

IASOA Arctic Flux Working Group March 11, 2015 Meeting Notes

Participants

NOAA: Sandy Starkweather, Taneil Uttal, Janet Intrieri, Chris Cox, Chris Fairall, Elena Konopleva, Sara Crepinsek, Ola Persson, Andrey Grachev

Phone: Glen Lesins, Eugenie Euskirchen, Dave Billesbach, Larry Hinsman, Dave Cook, Ralf Staebler, Arseniy Artamanov

Presentation by Dave Billesbach (Flux standardization and inter-calibration within the AmeriFlux network)

Dave gave an excellent presentation summarizing the objectives and procedures of the AmeriFlux network. AmeriFlux, specifically its technical team, provides a range of support for operators of flux towers and platforms at over 100 sites in North and Central America. Their home site has an impressive array of gas and energy flux instruments. They maintain a set of roving instruments to conduct intercomparisons and calibrations ideally every 3 to 5 years. GOLD files are available for operators to compare their processing software with a standard analysis based on a fixed raw data set. Dave encouraged us to develop our own GOLD files based on our “best” Arctic site.

Dave’s presentation was followed by a question and discussion segment. AmeriFlux developed with more temperate climates in mind and so a rigorous testing of the calibration procedures in harsh cold weather conditions is still lacking. For example most of the AmeriFlux sites in Alaska have not yet made use of the roving instruments for intercomparisons. Winter gas flux measurements are often seen to be close to zero and so the cold season has received less attention. One of the challenges with winter flux measurements is instrument riming. Heaters are needed to prevent this but cannot operate during active flux measurements. We need to include the heating options with all IASOA tower instruments in our instrument inventory. Heaters are too large of a power drain for remote sites without electric line power.

Site characterization is an important issue for AmeriFlux. They have a document that details procedures and issues. (The Biological, Ancillary, Disturbance and Metadata (BADM) Protocol is available at <http://ameriflux.lbl.gov/data/badm-data-templates/>) Again, Dave suspected that this was most developed for temperate regions and potentially lacking details for Arctic ecosystems.

Taneil mentioned the possibility of obtaining a set of roving instruments for radiation and flux calibrations and intercomparisons at Arctic towers. This is a very welcome development and Dave Billesbach’s advice and expertise will be sought if this proposal is realized.

Additional Questions for Dave B’s presentation via email

1. You recommended that we create an Arctic version of the GOLD files. I assume that means that we will use a new set of Arctic raw measurements but that we will still use your processing software to obtain the derived products.

We could use new data, existing data, or something yet to come. I think that the key would be that it samples a variety of conditions. It wouldn’t have to be a single day or week. It would probably be several days or weeks that are perhaps separated in time to sample a more diverse set of conditions. We should also consider having

several version. One for people using open path sensors (LiCor LI-7500 or LI-7700) and one for closed path sensors (LiCor LI-7200, Picarro, Los Gatos, etc.). Whatever is chosen should be processed by several people with the results carefully examined and compared to come up with the best estimates.

2.) I understand that cold season calibrations are limited in AmeriFlux but have you observed any issues or differences when comparing fluxes when the boundary layer is more stable (i.e. at night with lighter winds)? I believe we may be missing much of the ground to air flux when the boundary layer is very stable and calm since the gases may be leaking out and drifting as currents near the ground.

Atmospheric stability has long been a problem for eddy covariance work. When the atmosphere becomes stable, the footprint for E.C. can grow tremendously. Also, non-turbulent mixing terms become much more important in the over-all mass balance relations. In other words, advection and diffusion become important, and they're not typically measured at E.C. sites. Stratification/storage is another problem. Many forest sites will see a large puff of CO₂ emerging from the canopy around sunrise. This is interpreted as nocturnal CO₂ that is finally being mixed into the free atmosphere as turbulence builds. I'm not sure how much of a problem this is with CH₄ since it's a buoyant gas, but there are challenges!

IASC Flux Workshop Proposal

Sandy and Eugenie have put together a preliminary written proposal and presentation for an IASC Flux Workshop during the ASSW meeting in Fairbanks in March, 2016. The latest version will be emailed to our group soon. The proposal has been put on the agenda for the common session of the 2015 ASSW meeting in Toyama, Japan next month. The proposal will be for a cross-cutting initiative that involves the Atmosphere, Terrestrial and Cryosphere Working Groups of IASC. The international members of our IASOA flux group are strongly encouraged to lobby their national representatives in the IASC Working Groups since they control the budgets for financing special projects such as our proposed Workshop. These contacts need to be made before the April 23, 2015 meeting in Toyama. Since this is a cross-cutting initiative a final decision from IASC will not be made until this fall.