

Project Number 282910

ÉCLAIRE

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

Seventh Framework Programme

Theme: Environment

**9.2 First phase database for use in initial modelling and
 identification of data gaps for experiments being conducted in
 WP3.2 and WP3.3**

Due date of deliverable: **01/10/2012**

Actual submission date: **01/06/2013**

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 | <input 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. Executive Summary

Data mining methods have been developed and agreed for three activities: Empirical analysis of a long-term monitoring data set, data mining from long-term experiments and from scientific papers. The latter involved developing a template that was applicable for papers covering a wide range of effects from processes at the leaf-scale to effects on net ecosystem exchange for crops, trees, shrubs, heathland and grassland. Although technically challenging, the template was completed and distributed and almost all of the data for crops, heaths and grassland are in the database; there have been staffing problems for trees datamining and thus this part is delayed. For other activities, databases have been collected and are beign distributed to modellers in WPs 12 and 13. In the meantime, gaps have been identified for experimental work to be conducted in WPs 10 and 11.

2. Objectives:

- To conduct a pan-European data mining exercise compiling data from previous survey, field-scale manipulation and controlled exposure experiments on air pollution impacts on ecosystem function and services, including interactions with other drivers such as climate change

3. Activities:

- Empirical analysis of a long-term monitoring data set, data mining from long-term experiments and from scientific papers

4. Results:

Data mining from long-term experiments: After consideration of all data sets available, the following were identified as suitable for initial model testing:

- Whim bog, UK: N form experiment on peat bog
- Brandbjerg, Demark: Dry heath exposed to CO₂, warming, drought, N
- Alp Flix, Switzerland: montane grassland exposed to ozone and nitrogen

A data template was compiled and the process of collecting data has begun.

Empirical analysis of a long-term monitoring data set using the extensive monitoring data from the ICP Forests, data compilation commenced in the first year of the contract. However, very sadly, the lead scientist involved from WSL passed away suddenly in the autumn, 2013. After an appropriate time interval, data analysis is now resuming.

Data mining from scientific papers: The main focus of the literature-based data mining activities is to acquire response functions for the first stage improvement in model parameterisation being used in C3 and C4 modelling. We are focussing on the effects of ozone, alone and in combination with other pollutants and environmental stressors, on leaf-scale, season-long dynamics and ecosystem processes, particularly those associated with stomatal conductance, photosynthesis and carbon allocation. The first phase of the work, completed in late 2012, was to develop a template appropriate for all suitable physiological, growth and ecosystem-scale data available in the scientific literature. The aim was to produce one template that would feed data into one database in a standardised way to enable unique analysis of relationships between for example effects on photosynthesis and growth, and across species and vegetation types. This took considerable time as the original ECLAIRE database system was not found to be powerful enough and a change had to be made to MS ACCESS which required further changes in the template. At the same time as template development was taking place, a series of research questions and expected endpoints were agreed by the group for leaf-scale, season-long dynamics and ecosystem processes. These were used to specify search terms for use in Web of Knowledge, with searches conducted by Zhaozhong Feng, Gina Mills and Felicity Hayes and combined within one EndNote database. After removal of duplicates, there were 2838 potential papers of interest. Using strict rejection criteria based on the content of the abstract, this was reduced to 1205 papers for more detailed consideration by looking at the paper itself. At this stage, the list of papers was sent to contributors for completion of templates. It was anticipated that a further one half of the papers would not meet the criteria for inclusion. Figure X.1 shows the distribution of papers, by vegetation type and theme. In the individual task descriptions, we provide an update on current progress.

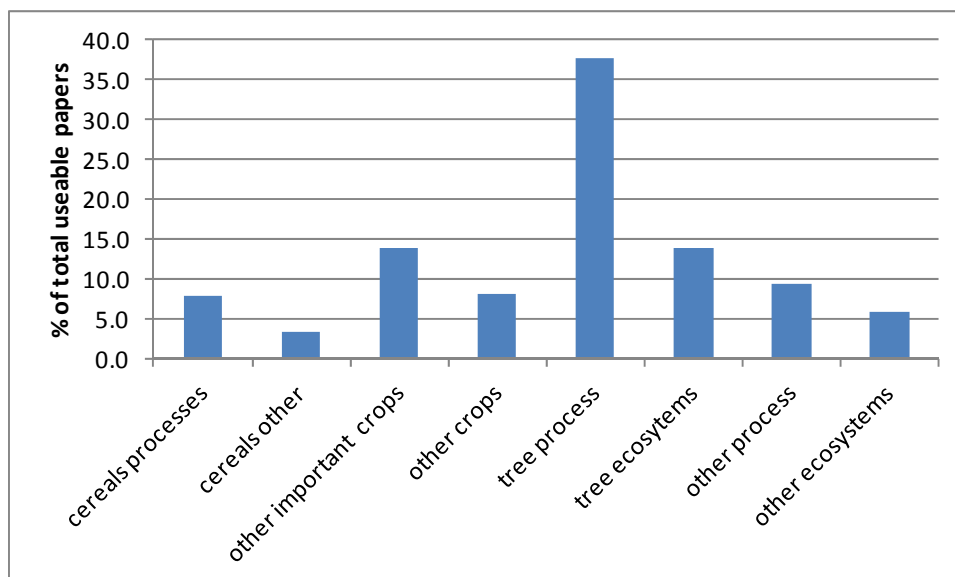


Figure X.1: Percentage of relevant papers within each category (out of the 1205 included for more detailed analysis)

5. Milestones achieved:

MS39 Compilation of data from published papers and list of knowledge gaps
Data compilation is 60% completed; knowledge gaps identified

MS40 Completion of data compilation
For reasons described below, this milestone is delayed

6. Deviations and reasons:

Development of a multi-purpose template for data collection from the literature proved to be technologically challenging. The ECLAIRE database software became unsuited to the complex data selection required and an MS ACCESS database is under construction. There have also been staff resourcing issues at the Institutes conducting the empirical analysis and tree-based data mining from the literature.

7. Publications:

ECLAIRE Document

Component 3: Data for modelling: explanation, needs and procedures for data mining and experiments

8. Meetings:

- October, 2011 Brescia, Italy ECLAIRE general assembly
- January, 2012 Dragor, Denmark – Component 3 meeting
- October, 2012 Edinburgh, UK ECLAIRE general assembly
- January, 2013 Halmstad, Sweden, as follow-on to ICP Vegetation meeting

9. List of Documents/Annexes: