STATION UPGRADE-MAY, 1998

Set up of the CIMEL automatic Sun tracking photometer (ASTP)

The ASTP has been set up on the roof of the staircase of the engineering building. The control box of the instrument and the robot with the optical head were placed on two adjacent heavy laboratory tables. The orientation of the tables is North-South, and the control box has been placed on the table to the North. The two solar panels (one for the ASTP and one for the transmitter) have been mounted on a separate stone plate and placed on the second table, south to the CIMEL robot. The RF antenna was placed in the southwest corner of the roof with an orientation of about 15 degrees to west from south and with an elevation of 80 degrees. A rain sensor has been fixed to the top of the first table. The control box has been fixed to the table.

The control box accommodates the sun photometer, the data collecting platform (DCP) and the RF power amplifier together with two 6 Volt batteries for the sun photometer and one 12 Volt battery for the transmitter. A 12 Volt charge regulator is also needed for the transmitter battery.

Setup of the sensors and the data acquisition system

The radiation instrumentation and the sensors for the conventional meteorological observations have been set up on the roof of the staircase of the Physics Building. Radiation sensor platforms have been rebuilt and a new solid stone platform has been constructed for the new solar tracker. The CR10 data acquisition computer has been programmed to sample 14 different sensors together with the internal temperature and battery voltage. The sampling rate is two seconds and the integration time is one minute. The connected SM716 storage module (configured to fill and stop) is capable of storing about ten or eleven days of measurements. The following quantities are measured:

Atmospheric pressure
The sensor is mounted in the protective box containing the CR10. This sensor is working in a continuous mode. This sensor uses the single ended input channel 1 (SE1) and the output location 1 (LOC1). The sensor output signal is converted to HPa.

Temperature
Temperature is measured with a combined temperature-humidity sensor placed at the western edge of the southern sensor platform. The CR10 assignment of the sensor is SE2 and LOC2 and the sensor output signal is converted in Celsius grade.

Humidity
Humidity is measured with a combined temperature-humidity sensor placed at the western edge of the southern sensor platform. The CR10 assignment of the sensor is SE3 and LOC3 and the sensor output signal is converted into percent.

Longwave downward radiation (Pyrgeometer)

The pyrgeometer has been mounted on the platform of the solar tracker. The silicon dome is shaded by the tracker's middle shading ball. The pyrgeometer uses the SE4, SE5 and SE6 input channels with the LOC4, LOC5 and LOC6 output locations corresponding to the pyrgeometer pile signal, body thermistor and dome thermistor respectively. These signals are in mVs, and require further processing to obtain the downward longwave radiation in the conventional Wm-2 units.

Direct PAR

This is a new sensor constructed using a NIP housing and a standard LICOR LI-1000 quantum sensor. The sensor is mounted on the tracker's lower right instrument holder (if facing the instrument from the side of the shading ball). This sensor uses the SE7 input channel and LOC7 output location and the signal is in mV. To convert the signal to PPFD a calibration constant should be derived from a larger set of simultaneously measured global and diffuse PAR.

Global PAR

Global PAR is measured with a LICOR LI-1000 quantum sensor mounted between the pyranometer to measure the global total and a backup 20W solar panel fixed around the middle of the southern sensor's platform. The global PAR uses the SE8 input channel and LOC8 output location. The signal is in mV units. Conversion of mV to PPFD units is simple the multiplication with the calibration constant.

Diffuse PAR

This quantum sensor is mounted under the shading ring on the eastern side of the northern sensor platform. The input cannel is SE12 and output location is LOC12. The signal is in mV and may be converted to PPFD units by multiplying with the calibration coefficient.

Direct short wave (SW)

The normal incidence pyranometer (NIP) is mounted on the lower left instrument holder of the tracker just below the tracker's sun sensor. The NIP uses the input channel SE10 and output location LOC10. The measured signal is in mV and to obtain Wm-2 further conversion is necessary using the calibration coefficient.

Global SW

The pyranometer (PSP) has been mounted on the eastern edge of the southern sensor platform, beside the global PAR quantum sensor. The PSP input cannel is SE9 and output location is LOC9. Use the calibration coefficient to convert the mV signal to Wm^2

Wetness

The wetness sensor is mounted beside the temperature-humidity sensor on the southern

sensor platform. This sensor has been positioned with a slope of about 45 degree relative to the surface to facilitate faster response to the stop of the rain. The input cannel is SE11 and the output location is LOC11. The signal is in mV and no further conversion is necessary to this measurement. The rain stop threshold should be determined experimentally.

Rain intensity

This sensor is a standard tipping bucket rain gauge mounted on a post of about 150 cm height in the south-west corner of the roof. The pulse counter channel 1 (PC1) of the CR10 has been configured to switch closure and the LOC15 has been assigned to store the average pulse count.

Internal temperature
The CR10 internal temperature does not require input channel, and the output location is LOC13. The temperature is in degrees.

Battery voltage

The CR10 battery voltage does not require input channel, and the output location is LOC14. The battery voltage is in Volts.
Two more sensors were installed but not connected to the CR10. In the western side of the northern sensor platform and under the former pyrgeometer-shading ring there is a PSP. In case of continuous failure of the tracker this pyranometer should be connected to the CR10 (instead of the NIP). If this happens, then the diffuse PAR sensor should be repositioned.

The solar panel on the southern platform should be permanently connected to a 12 Volts back-up battery trough a charge regulator. This back-up battery should be kept with full charge and used with the CR10 or with the CIMEL transmitter if needed.