



I've noticed wTs cospectra from the 10m MetCity sonic often show a strange artifact at high frequencies – the cospectrum flips positive in cases with otherwise negative Hs. See plot above. Can't think of a reason why wTs correlation at high frequencies would be opposite sign of that at lower frequencies. Can't be real and it definitely causes a bias in Hs (~ 10% in this example). The w and Ts spectra shown at right look fine. I wondered if this might be an artifact from heating the sonic?? CF said it could also be an error in Ts crosswind correction (Liu et al. 2001 BLMet doi:10.1023/A:1019207031397). If high frequency velocity noise leaks into Ts, the noise will correlate with itself and give a positive signal in the copsectrum. Do you know if the Metek is automatically doing this correction, or is it something we need to address in post processing?

I've been using an Ogive Optimization Toolbox in matlab lately to compute the MOSAiC fluxes. This method provides a way to get an improved estimate of surface flux in the presence of low-frequency interferences which are common in stable conditions. (Sievers et al. 2015 ACP doi:10.5194/acp-15-2081-2015). But it may also provide a way to deal with the artifact in the wTs cospectrum.

OOT output illustrated at right is the same time period as plots on the first slide. The middle plot shows the ogive (cospectrum integrated from high to low frequency, the flux is the low-frequency asymptote).

The red line is what we usually compute: 30-min detrend and integration of the cospectrum yielding an Hs of -15.3 W/m2. You can see the strange positive hump on the high frequency side caused by the artifact.

The blue line is the result from the OOT algorithm. The fitting process doesn't weight the high frequencies much and the ogive model ignores the artifact, yielding Hs = -17 W/m2, which I suspect in this case is a better estimate.

This is a ~10% correction to Hs, so seems significant. There may be other approaches. I'm just beginning to evaluate how the OOT handles flux calculations in stable low-wind conditions, where the low frequency problem is most problematic...

