Data flows for NEON's Fundamental Instrument Unit: Quality assurance and quality control approaches

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The National Ecological Observatory Network is a continental-scale ecological observation platform for understanding and forecasting the impacts of climate change, land use change, and invasive species on ecology. NEON science focuses explicitly on questions that relate to grand challenges in environmental science, are relevant to large regions, and cannot be addressed with traditional ecological approaches. To help address these challenges, NEON's Fundamental Instrument Unit (FIU) is responsible for making airshed and watershed observations at 60 different sites across the United States. It will provide data on key local abiotic factors that force climate change including temperature, precipitation, humidity, wind, radiation, carbon dioxide, ozone, and reactive nitrogen. In total, 95 different measurement types will be made by 14,717 sensors resulting in over 45 Tb of raw data per year. To facilitate this, automated approaches to recording high frequency data will have to be developed and implemented on a scale greater than any previous climate initiatives. Ensuring that all of these data are of the highest quality will require the optimal development of an efficient quality assurance and quality control (QA/QC) program. Results will focus on the preliminary implementation of small scale QA/QC on simulated observations from anticipated NEON observing sites. These results will be compared with similar techniques that are currently in place at other ground-based observing sites (e.g. DOE- Ameriflux sites). Emphasis will be placed on attaining desired levels of accuracy and precision through proper characterization of statistical errors and implementation of a preliminary calibration/validation plan.