

Project Number 282910

ÉCLAIRE

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

Seventh Framework Programme

Theme: Environment

**21.12 - Second database report on intermediate and final database
content, including QA/QC report**

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

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

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Dissemination Level		
PU	Public	<input checked="" type="checkbox"/>
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).
- 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
- WP21: To ensure data quality and implement procedures for quality control

2. Activities and Results:

WP1 Data submissions

Bosco Fontana campaign data (WP1.4)

WP1 Bosco Fontana data require a large number of different database forms to be constructed, which are unique for this task. The data management team have now developed Excel templates and are capturing the data in these forms to be added to the database. Relevant data-owners have been consulted and are now sending back in processed data in the uniform template structure.

Field measurement data (WP1.1)

The template was revised at the beginning of 2014 to allow for certain measurements that were missing from the original template. This was mainly for forest ecosystem field sites. Other changes included some re-sampling of data into the correct unit format and date-time corruptions. Templates with the re-sampled data were then sent back to the data owners to check and finalise their complete 15 month data set.

WP1.1 Submission: Most sites have now submitted a full (often more) 15 months of flux/met/soil data from their fieldsites. There are 3 sites that still have to complete their full 15 months of data – Grignon, Bosco Fontana and Speulder. A fourth site Auchencorth has yet to submit any data in the supplied template. The measurements have been done but the ozone fluxes are still being processed.

Auchencorth campaign Task 1.2: April 2014 saw the start of intensive measurement at Auchencorth field site UK. Targeted flux measurements were made of additional compounds, including above-

canopy NO and NO₂ by gradient and eddy-covariance, NH₃ and volatile organic compounds (VOCs). 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 have been written into the database to validate for duplicate fields, formatting of dates, field types and value ranges for individual fields.

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 for submission to the database by Month 40.

WP 9 - Literature data mining

This task is advanced. Data are held in an ACCESS database, which is accessible from the main ECLAIRE web site (for ECLAIR users only). However, there are outstanding data that need to be uploaded. We anticipate that this will be done by the end of the summer.

To date, there are 3032 records for “Leaf level processes”, 1794 records for “Dynamic processes” and 5162 records for “Ecosystems processes”.

QA/QC for WP9

The structure of the key fields for each table safeguards against duplicate key field entries. The definition of field data types constrains numeric and text fields. Queries will be run to check final content for valid values of different fields.

WP10/WP11 Data submissions

Data have been uploaded for the 4 different ecosystem types:

- *Forest* - Bangor (2012, 2013); Curno (2012)
- *Shrubland* - Brandbjerg (2006-2012)
- *Arable* - Santa Olalla (2011, 2012); Risoe phytotron (to come)
- *Grassland* - Alp Flix (2004-2010)

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.

WP21

ÉCLAIRE data portal (D21.8)

The ECLAIRE data portal has been running for 2 years and currently has 45 users from the ECLAIRE community. Further developments have been undertaken to enhance the user experience in downloading data from the system. This involves the move to an asynchronous approach where data retrieval is carried out in the ‘background’ with the user receiving an email (and data url) when the data request is ready. This new approach prevents the user from spending many minutes watching an onscreen progress bar as the data is retrieved from the database. The speed of download and online viewing of the data has also been vastly improved.

Online tutorials of this new system were given at the 3rd GA in Zagreb, 2013.

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://eclairdata.ceh.ac.uk
MS107	Data uploaded and QA checked for months 1-18	1	24	90% Complete with ongoing QA checks. 1 site still to upload for WP1
MS108	Data uploaded and QA checked for months 19-36	1	40	4 sites outstanding for WP1 3 sites for WP10/11 QA ongoing.

4. Meetings:

A meeting has been scheduled for late August 2014 to discuss issues and any outstanding data issues in time for MS107 and the 4th GA in Budapest (29th September, 2014).

5. List of Documents/Annexes:

ECLAIRE data QA/QC (ECLAIRE data QA_QC report.docx)

ECLAIRE data QA/QC Report

The ECLAIRE project requires data collection for several different work-packages, each of which involves measurements of a wide range of data, at different time resolutions, for different durations and different time periods.

The following QA/QC procedures are being implemented:

Duplicate records

Duplicate data records are defined as those having the same key-field values (for example, date-treatment-block-replicate). All data sets have Date/Time as a key field. Some datasets have several other key fields.

Duplicate data records are trapped by the database software, and the whole dataset is “rejected”.

Finding the duplicate data records presented a challenge, as some datasets contain tens of thousands of rows of data, sometimes with hundreds of duplicate rows of data.

A new FME routine has proved successful in identifying the row numbers of the offending data, and producing a report for the data provider as a basis for correcting the datasets.

Data field value ranges

To help ensure that correct units are being used, and to identify outlier values that might arise from software anomalies etc, the database software provides the option to enter value ranges for each data field. This has been used for ~ 50% of data fields across all work packages, but further “off-line” checks are planned, with the help of a new research associate.

Relationships between different data fields

There may be relationships between some data fields, for example negative CO₂ flux should accompany high PFD values.

With the help of WP1 scientists and the new research associate, important relationships will be identified and FME software will be used to perform the checks.

Time series data

Where a strong diurnal trend is expected (eg with some meteorological and flux data), data will be plotted against time to check for deviations from the expected pattern.

Completeness of submitted data

For each site and dataset, all data will be downloaded and checked for “empty fields”. PI’s will be contacted to request any missing data.