Integrated Surface Flux System

Integrated Surface Flux System (ISFS) is part of The National Center for Atmospheric Research Earth Observing Lab (NCAR / EOL). Our mission is to make atmospheric observations to support National Science Foundation-funded research projects. We deploy suites of ground- and tower-mounted instruments in support of university researchers studying a wide variety of topics in locations all around the world.

ISFS combines the capabilities of a network of surface weather stations with the ability to support intensive micrometeorological research at a single or multiple sites. Investigators can configure ISFS resources to match the research objectives of each field project.

Multiple sites (presently 30) can be instrumented to measure near-surface wind, temperature, humidity, pressure, and precipitation in the network mode. As needed, scientists can also request measurements of momentum fluxes, sensible and latent heat fluxes, short-wave and long-wave radiation, soil temperature, soil moisture, and soil heat flux at each station.

ISFS Sensors

- Fluxes/Turbulence: 3-Component Sonic Anemometer with infrared CO2/H2O Gas Analyzer
- Meteorology/Turbulence: Absolute Nanobarometer
- Fluxes/Hydrology: Soil Thermal Properties and Moisture
- Radiative forcing: 4-Component Integrated Radiometer
- Also: 1- Component Long & Short wave Radiometers
- Meteorology: 2-Component Sonic Anemometer (with heating)
- Meteorology: Temperature/Humidity
- All-Season Precipitation: Optical Distrometer

Major types of measurements

- Basic meteorology
- Surface energy balance
  - 4-component radiation
  - Sensible/Latent heat flux
  - Soil heating/moisture
- Dry deposition (CO₂, O₃, aerosols, water!, snow!)
- Flux-gradient relations (u*, T*, q*)
- Turbulent Kinetic Energy (TKE) budget
- Through-canopy turbulence
- Radiative flux divergence (clear-air nocturnal, fog)

ISFS Towers

The instruments can be mounted on a variety of towers at multiple heights in multiple locations to collect the desired measurements.

Data and Power

- Data are recorded and stored on our Linux based data acquisition systems running NIDAS. Data can be recorded at sampling frequencies up to 60 Hz.
- Stations can be powered with ISFS solar panels with backup batteries or AC line power where available.
- Data products are quality controlled after post calibration of sensors, and final data products are provided within 6 months of the completion of the field project.

Base Trailer

The ISFS Base trailer can be deployed with field projects to provide office space, and mechanical/electronic work space.

Flux Tower Deployments

NCAR/EOL Flux Tower Deployments 1990-2023