One Second Dataset

These data contain surface meteorological measurements of the Integrated Surface Flux System (ISFS) during the Persistant Cold-Air Pool Study (PCAPS) in the Salt Lake basin, during the winter of 2010, 2011.

For general information about the operations of the ISFS during PCAPS click here.

The ISFS one second dataset contains averages and single point values of many variables measured by the 7 NCAR ISFS stations during PCAPS.

The data are stored in 93 day-long NetCDF files, which are available for download at http://data.eol.ucar.edu/codiac/dss/id=233.003.

Information on the NetCDF file format and software is available at http://www.unidata.ucar.edu/software/netcdf/.

Time Representation

The first ISFS measurements were recorded on Nov 10, 2010, the last on Feb 10, 2011.

Each file contains data for one day, from 00:00 UTC to 24:00 UTC. The file names contain the date, formatted as "isfs_1Hz_YYYYMMDD.nc", where YYYY, MM and DD are the numeric year, month and day.

The **base_time** variable contains one value, the time of the start of the file, as a number of POSIX (non-leap) seconds since 1970 Jan 1, 00:00 UTC.

Values for each time-varying measurement will be found in the NetCDF files, as a variable with a **time** dimension. There are 288 5 minute periods per day, so the time dimension is 288.

The **time** variable contains the time to be associated with each sample, in units of seconds since **base_time**, or 00:00 UTC of the day. Each time value is the middle of the averaging period, and will have values of 0.5 (00:00:00.5 UTC), 1 (00:00:01), etc, up to 86399.5 (23:59:59.5 UTC).

Time-series variables and variables associated with multiple stations have one or both of the following dimensions:

Dimension name	size	description
time	86400	number of seconds in a day
station	7	index for each of the 7 ISFS stations

Variables that were recorded at rates faster than 1 Hz, namely **u**, **v** and **spd** from sonic anemometers, have been averaged to 1 second. Radiation and soil variables that were recorded at approximately 1/5 Hz will have missing values interspersed with measured values.

The missing data value is 1.0×10^{37}, indicating the sensor was not reporting at the corresponding time and station for the given variable, or that the data value did not meet QC criteria during post-project analysis.

The variables in the NetCDF files are:

Variable name	units	dimensions	description
latitude	degrees-north	station	Latitude of each station
longitude	degrees-east	station	Longitude of each station
base_time	seconds		POSIX time, non-leap seconds since 1970-01-01 00:00:00 00:00 UTC
time	seconds	time	Middle of each sampling period, in seconds since base_time.
P_2m	mb	time,station	Barometric pressure at 2 meters
T_2m	degC	time,station	Ambient air temperature at 2 meters
RH_2m	%	time,station	Relative humidity at 2 meters
Rainr	mm/hr	time,station	Liquid water precipitation rate, measured by ETI weighing precipitation gauge, at stations 3,4 and 6
u (See Note 1)	m/s	time,station	U component of wind, as measured by Campbell CSAT3 sonic anemometer, averaged from 60Hz samples.
v	m/s	time,station	V component of wind, from CSAT3, averaged from 60Hz samples
spd	m/s	time,station	Wind speed, average of CSAT3 60Hz wind speeds, calculated from components: spd=sqrt(u^2+v^2)
spd_max	m/s	time,station	Maximum 60Hz wind speed during the second
ldiag (See Note 2)		time,station	Fraction of non-zero CSAT3 diagnostic values for the second. 0=all OK.

Variable name	units	dimensions	description
counts_sonic (See Note 2)		time,station	Number of CSAT3 samples averaged. The usual value of 60 indicates that all 60 samples were received during the second.
sonicHeight	m	station	Approximate measurement height above ground of the CSAT3 anemometer at each station.
U_10m	m/s	time,station	U component of wind speed, as measured by RMYoung prop-vane anemometer at 10 meters at stations 1 and 6.
V_10m	m/s	time,station	V component of wind speed from RMYoung at 10 meters.
Rlw_in	W/m^2	time,station	Incoming long wave (infra-red) radiation, as measured by pyrgeometer
Rlw_out	W/m^2	time,station	Outgoing long wave radiation
Rsw_in	Wm^2	time,station	Incoming short wave (solar) radiation, as measured by pyranometer
Rsw_out	W/m^2	time,station	Outgoing short wave radiation
Rsw_dfs	W/m^2	time,station	Incoming, diffuse (indirect) solar radiation, measured by Licor pyranometer with a manually adjustable shadowband
Rsw_global	W/m^2	time,station	Incoming global solar radiation, Licor pyranometer without shadowband
Rsw_dfs_spn1	Wm^2	time	Incoming, diffuse solar radiation, as measured by SPN1 sunshine pyranometer at station 7
Rsw_global_spn1	W/m^2	time	Total incoming solar radiation, as measured by SPN1 at 7
Gsoil_5cm, Gsoil_5cm_aux (See Note 3)	W/m^2	time,station	Soil heat flux at approximately 5 cm below surface.
Qsoil, Qsoil_aux	vol%	time,station	Soil moisture content, at approximately 2.5 cm below surface
Tsoil_0_6cm, Tsoil_0_6cm_aux	degC	time,station	Soil temperature at approximately 0.6 cm below surface
Tsoil_1_9cm, Tsoil_1_9cm_aux	degC	time,station	Soil temperature at a depth of approx 1.9 cm
Tsoil_3_1cm, Tsoil_3_1cm_aux	degC	time,station	Soil temp at a depth of approx 3.1 cm
Tsoil_4_4cm, Tsoil_4_4cm_aux	degC	time,station	Soil temp at a depth of approx 4.4 cm
Lambdasoil. Lambdasoil_aux	W/m/degK	time,station	Soil thermal conductivity, computed from measurements of Hukseflux TP01.
asoil, asoil_aux	m^2/s	time,station	Soil diffusivity from TP01
Cvsoil, Cvsoil_aux	J/(m^3 K)	time,station	Soil heat capacity from TP01

- Note 1: u and v wind components from CSAT3 sonic anemometers are in standard meteorological coordinates, where a positive u is wind TO the east, positive v is wind TO the north. The original 3D wind vectors have been corrected for sonic tilt, as described here.
- Note 2: Signal levels of CSAT3 sonic anemometers are strongly influenced by liquid water. The ldiag and counts_sonic variables provide a quality indicator for the wind measurements, where ldiag=0 and counts_sonic >= 59 indicate that no signal problems were detected during the second. Note that due to oscillator clock drift of the sonic relative to the data system, sometimes 59 or 61 samples will be averaged in a second.
- Note 3: Auxiliary soil measurements, as indicated with an "_aux" suffix, were sampled at stations 1,5 and 6.

For values of the surface heat flux, derived from the soil heat flux at 5 cm and the heat storage in the soil from 0 to 5 cm, see the 30 minute dataset.