1-901

1. Recommended Procedure for the Measurement of Incident Solar Radiation

Prepared by the NAS/NRC Committee on Oceanography Working Group on Standardization and Intercalibration of Biological Measurements and Sampling Methods. March 28, 1963.

The following procedure is recommended for measurement of solar radiation on shipboard. For biological purposes generally useful, quantity for measurement is that of the radiation (per unit surface and time) falling upon a horizontal plane with the sensor acting as a cosine collector (this quantity may also be called irradiance, a term regularly used in the "visible" part of the spectrum).

Ideally, a continuous record should be obtained using a detector contained in a weatherproof case, mounted on gimbals, and located above the vessel's superstructure where it will receive as nearly as possible an uninterrupted view of the sky. The mounting location should be accessible to permit daily inspection and cleaning and so chosen that it is not adjacent to artificial radiation sources or near objects likely to reflect sunlight. Waterproof cable should be used to conduct the signal to the recorder.

If the mounting site of the detector is not located above the vessel's superstructure, a shadow may unavoidably fall on the detector from time to time with movement of the ship and sun. Indication of this will usually be apparent on the record and the trace should be corrected whenever this can be done with reasonable confidence.

Shock mounting of the detector on the gimbals platform is advised if vibration is strong at the location of the detector. If interference from radio frequencies originating from the vessel's communications equipment is troublesome, appropriate radio frequency filters and shielded signal leads should be employed to eliminate the interference.

The detector should be equivalent to the Eppley pyranometer (previously, pyrheliometer) (Eppley-Labs. Inc., Newport, R.I.). Both 10- and 50-junction models are available. The 10-junction detector (ca. 2 mv. per g.cal./cm^2 x min.), or equivalent, is sufficiently sensitive for use in temperate regions during the spring, summer and fall, and in the tropics on a year-around basis. The more sensitive 50-junction detector (or equivalent) which generates roughly 7.5 mv. per g.cal./cm^2 x min. should be employed during winter months at high latitudes. The signal should be recorded with a potentiometer recorder (Brown, Speedomax, or equivalent) of appropriate sensitivity, and the data reported in the manner recommended by the World Meteorological Organization. Recommendations consistent with those of WMO appear in the IGY instruction manual, Part VI, entitled "Radiation Instruments and Measurements" (Pergamon Press), pp. 450-453.

If it is not feasible to employ a pyranometer for the measurement of total radiation falling upon a horizontal plane, this quantity may be estimated by using a suitable factor applied to readings for "visible" radiation obtained through the use of a deck photometer (see Recommended Procedure for the Measurement of "Visible" Solar Radiation in Air and Water - March 4, 1963).

Regardless of the type of detector employed, recalibration and comparison with a properly calibrated stable detector is advised at frequent intervals.