Subject: Gill's Anemometers help to understand forest ecosystems

Reference AN0022

Gill Anemometers provide valuable data on French forest ecosystem

Introduction

For many years researchers and scientists have been trying to better understand the processes that govern the tree and forest ecosystem. Data recorded from research stations across the planet help understand the impact of gas exchanges on our environments.

Application

Since 2003, the ESE research laboratory has been managing a forest experimental site in the Barbeau state forest just 70 km's South –East of Paris, France. The forest, which is a temperate broadleaf forest made up of oak and hornbeam trees, is one of several stations belonging to ICOS (Integrated Carbon Observation System) dedicated to high precision long term observations and monitoring of greenhouse gas fluxes.

Sensors

A range of Gill Instrument anemometers, including the R3-50, HS-50 and WindSonic has been installed onto the top of Barbeau's 35 meter high tower to receive valuable environmental data:

3-axis

The 3D anemometers (R3-50 and HS-50) have been positioned at the very top of the station to collect U, V, W and T_{sonic}. The 3D anemometers are used in combination with fast CO_2/H_2O analysers for Eddy covariance measurements, which is a proven technique consisting of CO_2 and H_20 flux calculations of the covariance between the vertical component of wind velocity (w) and the mixing ratio of CO_2 or H_20 in air.

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WindSonic

In addition to the 3D anemometers, 6 WindSonic wind speed and direction sensors have also been installed on the tower to provide a vertical wind profile from the top of the tower down to the bottom. The small, lightweight sensors are used to collect accurate wind speed, wind direction and gust information.

Data collected from the WindSonic anemometers are used to estimate the wind velocity gradient and wind direction shear in the forest vertical profile and to determine the air turbulences in the plant cover. Furthermore the data associated to air humidity measurements is also used to calculate the real evapotranspiration of the forest ecosystem.

The measurement data from each anemometer is collected every half hour and is streamed daily to the main data server in Italy.

Why Gill?

Gill's anemometers were chosen for the project due to their reputation for high quality, easy installation and above all, for their solid-state construction which offers huge advantages over other mechanical instruments.