**Measured meteorological variables for HiWinGS 2013 – version 1**

05/20/2014 – Ludovic Bariteau

This document is the Readme for *HiWinGS_2013_1minMeans*, *HiWinGS_2013_10minMeans* and *HiWinGS_2013_hrMeans*. All versions are available in a Matlab format or in text files and refer to 1min, 10 min and hourly averages.

The files can be directly acquired with MATLAB. For instance to read the 1min text file from your local directory, use:

```
A=importdata('your_local_directory\HiWinGS_2013_1minMeansNFluxes.txt')
A=A.data;
```

The files contain 22 variables which are as follow:

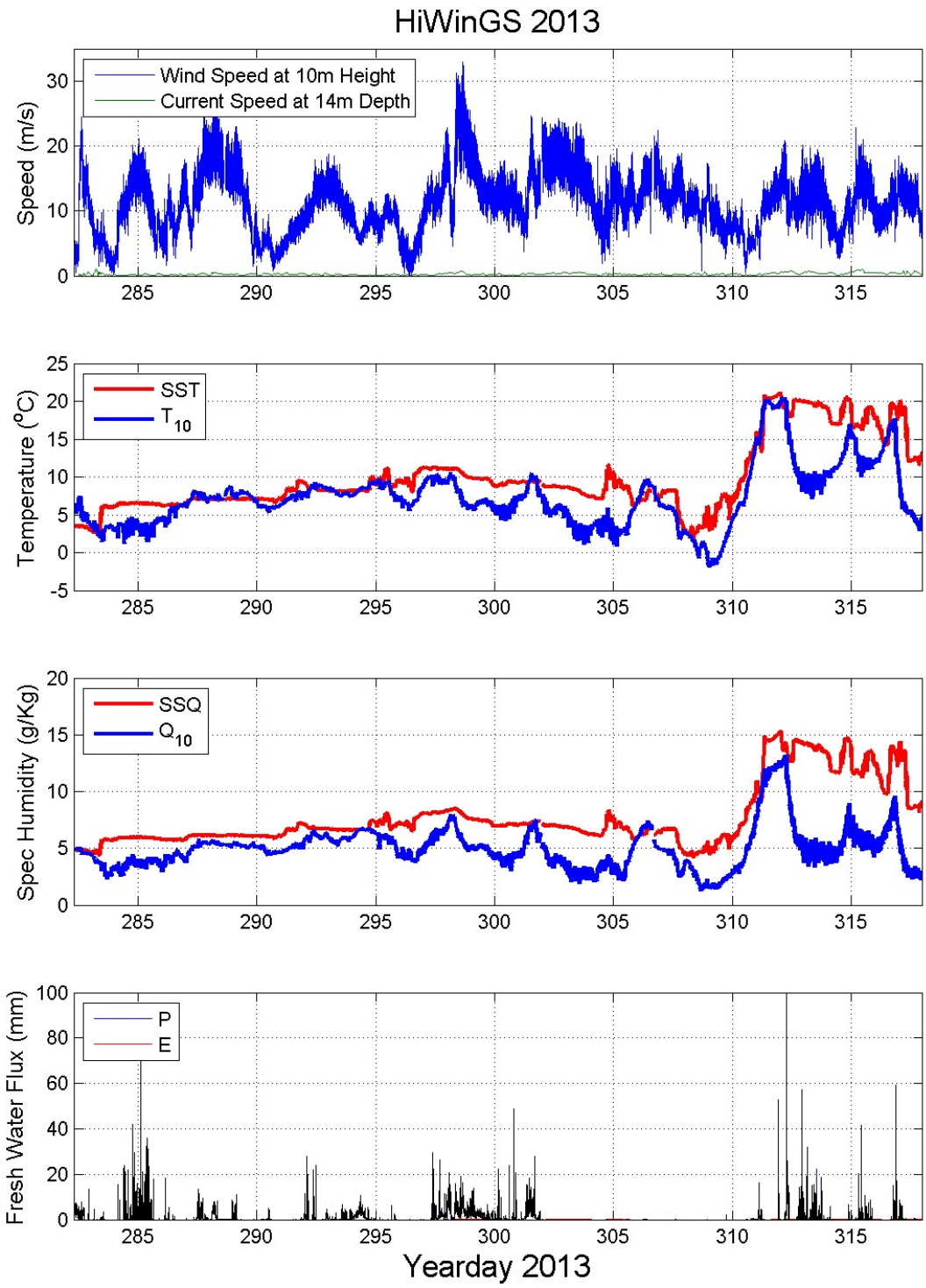
```
yday=A(:,1);    %Decimal yearday (UTC)
Lat=A(:,2);     %Latitude (deg)
Lon=A(:,3);     %Longitude (deg)
SOG=A(:,4);     %Speed over ground (m/s)
COG=A(:,5);     %Course over ground (deg)
Heading=A(:,6); %Ship's heading (deg)
cspd=A(:,7);    %Current speed (m/s) at 14m depth
cdir=A(:,8);    %Current direction (deg) from at 14m depth
wspd=A(:,9);    %Wind speed (m/s) relative to earth at 16.3 m
wdir=A(:,10);   %Wind direction (deg) from relative to earth
wspdR=A(:,11);  %Wind speed (m/s) relative to water at 16.3 m
wdirR=A(:,12);  %Wind direction (deg) from relative to water
rdir=A(:,13);   %Relative Wind direction (deg) from
Pair=A(:,14);   %Pressure (mb) at 15 m
RH=A(:,15);     %Relative humidity(%)at 15 m
Tair=A(:,16);   %Temperature (C) at 15 m
Qair=A(:,17);   %Specific humidity (g/Kg) at 15 m
Tsea=A(:,18);   %Sea temperature (C) from skip at 5m depth
Tsnake=A(:,19); %Near surface sea temperature (C) from Sea snake at 0.05m
depth
Solar=A(:,20);  %Measured downwelling solar (W/m2)
IR=A(:,21);     %Measured downwelling IR (W/m2)
P=A(:,22);      %Precipitation rate (mm/hr)
```

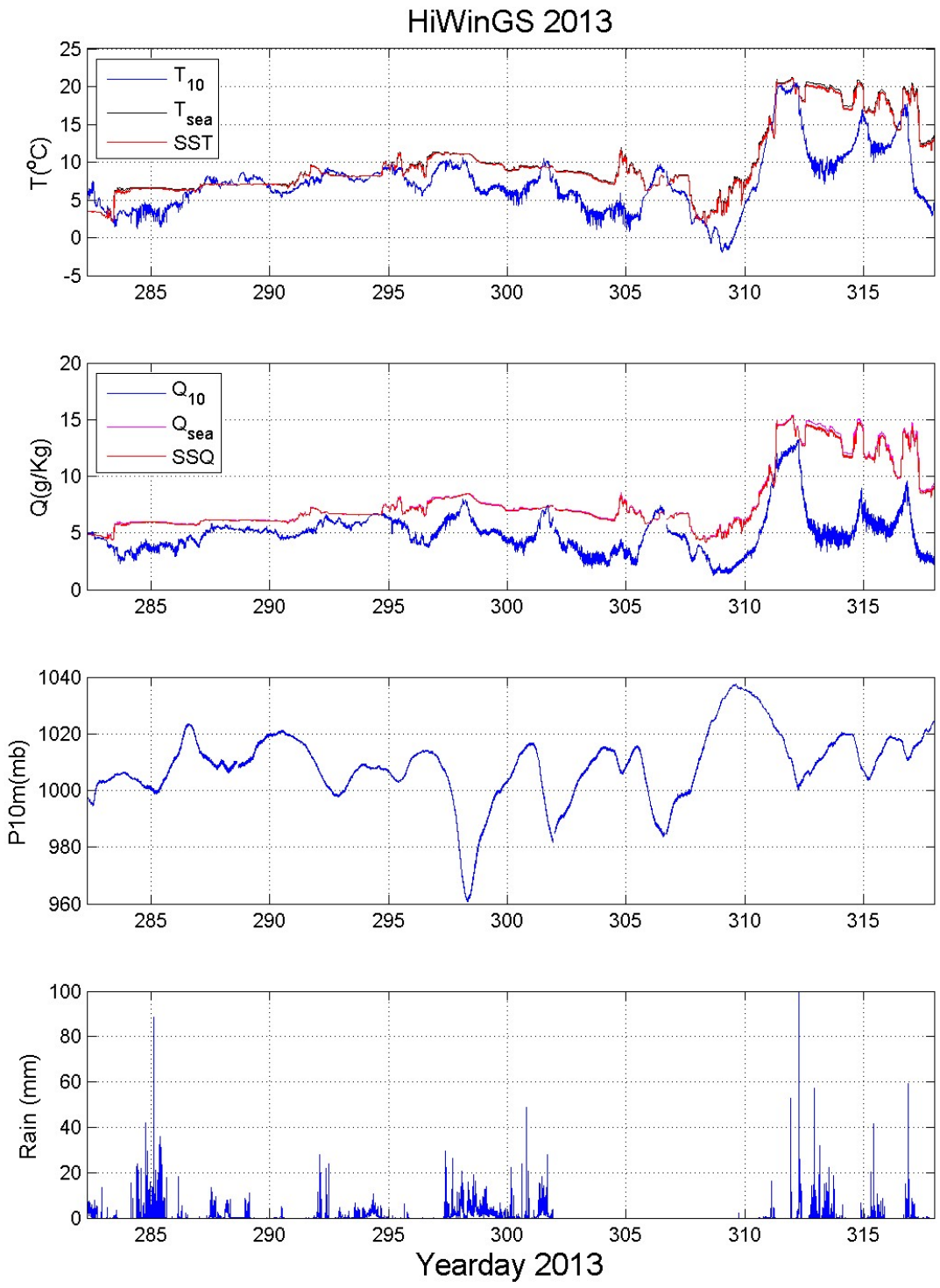
Notes:

In what follow PSD refers to the instruments from NOAA PSD group, UH to the instruments from University of Hawaii group and SCS to the ship's system.

- The wind and current directions are in meteorological convention (i.e., direction from).
- For Temperature and humidity the various sensors were compared against measurements made with an Assman ventilated psychrometer and a child mirror hygrometer. All measurements were adjusted to 15m for comparison. Additional comparison at night and with no rain was also done versus the dome temperatures of the IR sensors. Analysis shows that Tair taken from the starboard ship's sensor was found to be the closest (within 0.05 degC) to the Assman and dome temperatures. This sensor was used in the data set.

- Qair from the starboard ship's sensor was calibrated against the Assman measurement and the RH was reconstructed from the adjusted Qair, Tair and P measurements. Qcorrected = Qmeasured/0.93 – 0.34;
- The sonic anemometer from UH on the bow mast is used to measure the wind speed and direction. It was found to have the less distortion effects compare to the PSD sonic and ship's wind sensors. The PSD sonic has some flow blockage when the wind is from starboard.
- There were two sea temperature measurements available during HiWinGS. The 'sea snake' is a near surface sea surface temperature (SST) sensor consisting of a floating thermistor deployed from the portside of the ship. Its approximate depth is about 5cm. The ship's thermosalinograph (TSG) is mounted in the laboratory and the seawater intake is about 5m below the water surface. On average both instruments track each other very well and an offset correction of +0.1degC was applied to the sea snake by comparing it to the TSG for nighttime periods with no rain. During high winds the sea snake was flying out of the water thus the measurements reflects most likely a mean temperature of the top few cm of the ocean and lowest cm of the air. Therefore the TSG measurement were preferred in the the BULK fluxes computation
- Solar is provided by PSD pyranometers on top of the forward van.
- IR is provided by PSD purgeometer on top of the forward van. The dome and case temperature were adjusted to the air temperature at night to account for any offsets. IR values were then recomputed afterward.
- The speedlog was not functioning properly during the cruise. Thus the surface currents were obtained from the ship's ADCP systems (300-kHz Workhorse Mariner WH300 and 75kHz Ocean Surveyor OS75bb). Measurements were QCed by Jules Hummon (University of Hawaii) and Ludovic Bariteau. Because of strong mixing and resulting bubbles, few data remained in the first depth bin at 9m. To palliate this issue, values from the top three bins of the WH300 sensor (9, 11 and 13m depths) and the first bin of the OS75bb unit (21m deep) were averaged together. Data gaps were filled via interpolation. The resulting time series is representative of a current at 14m depth. Surface currents were used to compute the wind speed relative to water.
- The ship's speed from the C-Nav system was found to be noisy and not really reliable when the ship is stopped. The Furuno unit looked agreed more with the PSD GPS unit. Therefore the SOG and COG from PSD were used in this dataset. However the heading from the ship's measurements was good and used instead of the PSD unit.
- Barometric pressure from the ship's sensors was used as the PSD unit was found to be affected by flow distortion resulting in lower pressure values.


HiWinGS 2013
Wind Speed at 10m Height
Current Speed at 14m Depth
Speed (m/s)
SST
$T_{10}$
Temperature ($^o$C)
SSQ
$Q_{10}$
Spec Humidity (g/Kg)
P
E
Fresh Water Flux (mm)
Yearday 2013


HiWinGS 2013
T(°C)
T10
Tsea
SST
Q(g/Kg)
Q10
Qsea
SSQ
P10m(mb)
Rain (mm)
Yearday 2013