Project Number 282910

ÉCLAIRE

Effects of Climate Change on Air Pollution Impacts and Response Strategies for European Ecosystems

Seventh Framework Programme

Theme: Environment

D1.1 First 6 months of continuous flux data of CO_2, H_2O, O_3 and meteorological variables at 9 sites

Due date of deliverable: **30/04/2013** Actual submission date: **25/07/2014**

Start Date of Project: **01/10/2011** Duration: **48 months**

Organisation name of lead contractor for this deliverable : **NERC**

Project co-funded by the European Commission within the Seventh Framework Programme		
Dissemination Level		
PU	Public	☐
PP	Restricted to other programme participants (including the Commission Services)	☑
RE	Restricted to a group specified by the consortium (including the Commission Services)	☐
CO	Confidential, only for members of the consortium (including the Commission Services)	☐

1. Executive Summary

This delivery encompasses the generation of the first 6 months of measurement data from a 9-site flux network, covering a total of 15-month measurement duration. Measurements started a little later at some sites, primarily due to tight timing between the Intensive Integrated Po Valley Campaign (cf Deliverable 1.5) and the start of this measurement period.

All sites achieved good data capture and high quality data, providing the first-ever simultaneous, co-ordinated network especially of eddy-covariance O_3 fluxes, analysed with a common methodology.

In addition to the 9 sites funded by ECLAIRE, a further flux site (Castelporziano) has made most of the mandatory measurements as an associated site and is delivering data to the ECLAIRE database at no cost to the project.

Objectives:

This Deliverable is associated with the objective to deliver 6 months of high quality flux data of quasi-continuous O_3 and NO across a 9-site network, suitable for the development and improvement of exchange parameterisations.

2. Activities:

The following long-term measurements have been supported by ÉCLAIRE at the flux network sites:

- O_3 flux by eddy-covariance at all sites, using one of three instrument types (see Table 1).
- Soil NO flux measurements by automated chamber, or micrometeorology, adjusted for chemical interactions with O_3
- CO_2/H_2O fluxes
- Leaf wetness clip sensors to aid interpretation of O_3 flux to wet surfaces
- Direct / indirect / reflected PAR, recorded at 1 minute intervals
- Associated ancillary measurements (meteorology, soil status, soil & plant pools)

Table 1. Overview of the measurement approaches for O_3 and NO at the ÉCLAIRE flux network sites:

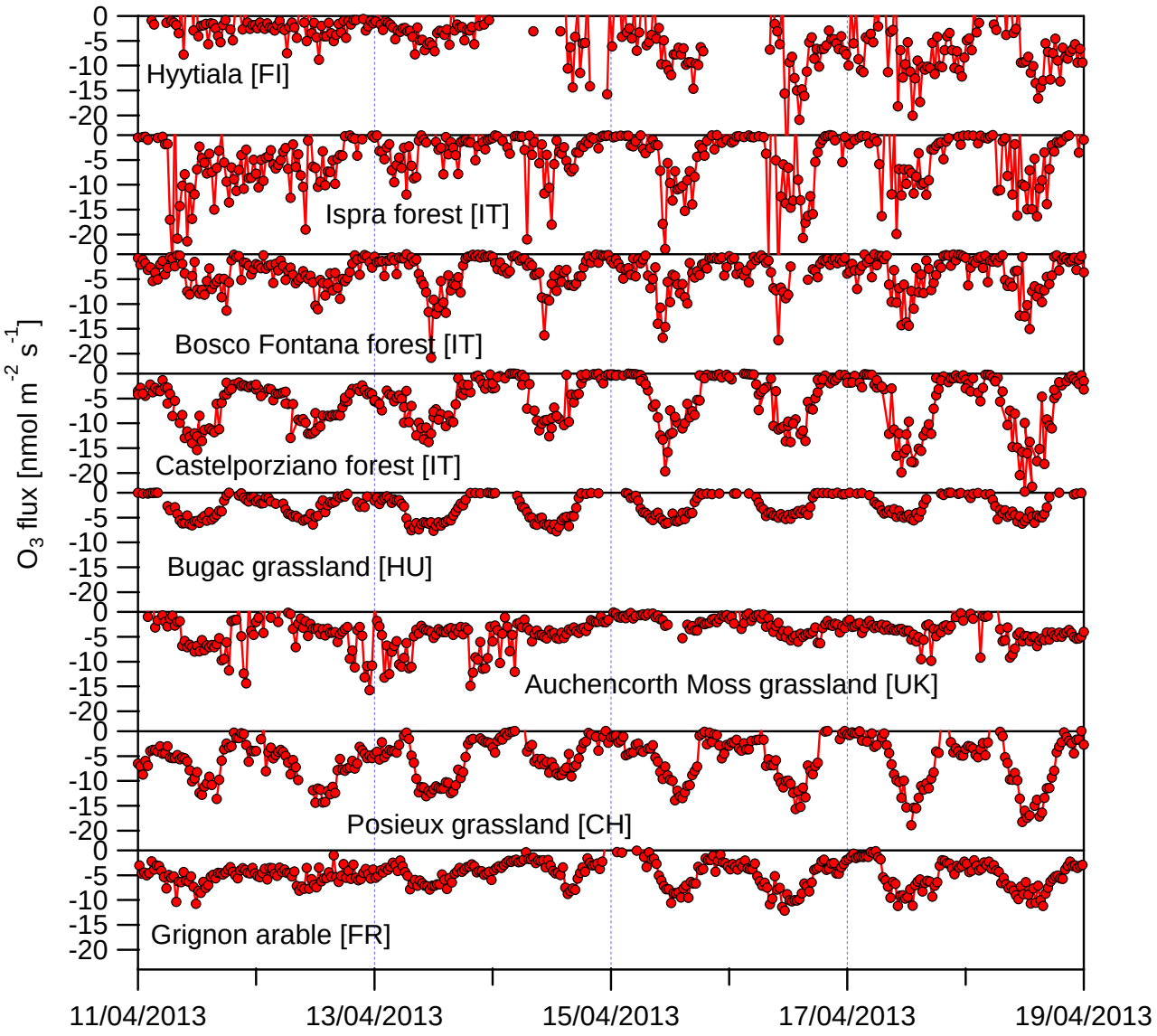
Eco-system	Site	Start of O_3 flux measurements	Type of fast O_3 analyser	NOx flux approach
Forest	Hyytiala (FI)	01/08/2012	LOZ-3 / Sextant	NO/NO_2/O_3 gradient
	Speuld (NL)		Sextant	NO/NO_2/O_3 gradient; auto-chamber (1)
	Bosco Fontana (IT)	13/07/2012	COFA	NO/NO_2/O_3 gradient
	Ispra Forest (IT)	30/07/2012	NOAA	NO/NO_2/O_3 gradient
	Castelporziano (IT)*	26/01/2012	NOAA	
Grassland	Bugac (HU)	01/08/2012	Enviscope	Auto-chamber (2), manual chamber (2), NO/NO_2/O_3 gradient
	Auchencorth Moss (UK)	12/11/2012	ROFI	Auto-chamber (4 + 1) + NO/NO_2/O_3 gradient
	Posieux (CH)	01/08/2012	Enviscope	NO/Nr eddy-covariance

Arable	Grignon (FR)	07/08/2012	Sextant	NO/NO_2 eddy-covariance
	Potrodolinskoye (UE)	13/09/2012	ROFI	Auto-chamber (4+1)

3. Results:

The deliverable is the data themselves, not a full report about the data. For example, here is shown the ozone flux across the network.

Figure 1. Example data: O_3 flux across the flux network.



4. Milestones achieved:

The associated milestone MS 1.1 has been achieved in that all sites have submitted flux data to the ECLAIRE flux database.

5. Deviations and reasons:

i) The deliverable was reached late, because:
   a. there were delays with some groups on setting up measurement instrumentation, partly because of the tight timing between the end of the integrated campaign at Bosco Fontana and the start of this measurement period;
   b. the core measurement period has been moved backwards in response;
   c. unified approaches had to be developed of how best to process and report the ozone flux measurement data in a consistent way;
   d. of delays in the preparation of the rather complex spreadsheet for data upload to the ECLAIRE database.

ii) There have changes in the sites compared with the original Description of Work:
   a. The Swiss site Oensingen was replaced by a similar Swiss grassland (Posieux) in response to changes of national funding.
   b. The Italian arable site was replaced by a forest site at Bosco Fontana to make full use of the investment ÉCLAIRE made by establishing a new tower for the integrated experiment (c.f. D1.5).
   c. A further associate site (Italian forest site at Castelporziano) has delivered data to the database at no cost to the project.

6. Publications:

Analysis of the measurement results is only just starting properly, now that the full dataset is becoming available. Many publications are planned on site-specific reporting of results, site-specific model applications as well as cross-site analyses.

7. Meetings:

Meetings to prepare the measurements, review measurement status and to identify problems happened during the first three ECLAIRE annual meetings (kick-off in Brescia, 24-27 Oct 2011; 2nd annual meeting in Edinburgh, 15-18 Oct 2012; 3rd annual meeting in Zagreb, 22-24 Oct 2013).

In addition, representatives from the flux sites met at NERC / CEH Edinburgh 26-28 May 2014 to discuss further harmonisation of ozone flux measurements and reporting and to make a start on the data analysis.

8. List of Documents/Annexes:

- ECLAIRE Flux Network - List and Protocols of Mandatory Measurements; available at http://www.eclaire-fp7.eu/node/142
- Measurement protocol for FaPAR, LAI and canopy structure; available at http://www.eclaire-fp7.eu/node/142