SKYRAD Handbook

November 2004

T. Stoffel

Work supported by the U.S. Department of Energy,
Office of Science, Office of Biological and Environmental Research

Contents

1. General Overview

The Sky Radiation (SKYRAD) collection of radiometers provides each Atmospheric Radiation and Cloud Station (ARCS) with continuous measurements of broadband shortwave (solar), longwave (infrared), and ultra violet irradiances for downwelling components. These 1-minute data are collected from a network of stations to help determine the total radiative energy exchange within the Tropical Western Pacific and North Slope of Alaska.

2. Contacts

2.1 Mentor

Tom Stoffel
National Renewable Energy Laboratory
1617 Cole Blvd.
Golden, CO 80401-3393
Phone: 303-384-6395
Fax: 303-384-6391
Email: tom_stoffel@nrel.gov

Richard L. Hart, Scientific Associate
Argonne National Laboratory
Bldg. 203
Argonne IL 60439
Phone: 708-252-5839
Fax: 708-252-9792
Email: hart@anler.er.anl.gov

2.2 Instrument Developer

This section is not applicable to this instrument.

3. Deployment Locations and History

The SKYRAD is operational at the North Slope of Alaska and Tropical Western Pacific sites.

4. Near-Real-Time Data Plots

Barrow, Alaska Quicklooks

Atqasuk, Alaska Quicklooks

5. Data Description and Examples

See Near-Real-Time Data Plots, Section 4, and Data Quality Health and Status, Section 6.1.

5.1 Data File Contents

5.1.1 Primary Variables and Expected Uncertainty

The following broadband irradiance measurements are available from the SKYRAD platform: DOWNWELLING SHORTWAVE (0.3 TO 3.0 micrometers) Global Hemispheric Irradiance measured by an unshaded pyranometer with a hemispheric field of view. DIFFUSE SHORTWAVE (0.3 TO 3.0 micrometers) Diffuse Hemispheric Irradiance measured by a shaded pyranometer with a hemispheric field of view. DIRECT NORMAL SHORTWAVE (0.3 TO 3.0 micrometers) Direct Normal Irradiance measured by a solar tracking pyrheliometer with a 5.7 degree field of view. DOWNWELLING LONGWAVE (4.0 to 50 micrometers) Irradiance measured by a shaded pyrgeometer with a hemispheric field of view. ULTRA VIOLET IRRADIANCE UV-B measured by a UV-Biometer with a hemispheric field of view.

5.1.1.1 Definition of Uncertainty

This section is not applicable to this instrument.

5.1.2 Secondary/Underlying Variables

This section is not applicable to this instrument.

5.1.3 Diagnostic Variables

This section is not applicable to this instrument.

5.1.4 Data Quality Flags

SKYRAD Data Object Design Changes for ARM netCDF file header descriptions.

5.1.5 Dimension Variables

This section is not applicable to this instrument.

5.2 Annotated Examples

This section is not applicable to this instrument.

5.3 User Notes and Known Problems

This section is not applicable to this instrument.

5.4 Frequently Asked Questions

This section is not applicable to this instrument.

6. Data Quality

6.1 Data Quality Health and Status

The following links go to current data quality health and status results.

- DQ HandS (Data Quality Health and Status)
- NCVweb for interactive data plotting using.

The tables and graphs shown contain the techniques used by ARM's data quality analysts, instrument mentors, and site scientists to monitor and diagnose data quality.

6.2 Data Reviews by Instrument Mentor

This section is not applicable to this instrument.

6.3 Data Assessments by Site Scientist/Data Quality Office

All DQ Office and most Site Scientist techniques for checking have been incorporated within DQ HandS and can be viewed there.

6.4 Value-Added Procedures and Quality Measurement Experiments

Many of the scientific needs of the ARM Program are met through the analysis and processing of existing data products into "value-added" products or VAPs. Despite extensive instrumentation deployed at the ARM CART sites, there will always be quantities of interest that are either impractical or impossible to measure directly or routinely. Physical models using ARM instrument data as inputs are implemented as VAPs and can help fill some of the unmet measurement needs of the program. Conversely, ARM produces some VAPs not in order to fill unmet measurement needs, but instead to improve the quality of existing measurements. In addition, when more than one measurement is available, ARM also produces "best estimate" VAPs. A special class of VAP called a Quality Measurement Experiment (QME) does not output geophysical parameters of scientific interest. Rather, a QME adds value to the input datastreams by providing for continuous assessment of the quality of the input data based on internal consistency checks, comparisons between independent similar measurements, or comparisons between measurement with modeled results, and so forth. For more information, see the VAPs and QMEs web page.

7. Instrument Details

7.1 Detailed Description

7.1.1 List of Components

This section is not applicable to this instrument.

7.1.2 System Configuration and Measurement Methods

This section is not applicable to this instrument.

7.1.3 Specifications

This section is not applicable to this instrument.

7.2 Theory of Operation

This section is not applicable to this instrument.

7.3 Calibration

7.3.1 Theory

This section is not applicable to this instrument.

7.3.2 Procedures

This section is not applicable to this instrument.

7.3.3 History

This section is not applicable to this instrument.

7.4 Operation and Maintenance

7.4.1 User Manual

This section is not applicable to this instrument.

7.4.2 Routine and Corrective Maintenance Documentation

This section is not applicable to this instrument.

7.4.3 Software Documentation

This section is not applicable to this instrument.

7.4.4 Additional Documentation

This section is not applicable to this instrument.

7.5 Glossary

See the ARM Glossary.

7.6 Acronyms

See the ARM Acronyms and Abbreviations.

7.7 Citable References

None.