BEST PRACTICES CHECKLIST

A comprehensive maintenance checklist for greenhouse gas flux measurement sites, with checks scheduled weekly, monthly, and seasonally. The checklist covers safety briefings, site access, instrument inspections, data acquisition, tower infrastructure, sensors, and database updates. This systematic approach ensures accurate and reliable greenhouse gas measurements across different scenarios and instruments.

Last edited August 11, 2023

AMERIFLUX

Checklist purpose:
The purpose of having a Flux Site Best Practices checklist is to share knowledge of items to consider when working at a flux site. The checklist is divided into task frequency (weekly, monthly, seasonal, annual). Checklist items are further organized by type of task, as some items may not be relevant to all sites. This list is not exhaustive but is meant to serve as a starting point for site staff to organize their work plans.

WEEKLY PREVENTIVE MAINTENANCE

General checks

- Note arrival date/time to the site.
- Conduct safety and work briefings with the team at the beginning of the work shift.
- Check for obstructions accessing the (wider) site, especially after storm events.
- Be aware of animal activity (rodent burrows, wasps, insects, snakes).
- Check for obstructions accessing the tripod/tower (loose debris, wires, tubing).
- Check electrical systems are operating properly (e.g., after a storm or animal damage).
- Document all changes to dataloggers, sensors, gas cylinders, etc.
- Note which instruments were cleaned.
- Check datalogger clocks and document clock drift and adjustments made.
- Check for water or insect intrusion in sensors, enclosures, pumps, etc.
- Ensure the shed and sensor enclosures are closed/locked before leaving the site.
- Note departure date/times from site.
- If remote communication is enabled, confirm access after each visit.

Continued on Next Page

MONTHLY PREVENTIVE MAINTENANCE

General checks

- Check cables/conduits/connectors for damage.

Tower/Tripod infrastructure

- Check for cracks or other visible structural damage (after storm, corrosion, etc.).
- Check guy wires and anchoring systems for proper tension, damage, or other issues.

Above-ground meteorological instrumentation

- Check if the radiation shield for the temperature and relative humidity is clean (dust, debris).
- Check the fan is spinning inside the mechanically aspirated shield.
- Remove debris from the precipitation gauges and run a validation check to ensure the sensor properly reports data.

Below-ground measurement instrumentation

- Check cables for signs of damage (rodents) and moisture intrusion.

Tall canopy/tower site

- Inspect all PPE (personal protective equipment, e.g., harnesses, fall protection equipment, helmets) before each use.
- Ensure wearing hard hats when working near the tower.
- Check for damage to tower structure (breaks, cracks, or other problems).
- Check guy wires and anchoring system for proper tension, damage, or other issues.
- Check for loose hanging wires on the tower.
- Check for loose wires/tubing on the tower platforms (tripping hazard).
- Check whether hauling system ropes are tied down (if used).

Data acquisition system

- Check for error messages (operating system, logging/acquisition software, etc.).
- Download data and keep raw data separate from any other data.
- Check whether data-logging resumes after data download.
- Check if data are written to files correctly.
- Check if enough space is available until the next data download or site visit.

Sites using a profile system

- Check the pressure of calibration gas cylinders (avoid using cylinders $< 300\,\mathrm{psi}$).
- Check tubings and filters.
- Check the radiation shield for dirt and bird droppings.
- Check the internal fans or pumps.
- Check the gas analyzer diagnostics and clean accordingly.
- Check measured values by the gas analyzer.

Sites using an open-path eddy flux system

- Check the sonic anemometer for bird droppings and other debris.
- Check the gas analyzer diagnostics and clean accordingly.
- Check measured values by the gas analyzer and sonic anemometer.

Continued on Next Page

SEASONAL/SEMI-ANNUAL PREVENTIVE MAINTENANCE

General checks

- Check site safety plan and update accordingly (https://ameriflux.lbl.gov/tech/safety/). Check for obstructions or hazards to be flagged around the tower/tripod;
- Check if all rebars and any other pointy objects still have safety caps on;
- Check whether solar panels (if used) need to be inspected or replaced;
- Inspect and test batteries (especially for sites operating on solar panel power).

Tower maintenance

- If tower/tripod infrastructure (including anchoring system) is due for a safety inspection, ensure this is happening before the start of the new season.
- Check whether guy ropes/wires and anchors are visually marked/flagged.
- Remove ropes if used as part of the hauling system.
- Check if climbing gear (harnesses, helmets, carabiners) and safety ropes are due for inspection, repairs, or replacement and are stored correctly.

Sensors maintenance

- Check sensors to be calibrated following calibration interval recommendations.
- Remove broken and malfunctioning and no longer used sensors.
- Make sure all serial numbers and firmware versions are properly documented.
- Replace inlet filter on closed path gas analyzer (if left out over winter).
- Replace inlet tube if necessary.
- Verify orientation, separations, and measurement heights of EC instrumentation.
- Check that BADM information in the AmeriFlux database is up-to-date.

WEEKLY PREVENTIVE MAINTENANCE CONT.

Sites using a closed-path eddy flux system

- Check the sonic anemometer for bird droppings and other debris.
- Check the gas analyzer diagnostics and clean accordingly.
- Check inlet filter.
- Check whether the inlet pump works properly.
- Check for any abnormal sound (i.e., leaks in tubes or gas cylinders).
- Check the pressure of calibration gas cylinders (avoid using cylinders $< 300\,\mathrm{psi}$).
- Check measured values by the gas analyzer and sonic anemometer.

Sites using soil respiration chambers

- Check for animal burrows/disturbance around chambers.
- Check for obstructions (twigs, debris) preventing the chamber lids from closing properly.
- Trim vegetation around chamber collar.
- Check gaskets around chamber lids.
- Check whether automatic chamber lids open and close on command.
- Confirm the correct chamber name/number is allocated to the correct measurement plot.
- Download data and verify whether data are collected correctly after data download.
- Measure inner chamber collar depth if changes are expected during the season.
- Note time of gas sampling if manual measurements are collected.

Above-ground meteorological instrumentation

- Check all radiometers and PAR probes for dirt, bird droppings, leaves, scratches, etc.
- Check whether the radiometer is clear of condensation or snow;
- Clean radiometer and PAR sensors.
- Check the leveling of the radiometer and PAR sensors.
- Check whether the radiometer ventilation/heater is on/running if set up to do so.
- Check all temperature and relative humidity radiation shields for dirt and bird droppings.
- Check all other meteorological sensors for damage, dirt, and deposits.
- Clean sensors following manufacturer recommendations.
- Check all measured values.

Below-ground measurement instrumentation

- Check for animal activity/animal burrows around or near below-ground measurement locations and/or damage to sensor cables.
- Inspect and clean debris at water table depth wells.
- Check all measured values.

NOTES

CONTACTS

You can contact the Tech Team at ameriflux-tech@lbl.gov