## Sonic directions

At the moment, none of our cal_files have Vazimuth entries, so everything is in instrument coordinates. This isn't useful for our users. We are expecting "exact" angles to be measured using the laser multistations during operations, but until then probably need to do something else. One complication is that we are using Gills, METEKS, RMYs, and CSATs. I assume the Gills were all set to have north=north. We set the METEKS and RMYs to have north=along boom away from the tower, though some may have been opposite(!). The CSATs are all along the boom, pointing away from the towers. So, we also need to know the tower orientation. The booms are nominally parallel to the ridge, pointing in the SE direction. Call this direction 142 degrees .

In one case, I oriented 10m.tse12 antiparallel to the other sonics (boom pointing in the NW direction) to avoid a local tree.
Thus:
Gill: (For Gill R3s, $\mathrm{V}_{\mathrm{az}}$ is the N arrow direction +240 degrees.)
$v a z=0+240=240$
CSAT: (For ATI and Campbell CSAT3 sonics, $\mathrm{V}_{\mathrm{az}}$ is the direction relative to true north, straight into the array from the un-obstructed direction, minus 90 degrees.)
$v a z=142+180-90=232$
CSAT. $10 \mathrm{~m} . \mathrm{tse} 12:$ vaz $=142-90=52$
RMY: (from me: +v is "from north", oriented perpendicular out from the connection box. Assuming we mounted the box away from the tower, this is the boom direction away from the tower:)
vaz $=142$ (it seems that $142+180$ works better - perhaps we put the connection box towards the tower?)
METEK: (from me: manual seems to show +v is perpendicular to N arrow - essentially East)
vaz $=142+90=232$ (sign convention appears to be left-handed. we'll change this in NIDAS. Also, this makes vaz $=232-180=52$ )
All this now implemented in cal_files and config.

