Instrument_Ops and Instrument Templates FAQs

Version 20150415

What to include in the templates

Q: One instrument has two sensors; do I report one or two instruments?
A: If you do not plan to ever install each sensor independently, report the sensors as one instrument. Select from the INST_MODEL CV based on the primary sensor type. For example, choose “RH-humidity” for a Vaisala HMP 155 measuring both humidity and temperature. You can then associate the same sensor to both the variables produced.

Q: I have a profile of sensors; should I treat these as a single instrument?
A: No. Report the metadata of non-contiguous sensors separately (i.e. report the installation of soil temperature sensors at different depths in separate columns). This will allow each sensor and each data stream to be tracked.

Q: I have a sensor measuring along a profile (e.g. TS probes or CO2 profile); should I treat it as single instrument?
A: No. You can report the instrument characteristics and serial number only one time in the Instrument sheet but then you have to report the metadata each position/level measured separately in the Instrument_Ops sheet (i.e. report the soil temperature probe depths in separate columns). This will allow each sensor’s depth/heigh and data stream to be tracked.

Q: I have dozens of instruments at my site; should all these instruments be included in the template?
A: Metadata for all instruments that report data to the network are important because only in this way can the measurements be correctly processed and interpreted. However, metadata for (1) gas analyzers and sonic anemometers and (2) measurements in the soil and along vertical profiles are highest priority.

Q: Should information about instruments that were deployed at the site but then removed be included in the templates?
A: Provide information about instrument operations and maintenance events (particularly installations and removals) as well instrument configurations and instrument pairings as far back in time as possible. This will allow flux data users to better understand the entire period of record of data from your site.

Q: Should all instrument calibrations be reported?

A: Calibrations are important to evaluate the quality of a measurement and in some case also for the data correction and processing, so we strongly suggest you send the calibration information.

Q: I swap gas analyzers out every few months to calibrate them in the lab. Does each installation and removal of a gas analyzer need to be included in the Instrument Ops template?
A: If the same gas analyzer is re-installed in the same position after calibration you can report only the calibration event but to the extent possible, we suggest you report all installations and removals of gas analyzers.

Q: I don't know the exact date a specific instrument installation, removal, etc.; can I just report the year without the month and day?
A: Reporting the month and year of installation (and not the day) or even just the year is acceptable. Alternatively, if you are not certain of the exact date of an instrument operations and maintenance event, you can indicate that with INSTOM_DATE_UNC greater than 0.

Reporting specific instrument operations

Q: One instrument was removed from one flux tower site, factory calibrated, and then returned to a different flux tower site in our cluster. Which site's BADM template should the factory calibration be reported on?
A: Instrument operations that don't occur at particular site (like factory calibrations) can be reported on any BADM template. In this case it doesn't matter if you report the calibration on the template for the site the instrument was installed at pre-calibration or the template for the site the instrument was installed after the calibration. Regardless the sensor factory calibration is imported into the database and linked to the specific sensor history.

Q: How do I report that the instrument's height was changed?
A: Add a removal event for the instrument one column, and in a second column (using the same INSTOM_DATE), enter an installation event with the new height in the INSTOM_HEIGHT row. Use the new installation event to again map the submitted variable(s) originating from the sensor (both if it keeps the same variable code or if it changes)

The general process of filling out the templates

Q: How long will this take?
A: Filling out the Instrument Ops template for a simple site with a relatively short period of record will take several hours if the metadata is handy. Reporting all instrument installations, removals and variable map events for a more complex site over a long period of record may take more than a day. The Instrument template will take a similar amount of time.

Q: How am I supposed to know what instrument metadata variables need to be reported?
A: For your reference, the third sheet in each template shows groups of variables that must be reported together. Column C has a "p" if a variable is the primary variable for a group of

variables. Column D lists an “r” if a variable is a required qualifier for a primary variable. For example, the instrument serial number (INSTOM_SN) is the primary variable for the INSTOM group. For INSTOM_SN, the required qualifiers are the instrument model (INSTOM_MODEL), the instrument operations and maintenance type (INSTOM_TYPE) and the instrument operations and maintenance event date (INSTOM_DATE).

Instrument-variable mapping

Q: What is a “variable map” operations and maintenance event and why it is important?
A: The variable map event links an instrument at your site to a specific variable data stream submitted to the network. A variable map event would typically occur as soon as an instrument is installed. Alternatively, if a replacement instrument collects data alongside an existing instrument for an extended period, a variable map event would occur at the time data from the replacement instrument replaces data from the original instrument in the data stream. The variable map event allows the right instrument metadata to be associated with the right data stream.

Q: Can multiple variables be mapped to the same instrument?
A: Yes, if a single instrument measures multiple variables, then add a “Variable map” instrument operations and maintenance event for each variable (in a new column). For example, for a sonic anemometer that is the source of sonic temperature, momentum flux, wind speed, wind direction, friction velocity and sensible heat data submitted for your site, enter separate variable map events for each variable, all with the same INSTOM_MODEL and associated INSTOM_SN.

Q: Can multiple instruments be mapped to the same variable?
A: Yes. For variables that are generated by more than one instrument, like CO2 gas flux, map the CO2 gas flux variable to both the gas analyzer and the sonic anemometer.

Q: Do I need to un-map a variable from an instrument after I’ve stopped reporting the instrument’s data?
A: If you have removed the instrument, the un-mapping is automatic. If you have not removed the instrument, but have begun to submit data from a replacement instrument, you have to map the variable to the new instrument and explain that in the INSTOM_COMMENT of the new sensor .

Specific variables

Q: What is the site reference point?
A: The site reference point is the latitude and longitude for your site provided in the site general information template.

Q: What if my instrument does not have a serial number?
A: A unique instrument identifier is necessary to track such changes in deployments over time. If at all possible, the manufacturer’s serial number should be used, as that seems most likely to

be simply verified over time. When a manufacturer's serial number is unavailable, a unique text string must be constructed; since we cannot allow that two sensors in the network have the same serial number, we suggest that that text string includes some sort of institution identifier such as "UNITUS" or "UCB". The rest of the string may be a simple number such as an institution asset tag ID or a string that someone could use as a clue to recognizing the instrument.

The rationale for the templates

Q: What is the difference between the INSTOM, INST and INSTPAIR groups?
A: The INSTOM group stores information on major instrument operations and maintenance events such as installations, removals and calibrations. The INST group stores configurations of these instruments. The INSTPAIR group stores information on pairs of instruments that are generally used together to measure a variable.

Q: Why are Excel spreadsheets being used?
A: Excel spreadsheets are machine-readable, which allows submitted metadata to be easily ingested into a common network-wide database. However, other tools and formats to submit these data are under preparation.

Q: Why is it necessary to use a common protocol for reporting instrument metadata?
A: Good metadata is particularly important when data is shared across a large community. Using a common metadata protocol for the network contributes to increased metadata validity, reliability and accessibility. Values entered for standard metadata variables can be programmatically checked against specific rules as well minimum and maximum acceptable values. Each metadata value is attributed to a specific person, and date stamped following a standard protocol, so that identifying the most up-to-date information is easy. Standard metadata variables, variable definitions and units make the metadata more accessible to data users, particularly those using data from multiple sites.

Q: How will this instrument information be used?
A: This information will be available to flux data users to better understand and interpret the measurements. The instrument metadata are also used in the data QA/QC process undertaken by network staff to produce standardized flux data products.

Controlled vocabulary (CV)

Q: What is controlled vocabulary (CV)?
A: The controlled vocabulary is a formally maintained list of terms that can be used as values for metadata variables. When CV is requested for a specific variable, the entry must be selected from the available CV list. Using CV improves the precision of the instrument model description. It also allows more coherent search and browsing of instrument models at all sites by the community.

Q: I don’t see my instrument model in the INST_MODEL CV; can I use “Other”?
A: lease refrain from using “Other” for the instrument model. If your instrument model or instrument type is not available in the list, please first contact the regional network for support and evaluate the addition of a new code in the CV.

Q: I don’t see any CV for my diffuse radiation sensor?
A: If you are using a shaded radiation sensor to measure diffuse radiation, use the CV corresponding to the un-shaded version of the sensor.