Quickstart Guide

STELLA versions Q, 1.0, 1.1 and 2.0

WHAT IS STELLA?

STELLA (Science and Technology Education for Land/Life Assessment) instruments are low-cost do-it-yourself handheld spectrometers that were designed to provide learners of all ages with an affordable instrument to collect spectral data.

HOW DOES STELLA WORK?

Spectrometers are scientific instruments used to measure and study how light interacts with physical objects. With state-of-the-art sensors, STELLA measures the intensity of light reflected from surfaces across a range of wavelengths in the visible and near-infrared regions of the electromagnetic spectrum, much like the sensors on Landsat satellites. Also like Landsat, the sensors filter the light - instead of using a diffraction grating.Twelve spectral measurements are made, ranging from 450 nanometers (nm) in the violet/blue area of the visible light spectrum to 860 nm in the near-infrared region. STELLA also includes sensors that measure surface temperature (emitted far infrared light), air temperature, relative humidity, barometric pressure, and altitude. STELLA incorporates a single, very broad thermal sensor. While STELLA's thermal sensor is much less precise than Landsat's, it does give users the ability to make instantaneous temperature readings.

WHAT DOES STELLA MEASURE?

*   Visible light in microwatts per centimeter squared (µW/m2):
        450 nm, 500 nm, 550 nm 570 nm, 600 nm, 650 nm
*   Near-infrared light in microwatts per centimeter squared (µW/m2):
        610 nm, 680 nm, 730 nm, 760 nm, 810 nm, 860 nm
*   Surface temperature (far infrared light) in degrees Celsius
        5600 nm to 14,000 nm
*   Air temperature in degrees Celsius
*   Ambient conditions:
*   Relative humidity (percent), and barometric pressure (hectopascals\
*   Altitude in meters
*   Time in Coordinated Universal Time (UTC)

HOW CAN STELLA HELP US UNDERSTAND OUR WORLD?

STELLA helps users improve their understanding of Earth science concepts through scientific engagement, discovery, and inquiry. With STELLA in hand, users can assess the spectral output and reflectance patterns associated with various land cover like building materials or vegetation. For example, healthy vegetation, which has high chlorophyll content, absorbs blue and red light and reflects green and near-infrared light. As plants become stressed and unhealthy, they reflect more visible light and less near-infrared light. Early indicators of plant stress can be detected with a spectrometer often before our eyes can see the change.

ACTIONS TO TAKE SPECTRAL MEASUREMENTS USING STELLA -1.0 or 1.1:

1. **Insert micro SD card into the STELLA.**
   Each measurement include a real-time and date stamp and data batch number that is displayed in the upper right corner of the display. TIP: It is helpful to write this number down before taking measurements and document any other data collection parameters such as distance from subject, cloud cover, location, time of day in your time zone and any complications.
2. **Turn the STELLA on**
   Press and release the power button. The display will show a welcome screen while the system is booting up. When the device is ready to use, the instrument table will appear.
3. **Press the Yellow circle for Single Point mode.** Note: A red light flashes when a data point is recorded. If the red light stays on, the SD card is missing or corrupt.
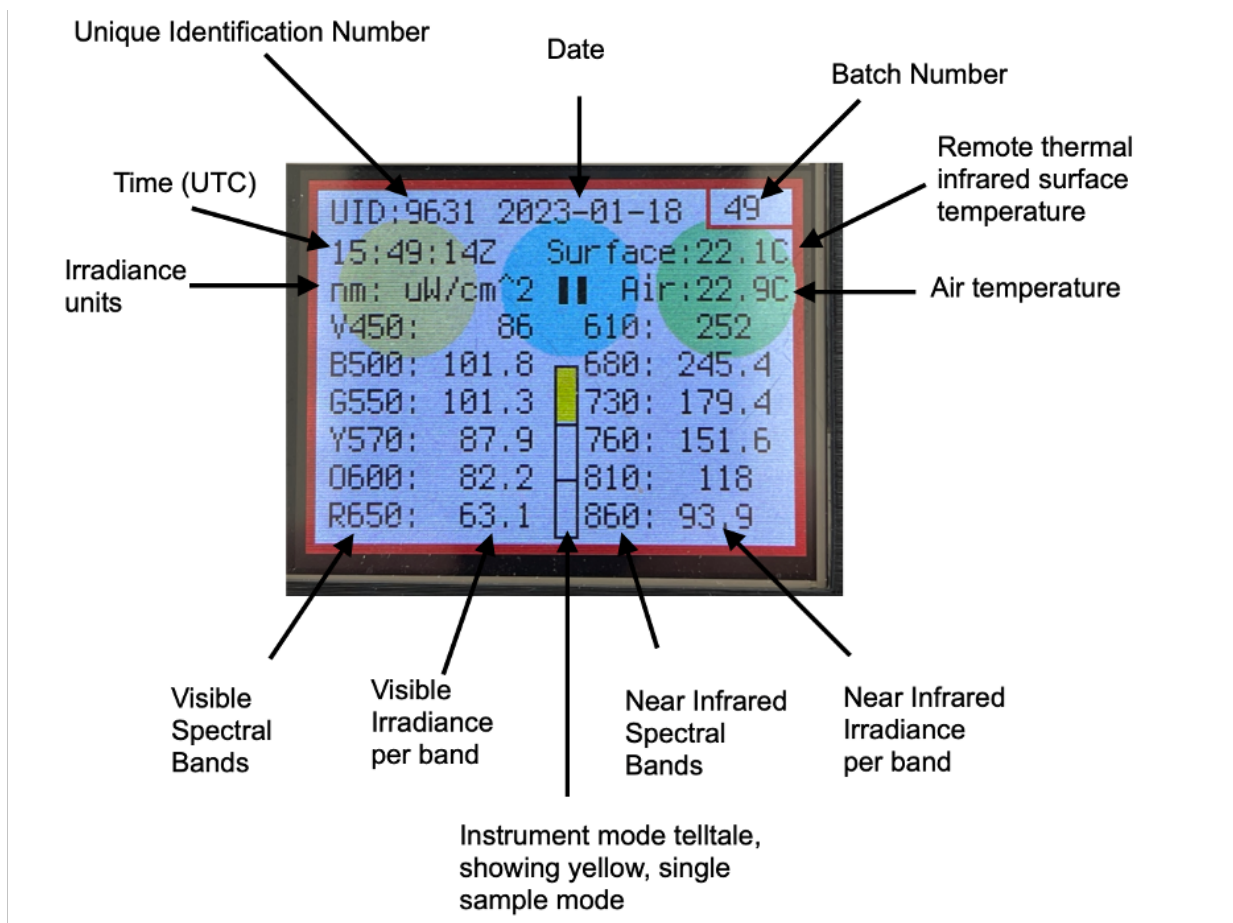4. **Position the STELLA so that the sensors are pointed at your target.**
   Area of measurement will be almost as wide the distance from it.
5. **Press the pushbutton to take a measurement.**
   The red light will flash when a data point it recorded.

Your measurement will display on the touchscreen.

Unique Identification Number
Date
Batch Number
Remote thermal infrared surface temperature
Time (UTC)
Irradiance units
Air temperature

UID:9631 2023-01-18 49
15:49:14Z Surface:22.1C
nm: uW/cm^2 ▐▐ Air:22.9C
V450: 86 610: 252
B500: 101.8 680: 245.4
G550: 101.3 730: 179.4
Y570: 87.9 760: 151.6
O600: 82.2 810: 118
R650: 63.1 860: 93.9

Visible Spectral Bands
Visible Irradiance per band
Near Infrared Spectral Bands
Near Infrared Irradiance per band
Instrument mode telltale, showing yellow, single sample mode

HOW TO CHARGE A STELLA:

Connect the STELLA to a USB port with a USB cable. The connection will charge the battery whether the device is turned on or off. The amber light next to the USB port, inside the housing, will turn off when the battery is fully charged.