Description of preliminary bulk fluxes from NOAA CPPA/Ocean Climate Observations: Stratus 2007 flux summary files

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The data files flux_5hf_STRATUS07.txt and flux_30hf_STRATUS07.txt contain 5- and 30-minute averages of bulk meteorological variables and fluxes computed from the PSD shipborne system aboard the NOAA ship *Ronald H. Brown*, based on preliminary analysis of observations made during the CPPA/Ocean Obs. Stratus 2007 cruise from the Panama Canal to the Galapagos via the DART/SHOA buoy at 20° S, 75° W; the WHOI buoy at 20° S, 85° W; and a new DART installation at 18° S, 86° W. Table 1 lists the days of the cruise and the approximate location of the ship. Most quantities given are subject to future modification based on accounting for other sources of data and revised calibrations. No direct turbulent flux calculations are included in this present data.

The files are 31 columns and 5184 (5-min) or 864 (30-min) lines covering the 16 year-days 290 (18 October) through 305 (2 November). The data columns are not labeled so they can be directly acquired with formatted read statements or with the following MATLAB load statement:

```
x=load('path\flux_5hf_stratus07.txt');%read file with 5-min average data; set
path
```

The columns are as follows:

jdy=x(:,1);%julian day at beginning of time average U=x(:,2);%true wind,PSD sonic (m/s) dir=x(:,3);%true wind direction, PSD sonic (deg) tsnk=x(:,4);%sea snake temperature,PSD, 0.05 m depth (C) tsg=x(:,5);%tsg water temperature, 5 m depth, (C) sal=x(:,6);%tsg salinity (psu) ta=x(:,7);%air temperature, PSD (C) gse=x(:,8);%sea surface specific humidity,from snake (g/kg) qa=x(:,9);%air specific humidity, PSD (g/kg) psp=x(:,10)*1.01;%downward solar flux, PSD units (W/m^2) rl=x(:,11);%downward IR flux, PSD units (W/m²) org1=x(:,12);%rainrate, PSD STI optical rain gauge, uncorrected (mm/hr) ushp=x(:,13);%doppler log, SCS (m/s) head=x(:,14);%ship heading, deg clockwise rel north, SCS laser ring gyro (deg) urel=x(:,15);%relative wind speed, PSD (m/s) reldir=x(:,16);%relative wind direction (from), clockwise rel ship's bow, PSD sonic (deg) lat=x(:,17);%latitude, deg (SCS pcode) lon=x(:,18);%longitude, deg (SCS pcode) zts=x(:,19);%depth for bulk flux Ts reference, =0.05 when snake is used sig_u=x(:,20);%std dev of ship speed, m/s (>.2 indicates maneuver during half hour average) taub=x(:,21); bulk wind stress along mean wind, (N/m^2) hsb=x(:,22);%bulk sensible heat flux, (W/m^2) hlb=x(:,23);%bulk latent heat flux, W/m^2 (includes Webb et al. correction)

```
hrain=x(:,24);%rain heat flux, as per Gosnell et al 1995, JGR, 18437-18442,
(W/m^2)
ta_im=x(:,25);%ship IMET air temp @21 m (degree C)
qa_im=x(:,26);%ship IMET air specific humidity (g/kg)
s_ship=x(:,27);%ship speed over ground (m/s)
dir_ship=x(:,28);%ship gyro heading (degrees)
psp_ship=x(:,29);%ship IMET pyranometer (solar flux, W/m^2)
pir_ship=x(:,30);%ship IMET pirgeometer (IR flux, W/m^2)
barpress=x(:,31);%IMET barometric pressure (hPa)
```

The data in this file comes from three sources: The PSD sonic anemometer (acquired at 20 Hz), the ships SCS system (acquired at 2 sec intervals), and the PSD mean measurement systems (sampled at 10 sec and averaged to 1 min). The sonic is 5 channels of data; the SCS file is 16 channels, and the PSD mean system is 44 channels. A series of programs are run that read these data files, decode them, and write daily text files at 1 min time resolution. A second set of programs reads the daily 1-min text files, synchronizes the three data sources, computes fluxes, averages them to 5 or 30 minutes, and writes these cruise-long files.

St8_Assmans3.txt and ST8_assmans3._nohds.TXT contain post-calibrated data from the WHOI Assman psychrometer, from E. F. Bradley. The _nohds version has the header line stripped so it can be read with a formatted read statement, and some data have been removed in a quality control by C. Fairall and E. F. Bradley. The columns are formatted as follows:

yearday (2007, GMT)
 time of day (hhmm GMT)
 pressure (hPa)
 dry-bulb temperature (° C)
 wet-bulb temperature
 water vapor partial pressure (hPa)
 specific humidity (g/kg)
 relative humidity (%)

Further experimental details are as follows:

True wind speed is computed from the sonic anemometer using the ship's GPS system; thus, it is interpreted as the speed relative to the fixed earth. Some modest flow distortion corrections have been used in an attempt to reduce the transitions when stopping for stations.

SST is from the PSD seasnake, which measures about 0.1° C higher than the ship's TSG.

Air temperature and humidity are derived from PSD (aspirated Vaisala HMP-235). The PSD temperature sensor agrees within 0.05° C of an Assman psychrometer. Relative humidity agrees the psychrometer within 1%. The ship's IMET system is -0.2° C cooler than the PSD system. (SPdeS, CF, EFB, 4 Nov. 2007)

Longwave (LW) flux was obtained from 2 Eppley PIR units, logged and computed as per Fairall et al. *Jtech*, 1998. Ship LW data is reliable; ship unit reads about 3 W/m² lower than PSD in

clear conditions.

Shortwave flux was obtained from 2 Eppley PSP units.

The PSD STI optical raingauge (Model 705) malfunctioned during this cruise, and measurements from the ship's IMET Young bucket rain gauge were substituted.

Air sea fluxes were computed using the COARE bulk algorithm version 3.0.

			mean	mean	
cruise	month	year	north	east	approx.
day	day	day	latitude	longitude	station
1	18	290	4.29	-80.37	
2	19	291	-0.58	-81.28	
3	20	292	-5.06	-82.54	
4	21	293	-9.44	-80.80	
5	22	294	-13.84	-78.22	
6	23	295	-18.08	-75.68	
7	24	296	-19.60	-74.79	SHOA
8	25	297	-19.61	-75.41	
9	26	298	-19.68	-80.15	
10	27	299	-19.76	-84.73	
11	28	300	-19.66	-85.48	WHOI
12	29	301	-19.73	-85.54	
13	30	302	-19.71	-85.51	
14	31	303	-19.59	-85.39	
15	1	304	-19.22	-85.63	
16	2	305	-17.93	-86.41	DART

Table 1. Cruise day, month day of October or November, year day, and approximate times of arrival at moored buoy stations.