Application Note

A Profiling System in Amazonia with Automatic Calibration Based on the CIRAS-SC Analyzer

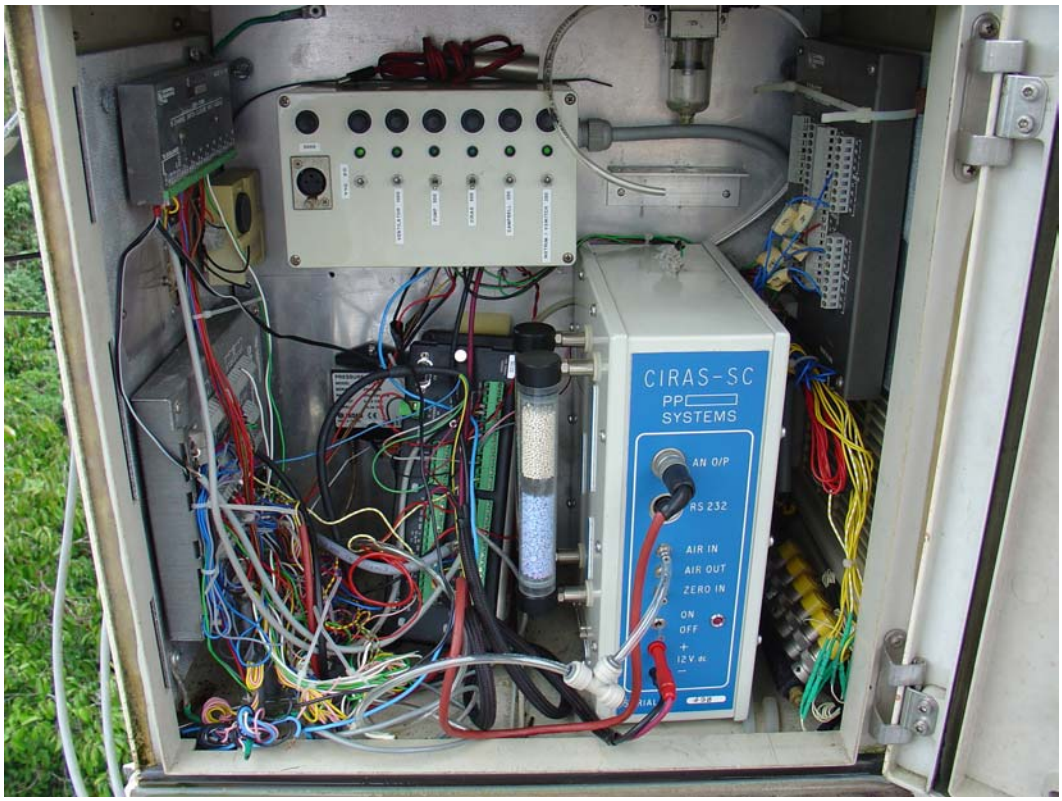

Figure 1. Profiling system based on the CIRAS-SC

Amazonia constitutes a large global store of carbon. Forest conversion in Amazonia is a net source of carbon to the atmosphere, while recent measurements indicate that undisturbed forest systems may be a net carbon sink. The importance of sequestration of carbon in regrowing forest and abandoned lands is unclear. These issues represent uncertainties in the global carbon balance and may influence the carbon dioxide concentration of the atmosphere and thus interact with the climate system. How will changes in land use affect the net carbon balance between terrestrial ecosystems and atmosphere, and do undisturbed forest ecosystems function as net carbon sink? What are the sizes of the carbon pools in the vegetation and soils of intact, secondary and selectively-logged forests, savannas, and agricultural lands? What are the net rates of carbon exchange between the atmosphere, vegetation and soil, and how are the size of the pools and the rates of exchange altered by natural and human disturbances?

One of the systems used to collect data to achieve some answers is a profile system with automatic calibration using a **CIRAS-SC** analyzer, assembled by LIM (Meteorological Instrumentation Laboratory) from CPTEC-INPE based on Alterra/Wageningen system. In this system, there are six measurement levels selected through solenoid valves in a normal operation. The selected level is connected to a pump which flushes the tubing and to the **CIRAS-SC** through a 2 way valve. The **CIRAS-SC** pumps an air sample continuously with its internal pump at 100 ml/min letting the excess flow away to the atmosphere through the Nafion (Perma-Pure) humidifier to assure that the **CIRAS-SC** pump works properly and does not get damaged (See Figure 2 on next page).

PP SYSTEMS

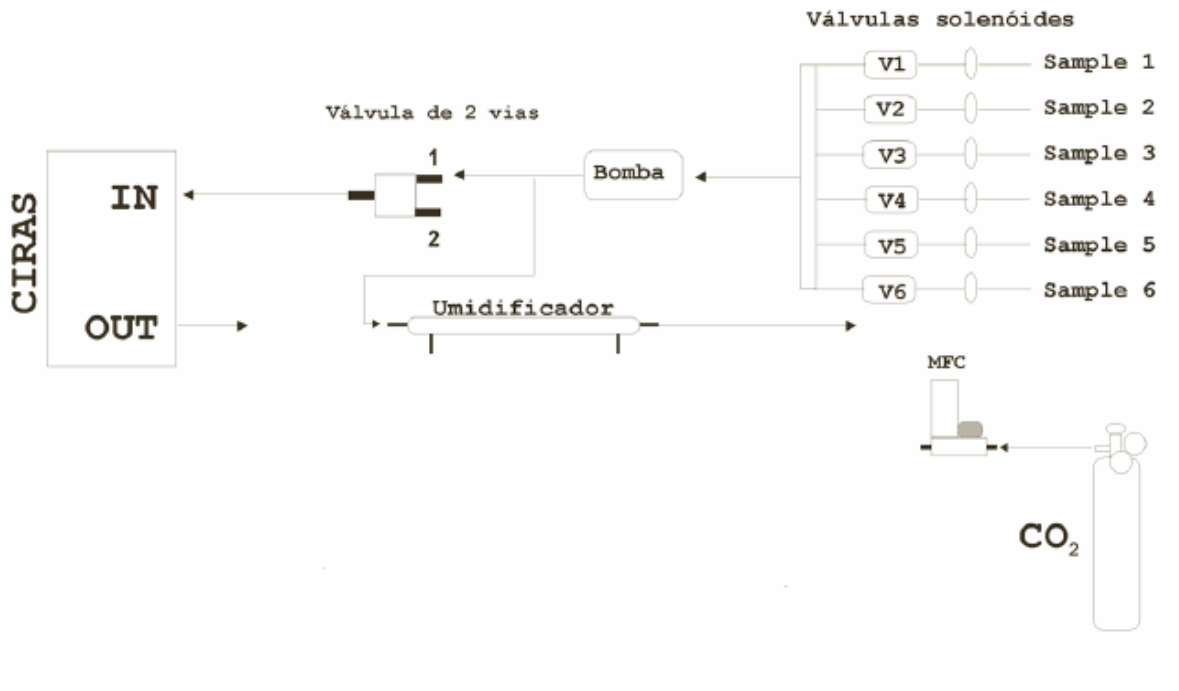

Figure 2.

Once or twice a day, the **CIRAS-SC** is supplied with humidified calibration gas. The flow of the calibration gas is regulated with a mass flow controller. The controller is set with a potentiometer to a flow of 150 ml/min. A Nafion (Perma-Pure) humidifier is used to humidify the calibration gas. The "wet" side of the humidifier is flushed continuously with the air coming from the highest level. The "dry side" of the humidifier is where the calibration gas goes through (See Figure 3 below). The air excess is connected to the free atmosphere (through a piece of thin T tubing to prevent diffusion of outside air into the calibration gas stream). This is done because the **CIRAS-SC** pumps an air sample continuously with its internal pump. The **CIRAS-SC** pumps at 100 ml/min. By supplying a little more (150 ml/min) and letting the excess flow away to the atmosphere we make sure that we don't spend to much calibration gas while supplying the **CIRAS-SC** with enough flow. If the flow through the **CIRAS-SC** is too high or too low it will produce an error code and non-meaningful data. All valves, MFC control and data collect are done by a CR10X Campbell datalogger.

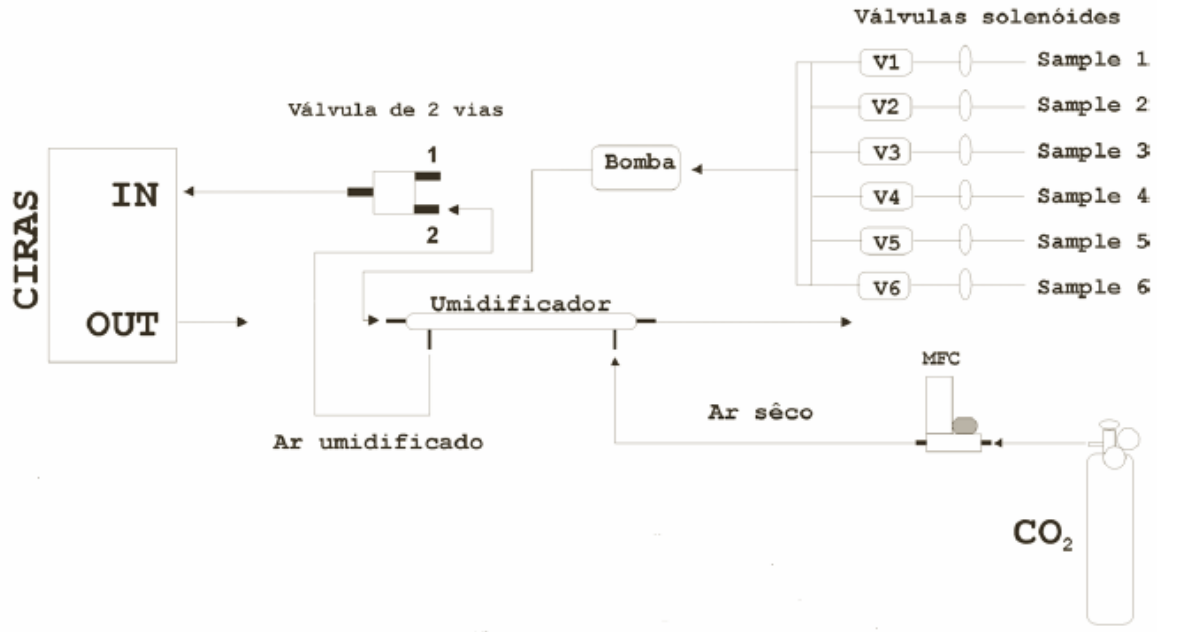

Figure 3

The profiling system described in this application note is located at the Rebio Jaru Tower Site (Rondonia, Brazil).

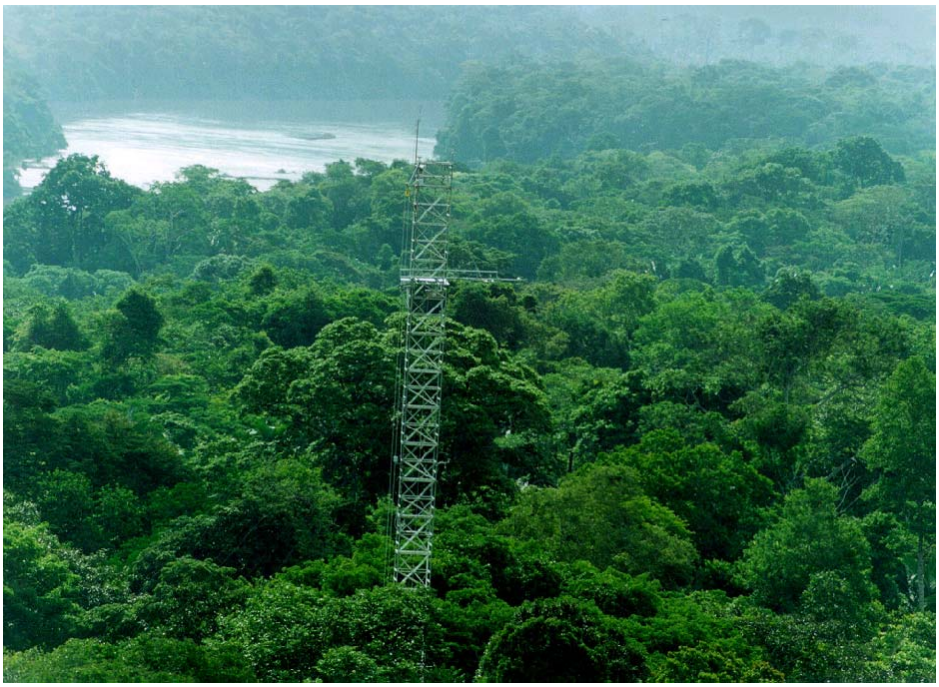

Figure 4. Rebio Jaru Tower Site (Rondonia – Brazil)

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