

# **Solar and Infrared Radiation Observation Station (SIROS) Handbook**

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## **1. General Overview**

Note: The SIROS instrument was converted to a [Solar Infrared Radiation Station \(SIRS\)](#).

## **2. Contacts**

### **2.1 Mentor**

This section is not applicable to this instrument.

### **2.2 Instrument Developer**

This section is not applicable to this instrument.

## **3. Deployment Locations and History**

This section is not applicable to this instrument.

## **4. Near-Real-Time Data Plots**

This section is not applicable to this instrument.

## **5. Data Description and Examples**

This section is not applicable to this instrument.

### **5.1 Data File Contents**

#### **5.1.1 Primary Variables and Expected Uncertainty**

This section is not applicable to this instrument.

##### **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**

This section is not applicable to this instrument.

#### **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**

This section is not applicable to this instrument.

### **6.2 Data Reviews by Instrument Mentor**

- **QC frequency:** Daily
- **QC delay:** Weekly
- **QC type:** QA flags; daily time-series graphical plots
- **Inputs:** “.a1” files
- **Outputs:** DQRs, summary reports
- **Reference:**

SIROS “.a1” files are now being inspected on a weekly basis. Routine inspections are planned for the data from the new solar and infrared radiation stations (SIRS) that have recently replaced the SIROSs, for data in the Campbell data logger format and the “.a0” files.

The National Renewal Energy Laboratory (NREL) uses the tools and quality assurance (QA) products from the Data Quality Management System (DQMS) software, version 2. This will allow inspection of daily time-series graphs, i.e., diurnal displays for one to seven days of global, direct, diffuse, and reflected irradiances. QA flags will be generated for each data value: a 2- digit flag (0-99) based on testing physical limits, three-component comparisons [ $global = direct * \cos(Z) + diffuse$ ], and K-space evaluations using SERI\_QC limits for each station-month-air mass combination. A Paradox-based data base management

system will be used for a data inventory (missing data, QA flags, and measured data), a station inventory (instrumentation details), and an instrumentation inventory (instrument calibration histories).

The DQMS products will then used to provide additional graphic displays helpful in assessing network performance. Weekly and monthly “K-space plots” and monthly “cylinder” plots showing QA flag and K-space values for each 5-min data point.

After fully utilizing DQMS capabilities, NREL plans to evaluate SIRS data in a spatial context. Comparisons between SIRS stations and the data available from the Oklahoma Mesonet will be made using simple GIS analysis techniques. A working prototype is planned for later this fiscal year.

Data from the central facility will be compared, for the SIRs, BRS (formerly “BSRN”), and GRAMS solar sensors. Clear-sky data from the Radiometer Calibration Facility will also be used as a basis for comparison, i.e., to provide reference direct normal, diffuse and global irradiance during BORCAL days.

NREL will also observe any effects of instrumentation exchanges due to recalibrations or equipment failures. Clear-sky irradiance data will be analyzed for possible radiometer responsivity drifts between calibrations.

Methods of reporting results will include DQRs and summary reports to the SGP site scientist team. Monthly summaries of data quality from all shortwave instrumentation at the CART site will be produced; an automated means of supplying these monthly reports to ARM data users has not yet been developed.

### **6.3 Data Assessments by Site Scientist/Data Quality Office**

This section is not applicable to this instrument.

### **6.4 Value-Added Procedures and Quality Measurement Experiments**

This section is not applicable to this instrument.

## **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**

See the [Preventative Maintenance Procedure Summaries for the SIROS](#) at the Southern Great Plains (SGP) Site.

## **7.5 Glossary**

See the [ARM Glossary](#).

## **7.6 Acronyms**

See the [ARM Acronyms and Abbreviations](#).

## **7.7 Citable References**

This section is not applicable to this instrument.