

Idiag at station A17

I looked at the 5-minute averages of Idiag for the CSAT at station 17 back to Oct 25, 18:00 MDT. (Recall that Idiag = 1 if any of the bits in the CSAT diagnostic word is non-zero.) It appears to be independent of wind speed and to occur for winds from NW to N and occurs more frequently with increasing temperatures (above 7 degC). (Note that temperature and wind direction are themselves uncorrelated). However non-zero Idiag is very occasional and is never greater than a five-minute average of 0.003, so this does not appear to be a serious issue requiring replacement of the sonic.

Here is the Splus output of `hist(dat("Idiag"))` for that period. \$breaks are the boundaries of each 'bar' or 'class' of the histogram and \$counts are the number of occurrences in each class. For example, there are 16 occurrences of the 5-minute average of Idiag falling between 0.0002 and 0.0004. Note that one occurrence in a 5-minute average is $1/(300 \text{ sec} * 20 \text{ samples/sec}) = 0.0001666\dots$, so the first histogram class between 0 and 0.0002 includes both zero and 1 occurrence in 5 minutes.

\$breaks:

```
[1] 0.0000 0.0002 0.0004 0.0006 0.0008 0.0010 0.0012 0.0014 0.0016 0.0018
```

```
[11] 0.0020 0.0022 0.0024 0.0026 0.0028 0.0030
```

\$counts:

```
[1] 1875 16 2 10 7 2 1 1 1 1 0 1 0 1
```

The frequency of occurrence of non-zero diagbits is 0.002% of the data, calculated as

```
sum(counts*breaks[-length(breaks)]) / sum(counts)
```

after increasing the number of classes in the histogram from 15 to 100 to improve the accuracy.