



The ICOS Sweden technology

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In ICOS Sweden, all 6 sites are equipped with a novel, standardized system for high-quality measurements of greenhouse gas concentrations and fluxes of energy and greenhouse gases along with environmental variables needed to understand the underlying ecosystem processes. Turbulent fluxes are determined from 20-Hz data of wind components and scalar concentrations, all sampled digitally and synchronously by a newly developed digital datalogger (ISDL). Vertical concentration gradients of greenhouse gases are measured by an infrared gas analyzer through a multi-level air sampling system. Relevant components of the radiation balance are measured at different levels above ecosystems as well as along transects below forest canopies. To determine energy storage within vegetation, a large number of thermocouples are installed in different parts of selected trees. At several locations in each ecosystem, groundwater level and depth profiles of soil temperature and soil water content are measured. Meteorological driving variables such as air temperature profiles, air pressure, and precipitation are also measured at each site. With regard to the long-term perspective of ICOS RI, the entire measurement system is constructed with emphasis on reliability, durability, and robustness with respect to wearing and strain caused by harsh Nordic environment. In particular, a specialist lightning protection system efficiently prevents instrument damage and data gaps. Fulfilling these needs, the ICOS Sweden system represents the high end of technological requirements for measurement systems in all European regions and climatic zones, providing a new standard for harmonized data collection along climatic and geographic transects.