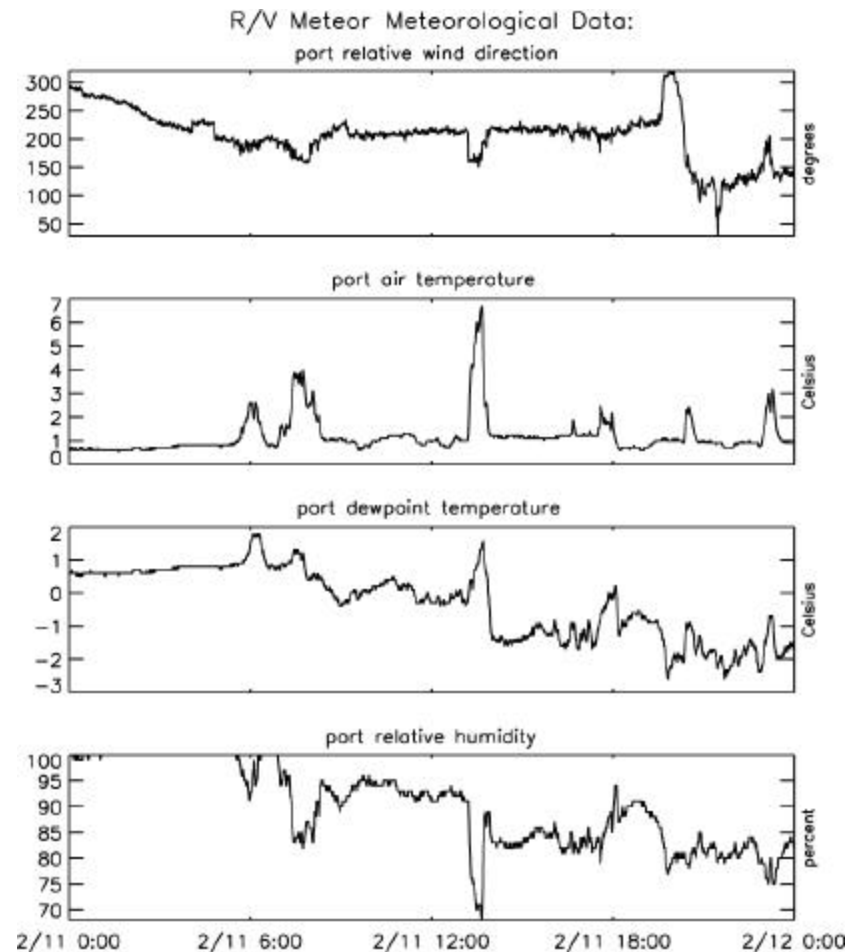
# Problems on Ships (1)



- Wind flow distortion
  - Affects more than wind data; includes precipitation, temperature, humidity
  - Users need good documentation (with photos) of wind sensor locations.
  - Modeling can be used to correct observations for flow distortion.

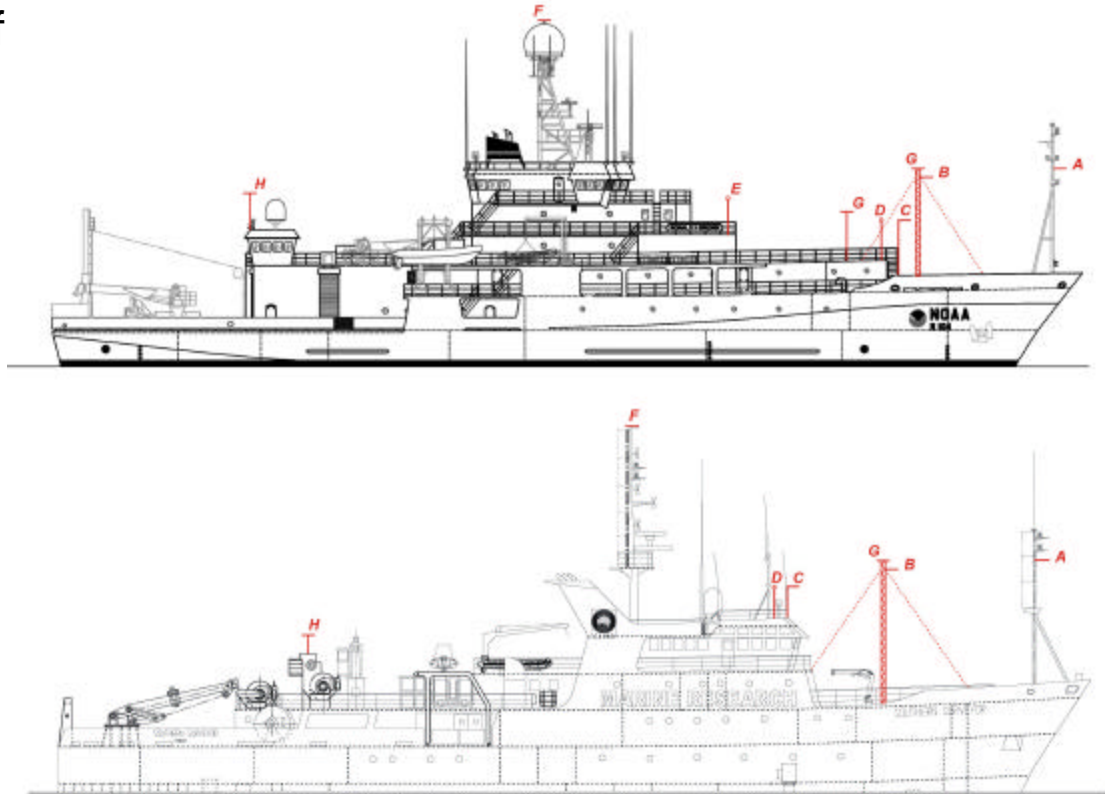
# Problems on Ships (2)

- Sea spray and salt contamination
- Ship motion
  - Sensors move through gradient of quantity being measured
  - Adversely affects wind and radiation measurements
- Exhaust contamination ✍
- Electrical problems
  - Ship power fluctuations
- Interference from RF transmissions



# Location of Instruments

- Location of instruments is critical to accuracy of measurements.
- Ideal position is high on a forward mast (A or B).
- Radiation sensors need to be free of shadows and allow for cleaning (F, G, or H).
- Due to different vessel designs, decisions must be made on case-by-case basis.



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# Distribution and Updates

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- Printed copies of the guide (version 1.0) will be provided to interested vessels.
- Presently available online at [ftp://ftp.etl.noaa.gov/user/cfairall/wcrp\\_wgsf/flux\\_handbook/](ftp://ftp.etl.noaa.gov/user/cfairall/wcrp_wgsf/flux_handbook/)
- An electronic version of the guide will be posted on the SAMOS web site.
  - Drill down capacity will allow users to access desired level of technical details.
  - Periodic updates
  - Technical contacts will be added to provide input on sensor selection and exposure, air-sea flux calculations, etc.
- Comments and questions can be sent to [samos@coaps.fsu.edu](mailto:samos@coaps.fsu.edu) for use in future versions.

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