30 Minute ISFS Data for SOAS

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These data contain surface meteorology measurements of the Integrated Surface Flux System (ISFS) during the Southern Oxidant and Aerosol Study (SOAS), at the Alabama Aquatic Biodiversity Center (AABC), during May, June and July of 2013.

For general information about the operations of the ISFS during SOAS see https://www.eol.ucar.edu/field_projects/soas.

The ISFS 30 minute dataset contains some of the first and second moments of variables measured by the NCAR ISFS during SOAS, in addition to derived calculations of the fluxes of sensible and latent heat, friction velocity, surface heat flux and net radiation.

The data are stored in NetCDF files. Information on the NetCDF file format and software is available at http://www.unidata.ucar.edu/software/netcdf/. Information specfic to ISFS NetCDF files is available at https://www.eol.ucar.edu/content/isfs-netcdf-files.

NetCDF File Names

Each NetCDF file contains one week of data. The file names are of the form "isfs_YYYYMMDD.nc", where YYYYMMDD is the year, month and day in UTC of the start of the data.

NetCDF Variables

See the table at the bottom of this page for a partial listing of the variables in the file. The second moments are not listed in that table.

See the table at https://www.eol.ucar.edu/content/soas-isfs-page for information on the sensors that were deployed.

Time Representation

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. The time dimension for a file containing a full week of data will be 336, the number of 30 minute periods in a week.

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 900 (00:15:00 UTC), 2700 (00:45:00), etc, up to 86250 (23:45:00 UTC).

Dimensions

The NetCDF dimensions in each file are:

Dimension name	size	description
time	up to 336	number of 30 minute periods in a week
site	2	index for the
layout	2	index to indicate one of two station layouts.

Short Name Attributes

Each measured variable will have a **short_name** NetCDF attribute. The field before the first period in the **short_name** is a generic variable name, such as **T** for temperature, **Rsw** for short wave radiation, or **u** for the U component of the wind. For second moments, such as variances and co-variances, the first field of the **short_name** will contain single quote marks after a variable to indicate it is an average of a deviation. For example, a leading short name of **w'tc'**, indicates the quantity is an average of (**w**-mean(**w**)) * (**tc**-mean(**tc**)), where mean(x) is the 5 minute mean of the variable x, **w** is the vertical wind component, and **tc** is the temperaure from the speed of sound.

Higher Moments

For each of the 3-D sonic anemometers, the following second moments in **u**,**v**,**w** and **tc** are provided for the computation of eddy-correlation fluxes. Scalar values such as water vapor density and carbon dioxide were also measured at the same locations. **kh2o** is a water vapor measurement from a Campbell krypton hygrometer at 2 and 13.9 meters on the AABC tower. **h2o** and **co2** are water vapor and carbon-dioxide measurements from LICOR 7500 gas analyzers at 8, 20, 26, 32 and 43.9 meters, and from a Campbell Scientific EC150 IRGA at 38 meters.

Second Moments

	u	v	w	tc	kh2o	h2o	co2
u	u'u'	u'v'	u'w'	u'tc'	u'kh2o'	u'h2o'	u'co2'
v		v'v'	v'w'	v'tc'	v'kh2o'	v'h2o'	v'co2'

	u	v	w	tc	kh2o	h2o	co2
w			w'w'	w'tc'	w'kh2o'	w'h2o'	w'co2'
scalar variances				tc'tc'	kh2o'kh2o'	h2o'h2o'	co2'co2'

Heights

The height in meters above ground of the measurement, if appropriate, will be indicated in a second field after a period in the **short_name**, for example **RH.26m**, or **u'tc'.38m**.

Variable Names

The actual NetCDF variable names will have underscores, '_', in place of periods and single quotes. Therefore a variable with a **short_name** attribute of **w'co2'.38m** will have a NetCDF variable name of **w_co2__38m**.

Units and Long Names

Each variable will have NetCDF attributes containing the units of the measurement, and a long name giving more information on the measurement.

Counts Attributes

Variables from sensors used in eddy-covariance flux measurements will have a **counts** attribute indicating the number of samples that were included in each statistic.

Missing Data

The missing data value is 1×10^{37}. A missing value indicates either that nothing was measured at the location indicated in the variable name and station index, or the sensor was not reporting at the given time, or it was detemined that the data value did not meet QC criteria during post-project analysis.

Table of NetCDF Variables

The following is a partial listing of the variables in the NetCDF files. It does not contain the second moments.

NetCDF name	ISFF short name	Units	Dimensions	Long Name
u_2m	u.2m	m/s	time	Wind U component from CSAT3
v_2m	v.2m	m/s	time	Wind V component from CSAT3
w_2m	w.2m	m/s	time	Wind W component from CSAT3
tc_2m	tc.2m	degC	time	Virtual air temperature from speed of sound, CSAT3
kh2o_2m	kh2o.2m	g/m^3	time	CSI Krypton water vapor
T_2m	T.2m	degC	time	Air Temperature from NCAR hygrothermometer
RH_2m	RH.2m	%	time	Relative Humidity from NCAR hygrothermometer
H_2m	H.2m	W/m^2	time	
LE_2m	LE.2m	W/m^2	time	
rhoDry_2m	rhoDry.2m	kg/m^3	time	
u__2m	u*.2m	m/s	time	
p_8m	p.8m	mb	time	Barometric Pressure, Paroscientific 6000
u_8m	u.8m	m/s	time	Wind U component from CSAT3
v_8m	v.8m	m/s	time	Wind V component from CSAT3
w_8m	w.8m	m/s	time	Wind W component from CSAT3
tc_8m	tc.8m	degC	time	Virtual air temperature from speed of sound, CSAT3
h2o_8m	h2o.8m	g/m^3	time	LICOR 7500 water vapor density
co2_8m	co2.8m	g/m^3	time	LICOR 7500 CO2 density
T_8m	T.8m	degC	time	Air Temperature from NCAR hygrothermometer
RH_8m	RH.8m	%	time	Relative Humidity from NCAR hygrothermometer
lidiag_8m	lidiag.8m		time	LICOR 7500 diagnostic value
H_8m	H.8m	W/m^2	time	
LE_8m	LE.8m	W/m^2	time	
rhoDry_8m	rhoDry.8m	kg/m^3	time	
u__8m	u*.8m	m/s	time	
u_13_9m	u.13.9m	m/s	time	Wind U component from CSAT3
v_13_9m	v.13.9m	m/s	time	Wind V component from CSAT3
w_13_9m	w.13.9m	m/s	time	Wind W component from CSAT3
tc_13_9m	tc.13.9m	degC	time	Virtual air temperature from speed of sound, CSAT3
kh2o_13_9m	kh2o.13.9m	g/m^3	time	CSI Krypton water vapor
T_13_9m	T.13.9m	degC	time	Air Temperature from NCAR hygrothermometer
RH_13_9m	RH.13.9m	%	time	Relative Humidity from NCAR hygrothermometer
H_13_9m	H.13.9m	W/m^2	time	
LE_13_9m	LE.13.9m	W/m^2	time	
rhoDry_13_9m	rhoDry.13.9m	kg/m^3	time	

u__13_9m	u*.13.9m	m/s	time	
p_20m	p.20m	mb	time	Barometric Pressure, Paroscientific 6000
u_20m	u.20m	m/s	time	Wind U component from CSAT3
v_20m	v.20m	m/s	time	Wind V component from CSAT3
w_20m	w.20m	m/s	time	Wind W component from CSAT3
tc_20m	tc.20m	degC	time	Virtual air temperature from speed of sound, CSAT3
h2o_20m	h2o.20m	g/m^3	time	LICOR 7500 water vapor density
co2_20m	co2.20m	g/m^3	time	LICOR 7500 CO2 density
T_20m	T.20m	degC	time	Air Temperature from NCAR hygrothermometer
RH_20m	RH.20m	%	time	Relative Humidity from NCAR hygrothermometer
lidiag_20m	lidiag.20m		time	LICOR 7500 diagnostic value
H_20m	H.20m	W/m^2	time	
LE_20m	LE.20m	W/m^2	time	
rhoDry_20m	rhoDry.20m	kg/m^3	time	
u__20m	u*.20m	m/s	time	
u_26m	u.26m	m/s	time	Wind U component from CSAT3
v_26m	v.26m	m/s	time	Wind V component from CSAT3
w_26m	w.26m	m/s	time	Wind W component from CSAT3
tc_26m	tc.26m	degC	time	Virtual air temperature from speed of sound, CSAT3
h2o_26m	h2o.26m	g/m^3	time	LICOR 7500 water vapor density
co2_26m	co2.26m	g/m^3	time	LICOR 7500 CO2 density
lidiag_26m	lidiag.26m		time	LICOR 7500 diagnostic value
T_26m	T.26m	degC	time	Air Temperature from NCAR hygrothermometer
RH_26m	RH.26m	%	time	Relative Humidity from NCAR hygrothermometer
H_26m	H.26m	W/m^2	time	
LE_26m	LE.26m	W/m^2	time	
rhoDry_26m	rhoDry.26m	kg/m^3	time	
u__26m	u*.26m	m/s	time	
u_32m	u.32m	m/s	time	Wind U component from CSAT3
v_32m	v.32m	m/s	time	Wind V component from CSAT3
w_32m	w.32m	m/s	time	Wind W component from CSAT3
tc_32m	tc.32m	degC	time	Virtual air temperature from speed of sound, CSAT3
h2o_32m	h2o.32m	g/m^3	time	LICOR 7500 water vapor density
co2_32m	co2.32m	g/m^3	time	LICOR 7500 CO2 density
lidiag_32m	lidiag.32m		time	LICOR 7500 diagnostic value
p_32m	p.32m	mb	time	Barometric Pressure, Paroscientific 6000
T_32m	T.32m	degC	time	Air Temperature from NCAR hygrothermometer
RH_32m	RH.32m	%	time	Relative Humidity from NCAR hygrothermometer
H_32m	H.32m	W/m^2	time	
LE_32m	LE.32m	W/m^2	time	
rhoDry_32m	rhoDry.32m	kg/m^3	time	
u__32m	u*.32m	m/s	time	
u_38m	u.38m	m/s	time	Wind U component from CSAT3
v_38m	v.38m	m/s	time	Wind V component from CSAT3
w_38m	w.38m	m/s	time	Wind W component from CSAT3
tc_38m	tc.38m	degC	time	Virtual air temperature from speed of sound, CSAT3
h2o_38m	h2o.38m	g/m^3	time	Water vapor density from CSI IRGA
co2_38m	co2.38m	g/m^3	time	CO2 density from CSI IRGA
irgadiag_38m	irgadiag.38m		time	CSI IRGA diagnostic
T_38m	T.38m	degC	time	Air Temperature from NCAR hygrothermometer
RH_38m	RH.38m	%	time	Relative Humidity from NCAR hygrothermometer
H_38m	H.38m	W/m^2	time	
LE_38m	LE.38m	W/m^2	time	
rhoDry_38m	rhoDry.38m	kg/m^3	time	
u__38m	u*.38m	m/s	time	
Rlw_in_41m	Rlw.in.41m	W/m^2	time	
Rlw_out_41m	Rlw.out.41m	W/m^2	time	
Rsw_in_41m	Rsw.in.41m	W/m^2	time	
Rsw_out_41m	Rsw.out.41m	W/m^2	time	
Rsum_41m	Rsum.41m	W/m^2	time	
lidiag_43_9m	lidiag.43.9m		time	LICOR 7500 diagnostic value
p_43_9m	p.43.9m	mb	time	Barometric Pressure, Paroscientific 6000
u_43_9m	u.43.9m	m/s	time	Wind U component from CSAT3
v_43_9m	v.43.9m	m/s	time	Wind V component from CSAT3

w_43_9m	w.43.9m	m/s	time	Wind W component from CSAT3
tc_43_9m	tc.43.9m	degC	time	Virtual air temperature from speed of sound, CSAT3
h2o_43_9m	h2o.43.9m	g/m^3	time	LICOR 7500 water vapor density
co2_43_9m	co2.43.9m	g/m^3	time	LICOR 7500 CO2 density
T_43_9m	T.43.9m	degC	time	Air Temperature from NCAR hygrothermometer
RH_43_9m	RH.43.9m	%	time	Relative Humidity from NCAR hygrothermometer
H_43_9m	H.43.9m	W/m^2	time	
LE_43_9m	LE.43.9m	W/m^2	time	
rhoDry_43_9m	rhoDry.43.9m	kg/m^3	time	
u__43_9m	u*.43.9m	m/s	time	
Rlw_in	Rlw.in	W/m^2	time	
Rlw_out	Rlw.out	W/m^2	time	
Rsw_dfs_spn1	Rsw.dfs.spn1	W/m^2	time	
Rsw_global_spn1	Rsw.global.spn1	W/m^2	time	
Rsw_in	Rsw.in	W/m^2	time	
Rsw_out	Rsw.out	W/m^2	time	
Rsum	Rsum	W/m^2	time	
Gsfc_a	Gsfc.a	W/m^2	time	
Gsfc_b	Gsfc.b	W/m^2	time	

PROJECT WEBSITES

SAS Project Page

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