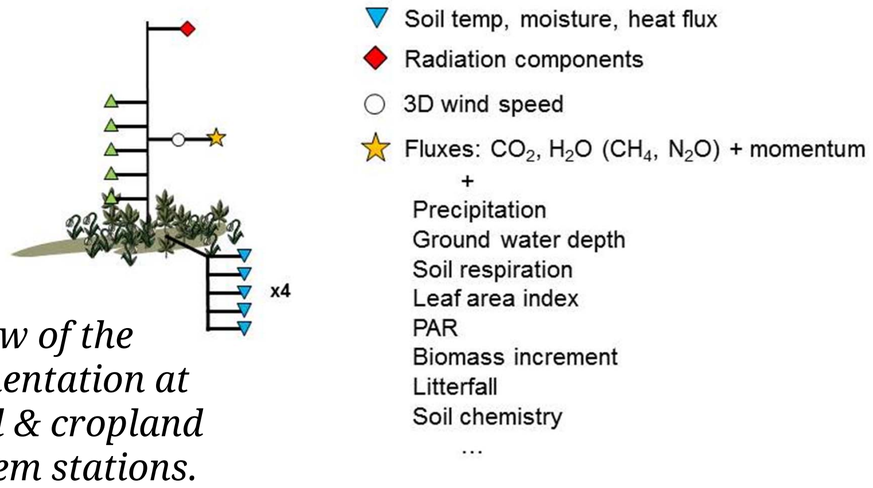
ICOS Sweden measurements

- Looking at the atmosphere, ecosystems and the Baltic

In total, seven so-called ecosystem field stations and three atmospheric stations are included in the Swedish network. All field stations are equipped with instrumentation for the study of the greenhouse gas exchange in the local ecosystems, while three of the stations are also equipped with tall (100-150 meter-high) towers that carry equipment for atmospheric measurements

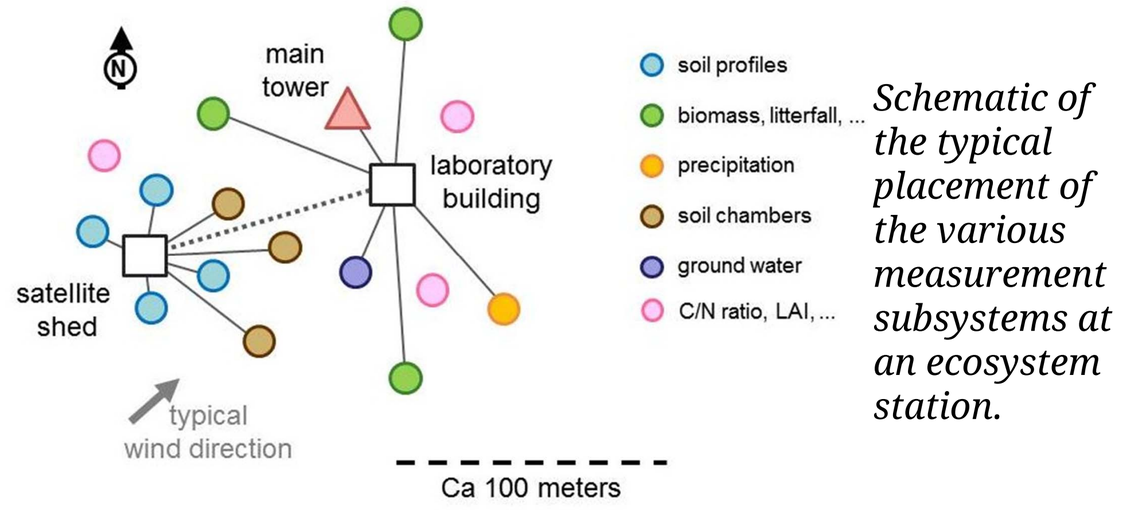
The main aim of the Swedish field stations is to cover typical Swedish conditions and biotopes. Sweden's land surface is dominated by forests and that is why half of the field stations are situated in woodland: Svartberget, Norunda and Hyltemossa. Scandinavia also has large areas of wetland, and two field stations are located in this type of terrain: Stordalen and Degerö. One field station, Lanna, is placed on agricultural land, and the newest addition Östergarnsholm will monitor the Baltic Sea.

The ecosystem field stations are designed to estimate the extent of the local ecosystems' exchange of greenhouse gases (carbon dioxide, methane and nitrous oxide) between the atmosphere and the ecosystem. We can calculate this by measuring the concentrations of the gases in the air above the ecosystem in question at the same time as measuring direction and strength of the turbulent air currents in motion above the ecosystem (woods, wetlands etc.).



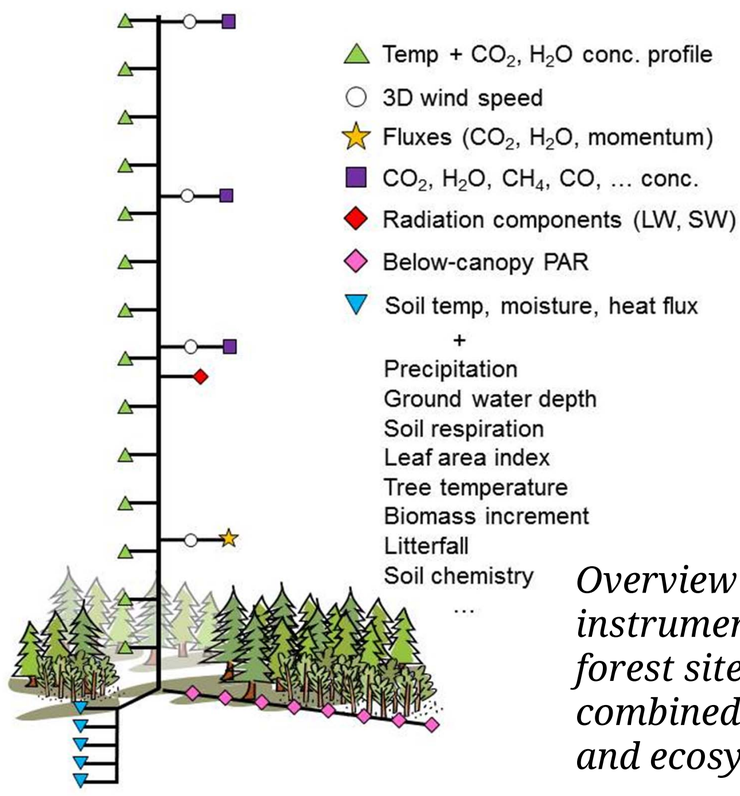
Overview of the instrumentation at wetland & cropland ecosystem stations.

We also measure energy exchange at these stations, including short- and long-wave radiation, heat flow and evaporation, as well as meteorological parameters like air temperature and humidity, insolation etc. In addition, the ecosystem itself including the vegetation and soil are monitored, for example by measuring tree growth, leaf area index, litter fall, soil temperature and soil moisture.



Schematic of the typical placement of the various measurement subsystems at an ecosystem station.

It is important to note that the ecosystem station measurements are not sensitive to emissions from industry or vehicular traffic outside the immediate fetch area. The collected data therefore mainly provide information about the way the local ecosystem functions in an area within a radius of approximately 300 meters round the stations.



Overview of the instrumentation at our forest sites, with combined atmospheric and ecosystem stations.

At the atmospheric field stations, we will first measure concentrations of greenhouse gases, wind speed and wind direction at a height of 100-150 meters above the ground. Gas concentrations are measured both continuously, directly on site, and also by periodically collecting together gas samples, which are then analyzed at a central laboratory common to the entire ICOS network.

The atmospheric concentration data can give us information at considerably broader spatial scales – typically within a radius of hundreds of kilometres. Since it is the wind that transports the air packets to the monitoring stations, it is the wind direction "history" that determines the geographical areas from which the measured signal originated.

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