



Project Number 282910

ÉCLAIRE

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

Seventh Framework Programme

Theme: Environment

21.13 Third database report on intermediate and final database content, including QA/QC report

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Start Date of Project: **01/10/2011**

Duration: **48 months**

Organisation name of lead contractor for this deliverable :
NERC-CEH

Project co-funded by the European Commission within the Seventh Framework Programme		
Dissemination Level		
PU	Public	y
PP	Restricted to other programme participants (including the Commission Services)	<input type="checkbox"/>
RE	Restricted to a group specified by the consortium (including the Commission Services)	<input type="checkbox"/>
CO	Confidential, only for members of the consortium (including the Commission Services)	<input type="checkbox"/>

1. Objectives:

The objectives below represent the field-site experiments outlined in the description of work that produce data outputs for the ECLAIRE database:

- WP1:
 - To obtain 15 months of high temporal resolution flux data of key trace compounds (O₃, NO, CO₂, H₂O) across a 9-site European flux network for the study of fluxes in relation to climatic drivers, using changing meteorological conditions at the sites as a proxy for climate.
 - To study the exchange of additional compounds (NH₃, NO_x, VOCs) through synchronised intensive measurement periods across the 9-site flux network, in relation to meteorological drivers, and to provide a test database for the evaluation of European chemical transport models.
 - To quantify the effect of aerosols on gross primary productivity through modulating in-canopy light levels for three forest ecosystems.
 - To quantify the importance of in-canopy chemical transformations on the deposition mechanism and effective emission of biogenic compounds into the atmosphere, through an integrated intensive measurement campaign above/within a polluted forest.
 - To make targeted measurements of NH₃ exchange with Mediterranean semi-natural vegetation during distinct growth phases (active vs. dormant).
- WP2:
 - The aim of this work package is the study and quantification of key emission mechanisms to provide targeted data that can be used to derive parameterisations of the emission processes in WP1.3.
 - To obtain response curves of soil and litter emissions to meteorological drivers (temperature, moisture) for CO₂, CH₄, O₃, N₂O, NO, NO₂ and NH₃ across a wide range of soils.
 - To provide data on NO emissions after rewetting events as a basis to improve the mechanistic understanding and predictive capability, through novel laboratory experiments.
 - To quantify VOC emission responses under combined environmental change scenarios and develop a process understanding of the controls.
 - To investigate the effect of stresses (drought, heat) on BVOC emissions and the impact on O₃ deposition and formation.
 - To quantify deposition rates of VOCs and their controls.
- WP10: To conduct relevant field-scale and controlled-exposure experiments on impacts of air pollution components on plant and ecosystem processes including interactions with climate change. Plant and ecosystem responses in terms of plant performance, carbon uptake and ecosystem carbon dynamics will be measured at 4 different ecosystem types.
- WP11: As part of measurements made at sites under WP10 studies will be made on three novel concepts to establish new empirical relationships for vegetation-air pollution interactions.
 - To quantify how climate change, including increasing background ozone concentration will enhance greenhouse gas and NO release and exacerbate the threat to vegetation caused by dry or wet N deposition, including the distinction between oxidized (NO_y) and reduced (NH_x) nitrogen forms.
 - To assess if BVOC emissions from vegetation will increase the potential for O₃ and NO_x uptake by plants, and detoxification of reactive oxygen species, leading to improved antioxidant properties and reduced emission of other stress-induced, reactive BVOC (e.g., LOX compounds).
 - To demonstrate if hygroscopic particles accumulating on leaves from aerosol and trace gas deposition may attract water and lead to enhanced transpiration and reduced drought tolerance.
- WP21: To ensure data quality and implement procedures for quality control

2. Activities and Results:

WP1 Data submissions

Bosco Fontana campaign data(WP1.4)

Data forms have been added to the database. Relevant data-owners are still continuing to be consulted and are now sending back in processed data in the uniform template structure. Some data needs re-analysing

Field measurement data (WP1.1)

WP1.1 Submission: There are only 2 sites that still have to complete their full 15 months of data – Auchencorth and Bosco Fontana. Auchencorth has now submitted its meteorological data.

Auchencorth campaign Task 1.2: The campaign is still ongoing and data submission requirements and templates still need to be proposed, although existing templates can be utilised.

QA/QC for WP1

Quality assurance checks are ongoing.

Targeted measurements of NH₃ exchange with Mediterranean vegetation (WP1.5)

Mandatory measurements have also been taken at a Mediterranean site in Spain. Data has been collected and is currently being analysed. The data concerned does not look entirely as expected, therefore they are actively discussing this with other Component colleagues. Delivery to the database will be delayed until this has been solved.

WP2: Controlled studies on exchange processes

- WP2.1 - data has been delivered (Controlled emission measurements of CO₂, CH₄, N₂O, NO and NH₃ using monoliths and litter from the ÉCLAIRE flux network) - BFW
- WP2.4 - data has been delivered for WP2.4. (plant chamber-reaction chamber system (JPAC) in order to separate stress induced emissions, O₃ & NO_x deposition within the eco-system, and photo-chemical ozone formation) – JUELICH
- WP2.2 (providing data on NO emissions after rewetting events on soil cores – KIT). The data is delayed until end of the year due to sampling system needing to be redesigned.
- WP2.3 (Assessment of primary and secondary BVOC exchange rates) data captured but not yet submitted

WP 9 - Literature data mining

No more updates since last report.

WP10/WP11 Data submissions

Data have been uploaded for the 4 different ecosystem types:

Ecosystem	Site 1	Site 2
Forest	Bangor (UK) 2012-2013	Curno (It) 2012-2014
Grassland		Alp Flix (Sui) 2004-2010
Agriculture	Santa Olalla (Es) 2011-2012	Riso Phytotron (Dk) 2009-2011
Shrubland	Brandburg (Dk) 2006-2012	Whim Bog (UK)2012-2013

Additional measurements have associations with WP11 where they have also contributed to the overall measurements in WP10:

- Whim Bog (2013)
- Bonn (2012)

A WP10/WP11 specific user guide has been posted on the ECLAIRE web portal, and the users informed of the task. We are communicating frequently with data providers and modellers, and offering as much support/help as they require.

A user guide (**D21.10**) to data downloading specifically for WP10/WP11 has also been posted on the ECLAIRE web portal, and the C3 PI has been informed of this, and asked to distribute to the relevant modellers.

QA/QC for WP10 and WP11

Quality assurance checks have been written into the database to validate for duplicate fields, formatting of dates, field types and value ranges for individual fields.

WP11.3

The first plant dataset (sunflowers) has been received from UBO. The study is to show how deposition of atmospheric aerosol may alter plant vulnerability to drought conditions, as a result of a 'wicking effect' whereby hygroscopic particles draw water out of otherwise closed stomata. Experiment data on Scots pine and beech are to come by the end of the year. The data will be assessed and uploaded to the data system.

WP21

ÉCLAIRE data portal (D21.8)

Online tutorials and a full live demonstration on downloading data were given at the 4th GA in Budapest, 2014.

Further updates and feature requests have been documented for future development and improvements.

3. Milestones achieved:

Milestone number	Milestone name	Lead beneficiary number	Delivery date from Annex I	Comments
MS100	Common measurement protocols for C1 and C3 agreed and distributed	5	12	Complete. Further discussion were undertaken at the Zagreb 3 rd GA to finalise measurement parameters for forest ecosystem field types for WP1.1.
MS104	DP and DMP first drafts written and agreed by DMC (D21.7)	1	6	Complete and online
MS106	ÉCLAIRE data portal online with user registration	1	12	Online with 45 users http://eclairadata.ceh.ac.uk
MS107	Data uploaded and QA checked for months 1-18	1	24	Completed

MS108	Data uploaded and QA checked for months 19-36	1	40	3 sites outstanding for WP1 1 site for WP10/11 QA ongoing.
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4. Meetings:

GA and the Open Science Conference Budapest 2014

5. List of Documents/Annexes:

None