Meeting Notes – IASOA Flux – April 8, 2015

Gold Files

Our discussion focused on a strategy for developing Gold Files for the IASOA (and other Arctic sites), building off of Dave Billesbach's presentation in March (see notes).

Glen felt that we should address 2 levels, in creating these files

1) Instrument level – what to use to create the raw data
2) Processing level – what routines to use

Dave B. agrees that these are the key principals. In addition we should consider the representativeness of the ecosystem. That is the site-specific issue that we can address with our site evaluation work. The raw data for the gas flux Gold Files is in the form of high-speed number densities.

Tiksi might be a leading candidate in creating the Gold File. Data is fairly continuous, covers most of the year. Barrow has some pretty complete files as well. The type of instruments at each site is a consideration.

Dave B. commented that we might need to have several gold files. The analysis needed to compute the fluxes is different for closed path versus open path instruments. You have to do different things for e.g. a Licor open path than a Picarro.

We would like to extend the Gold File beyond the gas fluxes to include sensible heat and radiation. This would allow Arctic towers without gas flux measurements to participate. (e.g. Summit). We can treat this as a gap analysis to get more instruments added network wide.

By developing best practices procedures and encourage intercomparison we hope, in the long run, to standardize the network as much as possible. We need to encourage operators and funding agencies to consider this where there are opportunities.

Glen tried to download gold files from the Ameriflux site but couldn't find them. Dave Billesbach will look into this.

Ameriflux is in the process of accepting raw data and doing some extensive processing on a Berkely super-computer.

For instrumentation, is the biggest difference because of the different gas sensors, especially for the methane because of the spectroscopic measurements.

For CO2 and water vapor – broadband absorption of some mid-IR. Source/detector out in the wind (open path system). Need to account for extra terms. You can also

pump air into a closed chamber & you loose some of those terms. Same for methane and other trace gases. You look at molecules. Some extra terms needed.

LICOR 7700 handbook is a good reference. Useful handbook written by the Japanese on measuring gases from towers. Practical Handbook of Tower Flux Observation. Focuses on CO2. (perhaps we can post the handbooks on our Flux site?)

Two closed path methods. PICARROS (tunable diode laser, single molecular transition) done at very low pressure v.s. LICOR 7200 is ambient. For most trace gases, better to do closed path & remove the water vapor. The water vapor cross-talk is big and uncertain enough for CO2 & a couple other tg's. You have to dry the air first.

Think about what is happening with cold temperature sampling. It would be nice to do a comparison of open/closed path instruments simultaneously to evaluate.

Chris Cox has something similar that focuses on energy fluxes. We can post these on the website as key references.

How does calibration play into this? Billesbach calibrates gas sensors once a year. None of the drifts(in the fluxes?) were more than ½% in a year for the open path system which is adequate for flux work. However, if you need precise absolulte mixing ratios, you need to calibrate several times perday and so stay away from open path systems.

Actions:
Proposed gold file. Tiksi – find interesting time periods and phenomena. At least for some of the instruments.

How long of periods for the gold files? About 1 week each for 2 to 3 different weather conditions

- high fluxes (1 week likely in the summer)
- low fluxes (1 week likely during a colder period)
- might consider cases with or without snow cover

Glen will start the process of planning for theGold Files with help from Dave B., Andrey and Elena (Mika also?)

<u>Inventories and Metadata</u>

We reviewed examples from a few different sites/archives to see if there is going to be one good way for us to pull together the info we are interested in w/o duplicating efforts.

1) NOAA/PSD/IASOA Datagrams – Provides a roadmap to parse out data that comes from a single data logger for flux towers

The Tiksi datagram can be downloaded from:
ftp://ftp.etl.noaa.gov/psd3/arctic/tiksi/surface_properties/fluxtower/towermet/0_docs/Tiksi_Datagrams_FLUXTOWER_met.pdf
Your comments, suggestions and questions are welcome.

Calibration histories, photos, hopes to eventually expand these to clickable links to manuals or core references for QC work

15 different quick looks per tower. Sara emailed that the plan is to make the time period for quick looks user selectable. This is help a lot for browsing and determining data voids

Product file is constantly evolving, link to the IASOA portal

Tiksi, Alert, Eureka, Summit, Ny-Alesund

2. Review of metadata from the UAF-AON site is similar in detail to DOE-ARM, less detail than IASOA datagrams vis a vis photos.

3. DOE-ARM

BRW files are 30 ECOR30ECOR (metadata is in the NetCDF);

Sandy will follow up with Giri at DOE-ARM archive about why these aren't included in the standard IASOA harvest.

Level of ARM detail is similar to level of datagram, except no equations and phtos.

User experience will likely be enhanced if the IASOA data is archived in NetCDF format. There appears to be plans to eventually do this.

4. Ameriflux metadata – hated spreadsheet BADMS. Core metadata spreadsheet. Very high maintenance. Instrumentation, site ecology, canopy structure. Work in progress. Examples on the Ameriflux

Actions:
Gold File team will provide Sandy with core/critical info they'd like to know about each tower (high level). Sandy will make a recommendation about the best way to complie this info from the resources above. Also will follow up with Nama and the ABOVE (NASA) project to see what they did.