



Remote Measurements & Research Company, LLC
214 Euclid Av, Seattle WA 98122 206-420-7061 info@rmrco.com

RMRCO RAD SYSTEM INSTALLED ON NOAA R/V PISCES 15 Jan 2010

A RMR Co. [RAD](#) radiation system was installed on the new NOAA research vessel [Pisces \(pdf 2.3 MB\)](#). The installation was the third NOAA vessel to receive a RAD and more are scheduled to receive system as they come on line.

The RAD (Radiation Analog to Digital interface) was designed to solve a difficult problem for climate-quality data stations. Radiation sensors, both longwave, infrared, sensors and shortwave, solar, sensors use thermopiles to sense incoming radiation. In the case of the longwave sensor the temperature of the sensor case and dome must be measured as well. The thermopile output is measured in microvolts. The calculation of actual radiation, in units of watts per square meter (W/m^2) requires good sensor calibration and, in the case of longwave measurements, the computation is a reasonably complex function of the thermopile output and the various sensor temperatures.

Scientists generally want real time data in physical units and with radiometers this is usually not possible. Having physical units is crucial in assessing measurement accuracy or diagnosing faulty equipment.

RAD is a small but powerful computer that connects to the longwave and shortwave sensors. [The Eppley Laboratory](#) standard sensors are used in these initial designs. Basically the RAD consists of very high precision, high gain preamplifiers, a 16 bit analog-to-digital-converter (ADC), and a powerful microprocessor. The microprocessor, an AVR chip, is programmed in C to sample all channels, eliminate noisy samples, average for selected times, and transmit a NMEA-like text data string over an RS232 serial connection. The Pisces operated at 9600 baud over a 75 m cable. A considerable amount of attention to grounding, filtering, digital sampling has yielded a device with exceptionally low noise ($\pm 0.02\%$). The operator can enter calibrations, offsets, time, and sampling rates over the serial connection through a simple menu.



The RAD system installed on the R/V Pisces in Pascagoula MS. The mounting plates, pipe mounts, and connecting cables are provided. Installation is accomplished in minutes.