

Observations for climate: Shipboard automated meteorological and Oceanographic systems on research vesselsShawn Smith[†]; Mark Bourassa; Jeremy Rolph; Kristen Briggs[†] Florida State University, USALeading author: smith@coaps.fsu.edu

The authors will report on ongoing activities within the United States (U.S.) to expand routine acquisition, quality control, and distribution of underway surface marine observations collected by research vessels. The Shipboard Automated Meteorological and Oceanographic System (SAMOS) initiative, in partnership with the University-National Oceanographic Laboratory System Rolling Deck to Repository (R2R) project, has recruited 28 research vessels to routinely provide navigational, meteorological, and oceanographic observations to a data assembly center (DAC) at the Florida State University. The authors will highlight efforts to evaluate the quality of the observations, collect essential metadata, provide data quality feedback to vessel operators, and ensure the long-term preservation of the data at the U.S. National Oceanographic Data Center. A SAMOS is typically a computerized data logging system that continuously records navigational (ship position, course, speed, and heading), meteorological (winds, air temperature, pressure, moisture, rainfall, and radiation), and near ocean surface (sea temperature and salinity) parameters. Measurements are recorded at high-temporal sampling rates (typically one minute or less). A SAMOS comprises scientific instrumentation deployed by the research vessel operator; instruments are not provided by the SAMOS initiative. The SAMOS initiative is complementary to the Voluntary Observing Ship (VOS) Scheme and some vessels contribute to both programs. Traditional VOS report observations at one- to six-hour intervals, much less frequently than SAMOS, to meet objectives including the initializing numerical weather prediction (NWP) models and providing input to marine climate datasets. VOS have greater spatial coverage than SAMOS by using a wider range of vessel types--some instrumented with automatic systems and some with basic instrumentation supplemented with visual observations. Growing interest in climate variability and the need to quantify the role of air-sea fluxes in the coupled ocean-atmosphere system have placed unprecedented observational requirements on marine meteorology. Since 2005, the SAMOS DAC has provided high-quality data, frequently from regions that are far outside typical VOS shipping routes. These data include extremes in winds, air temperature, humidity, sea temperature, and salinity that are essential for calibrating new satellite sensors and improving retrieval algorithms. The high-temporal frequency of SAMOS data allow accurate collocations of satellite and in situ data that account for random errors imparted by both temporal and spatial separation between observations. SAMOS vessels are frequently equipped with shortwave, longwave, and photosynthetic radiometers, providing unique records over the oceans to validate a wide range of satellite-based products. Additionally, sophisticated air-sea flux instrumentation are deployed on a limited number of research cruises, but these sensors are more expensive than conventional SAMOS instruments. SAMOS partners with groups deploying these flux systems to provide shipboard comparisons to the instrumentation used to collect SAMOS observations. SAMOS is a pragmatic solution, meeting climatologists' requirements for accuracy and temporal and spatial coverage by taking advantage of the existing fleet of suitably equipped RVs.