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Preliminary bulk fluxes from the 2005 NOAA CLIVAR/Ocean Climate Observations

Cruise on the NOAA ship Ronald H. Brown January 1 to March 19, 2005

Readme for ETL flux summary files

The data file 'flux_5hf_carb05.txt' contains computations of bulk meteorological variables and fluxes derived the ETL system based on preliminary analysis done during the CLIVAR/Ocean Obs 2005 cruise from Punta Arenas Chile for the Ocean Carbon study through completion of the NTAS Climate Reference buoy (14.76N 50.93W) replacement. 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 file is 30 columns and 17065 lines covering Julian days 1 (January 1) through the middle of 77 (March 17). There are two versions, one with and one without column headings (flux_5hf_stratus04_nohd.txt). The data columns are not labeled so they can be directly acquired with a MATLAB 'load' statement. A second set of files is provided at 30-min resolution (2822 lines of data) named flux_30hf_carb05.txt.

```
x=load('your_local_directory\flux_5hf_carb05_nohd.txt ');%read file with 5-  
min average data; set your local directory
```

The columns are as follows:

```
jdy=x(:,1);%julian day at beginning of 5-min average  
U=x(:,2); %true wind speed, m/s; etl sonic anemometer (18.5 m)  
dir=x(:,3);%true wind direction (from), deg (clockwise rel north)  
tsnk=x(:,4);%sea snake temperature, This sensor was not deployed do not use  
tsg=x(:,5);%tsg water temperature, C (5 m depth)  
sal=x(:,6);%tsg salinity, psu (5 m depth)  
ta=x(:,7);%air temperature, C (z=15.5 m)  
qse=x(:,8);%sea surface specific humidity, g/kg  
qa=x(:,9);%air specific humidity, g/kg (z=15.5 m)  
rs=x(:,10);%downward solar flux, W/m^2 (ETL units)  
rl=x(:,11);%downward IR flux, W/m^2 (ETL units)  
org1=x(:,12);%rainrate, mm/hr (ETL STI optical rain gauge #1, uncorrected)  
ushp=x(:,13);%ship speed, m/s (SCS gps)  
head=x(:,14);%ship heading, deg clockwise rel north (SCS laser ring gyro)  
urel=x(:,15);%relative wind speed, m/s (ETL sonic)  
reldir=x(:,16);%relative wind direction (from), deg clockwise rel ship's  
    bow(ETL sonic)  
Lat=x(:,17);%latitude, DDMM.MMMM (SCS pcode)  
Lon=x(:,18);%longitude, DDDMM.MMMM (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)  
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, W/m^2 as per Gosnell et al  
Ta_im=x(:,25);% IMET air temp, C (15 m)  
Qa_im=x(:,26);% IMET air specific humidity, g/kg (15 m)  
U_im=x(:,27);% IMET true wind speed, m/s (15 m)
```

```
Dir_im=x(:,28);% IMET true wind direction, deg (15 m)
Psp_im=x(:,29);% IMET solar flux, w/m^2
Pir_im=x(:,30);% IMET IR flux, w/m^2
```

The data in this file comes from three sources: The ETL sonic anemometer (acquired at 20 Hz), the ships SCS system (acquired at 2 sec intervals), and the ETL 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 ETL mean system is 42 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, time matches the three data sources, averages them to 5 or 30 minutes, computes fluxes, and writes new daily flux files. The 5-min daily flux files have been combined and rewritten as a single file to form flux_5hf_crb05.txt.

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 ETL seasnake, which read about 0.1 C higher than the ship's TSG. Note, the seasnake was connected but not deployed in the water for this cruise. **Do not use.**

Air temperature and humidity are derived from ETL (aspirated Vaisala HMP-235). One-day averaged ETL values are within 1.5% specific humidity and 0.1 C of the IMET system.

Longwave 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 4 W/m² lower than ETL units.

Shortwave flux was obtained from 2 Eppley PSP units. The ship PSP unit read 5% higher than ETL unit (a second ship unit deployed for a few days in December agreed with ETL unit). Suggest ship PSP values be divided by 1.05.

The rainrate was obtained from the ETL STI optical raingauge (Model 705), which had a no-rain offset of 0.07 mm/h. This system had an erratic noise level on its 'no rain' offset.

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

Carbon05 NOAA Ship Ronald H. Brown Track



