Project Number 282910

ÉCLAIRE

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

Seventh Framework Programme

Theme: Environment

Deliverable D23.1: ÉCLAIRE Training plan

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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)	☐

Executive Summary

i).   This document presents the training plan for ÉCLAIRE, which has been developed through project Work Package 23 (Training) and constitutes Deliverable D23.1

ii). The objectives of the ÉCLAIRE training activities are:

> a) *Contribute to the skills development and knowledge of young scientists in ÉCLAIRE in order for them to complete their project objectives;*
>
> b) *Provide the opportunity for young scientists to get to know and interact with other researchers with similar training needs*

iii). The Training Plan has been developed using the results of a young scientist (and supervisor) training survey conducted during the first few months of the project that collected information on the young scientists' role in the project and their training needs

iv). The young scientist survey was completed by 19 scientists (53% female, age range 22-40). The respondents suggested a range of specific training activities that they would like to attend through their involvement in ÉCLAIRE covering both measurement and modelling techniques

v).   The survey results also highlighted the general training needs of the respondents, such as scientific writing and statistical analysis

vi). Based on the training activity suggestions of both the young scientists and their supervisors, topics for the ÉCLAIRE Summer School (in Year 2) are proposed

vii). The proposed central theme of the Summer School is the measurement and modelling of exchange processes. This core theme could be coupled with an analysis of upscaling effects (plant-canopy-ecosystem-landscape-region-country-Europe-global) and advanced statistical analysis to cover two of the other identified training needs

viii). In addition to the Summer School proposal, a second core training activity is suggested covering modelling ecosystem impacts of air pollution and climate, suggested for Year 2 as well

ix). Although ÉCLAIRE does not plan to provide general training activities such as scientific writing and statistical analysis, ÉCLAIRE partners will be encouraged to organise these activities locally and the Training Work Package (WP23) will provide advice and track these activities to assess their impact

x).   Activities highlighted in this training plan will be organised via a dedicated Training section on the ÉCLAIRE website. This section will include news updates, a training request form and an activity calendar where website users can add their planned training activities

xi). To assess the accomplishment of training objectives and the success of individual training activities, post-activity questionnaires will be sent out at an agreed period after the activity (e.g. one year) coordinated using the training activity calendar

xii). Once the Training Plan is adopted by the Executive Steering Committee, the first task will be to set-up the Training section on the ÉCLAIRE website where planned training activities can be posted and where young scientists can highlight their training needs.

Objectives:

The training activities of the ÉCLAIRE project are designed to:

  i) *Contribute to the skills development and knowledge of young scientists in ÉCLAIRE in order for them to complete their project objectives;*

  ii) *Provide the opportunity for young scientists to get to know and interact with other researchers with similar training needs*

In order to be inclusive, the project takes a very broad definition of a young scientist in order to not exclude researchers that have entered into a research career late or have recently changed their specialisation and are still on steep learning curve. ÉCLAIRE training activities are open to all interested parties, although by their nature it is expected that the majority of the participants will be PhD students are researchers that have obtained their PhD within the last 5 years or so.

1. Activities:

1.1. Development strategy

The Training Plan has been based principally on the results of a survey of young ÉCLAIRE scientists conducted in April 2012 (see Section 2). The results of this survey were supplemented by responses of the supervisors/managers of the young scientists that responded to the survey. The supervisors/managers were asked to respond to the following 3 questions:

  1) What are the scientific training activities that are required by the young scientists in ÉCLAIRE that you are responsible for in order to meet their objectives within the project?

  2) What are the general training activities (e.g. statistics, GIS, communication skills etc) that will help them meet their objectives?

  3) What training activities can your organisation provide for young scientists in ÉCLAIRE?

The results of the young scientist survey and the supervisor responses were collated and grouped into common themes e.g. measurement-based, modelling-based, exchange processes, ecosystem impacts etc., and the training strategy was developed by identifying key activities that could benefit a significant number of young scientists in ÉCLAIRE either through individual training activities or through inclusion in the ÉCLAIRE Summer School planned for Year 2 of the project.

1.2. Young Scientist Survey Description

The survey consisted of 18 questions (Q1-18) covering the role of the young scientist in ÉCLAIRE and their prior, planned and desired training activities. Specific scientific training activities (e.g. flux measurements, exchange modelling) were distinguished from more general skills such as statistics or scientific writing.

The survey was designed and completed online through freeonlinesurveys.com, which facilitated the tracking of responses and collation of data. Q1-Q5 dealt with personal information (name, age, sex, email, and ÉCLAIRE partner) and Q6-Q9 covered academic qualifications and their role within ÉCLAIRE (e.g. Work Package, PhD/research topic etc). Q10-Q11 dealt with previous training activities attended and Q12-Q13 identified training activities that are already planned. Q14-Q15 asked which specific scientific training activity the young scientists would be interested in and Q16-Q17 was used to assess the interest level for a list of general training activities (Figure 1).

A bonus question was added to ask for suggestions for topics for the ÉCLAIRE Summer School (Q18).

Figure 1: Screenshot of the "General training activities" page of the online survey

2. Results:

2.1. Young Scientist Survey Results

Response profile

The survey was completed fully by 19 scientists; 10 of which were female (53%) and 9 male (47%). The age range was from 22 to 40 years old with the distribution shown in Figure 2. Thirteen of the respondents were educated up to bachelors or masters degree level and six were at post-doctorate level.
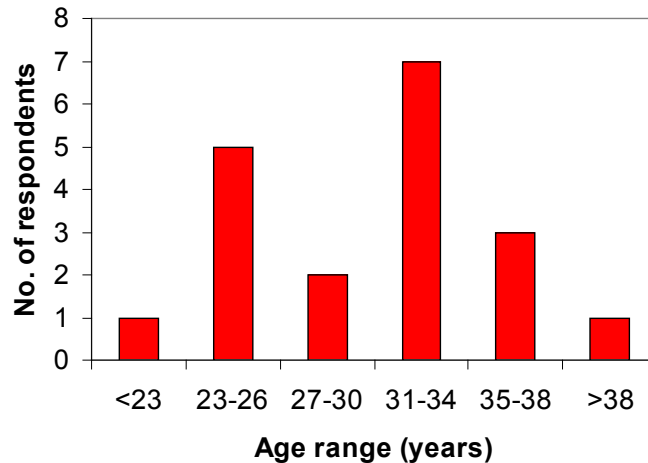

Figure 2: Age distribution of survey respondents

Survey responses came from scientists based at 14 of the ÉCLAIRE partners in 11 different countries as well as from 2 organisations external to ÉCLAIRE. Sixteen Work Packages were represented by the responses with all work packages of Science Components 1 and 2 (WPs 1-8) represented (Figure 3). The least-represented Science Component was Component 4 (WPs 14-17).
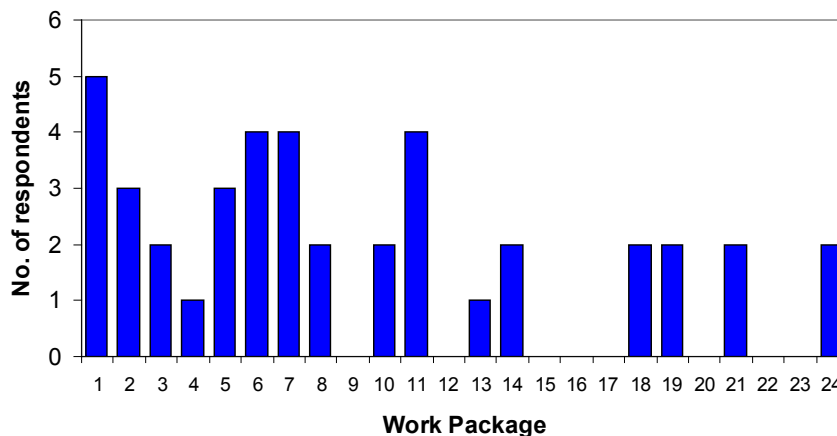

Figure 3: Number of respondents working on each project Work Package

Training previous to ÉCLAIRE

Training courses that the respondents had attended previous to the project (14) covered both measurement (micro-meteorology, gas exchange) and modelling topics (ecosystem, climate and impacts) as well as more general activities covering both aspects (e.g. summer schools). Two of the respondents had also received training in scientific writing.

Planned training activities of ÉCLAIRE

Respondents listed 10 specific scientific training activities that were already planned as part of their work in ÉCLAIRE. The majority of these training activities (8) were measurement-based (CO_2, trace gas and aerosol exchange, soil microbiology). One training activity in modelling is planned (stomatal conductance and plant ozone dose) and one respondent was planning to go to the Summer Course in Flux Measurements and Advanced Modeling at the University of Colorado in July 2012.

Planned activities for general training (6) included presentation skills, paper writing, GIS, statistics and project management.

Desired training activities within ÉCLAIRE

Respondents listed 16 specific training activities in which they would be interested in participating (Table 1).

Table 1: ÉCLAIRE training activities suggested by the survey respondents

Mostly measurement	Mostly modelling	Mixture
Flux measurement of Ammonia and NO_x from agricultural and Forest Ecosystems	Modelling of stomatal conductance and plant ozone dose	Plant-air exchange measurement and modelling techniques at different scales
Advanced methodology for measuring leaf scale responses and how they can be linked to canopy scale	Parameterization and modelling of reactive trace gas exchange	
Alternative approaches for stomatal conductance characterisation e.g. isotopes, carbonyl sulphide (COS), etc	Modelling of nutrient turnover in forest ecosystems	
Eddy covariance	Soil water modelling	
Measurement of plant responses to climate change, including changes of leafage and fine roots biomass in response to environmental pollution	Modelling of emissions on global scale	
Aerosol (deposition) measurement	Ecosystem modelling, advanced level	
Gas exchange especially for needles		
New techniques for reactive N flux measurement and evaluation of data		
Ozone measurement techniques and data analysis		

Of the general training activities, most interest was shown for Scientific Writing followed by Statistics and GIS training (Figure 4). Least interest was shown for Communication skills and Media training although more than 40% of the respondents (8) would be interested in the latter activity.
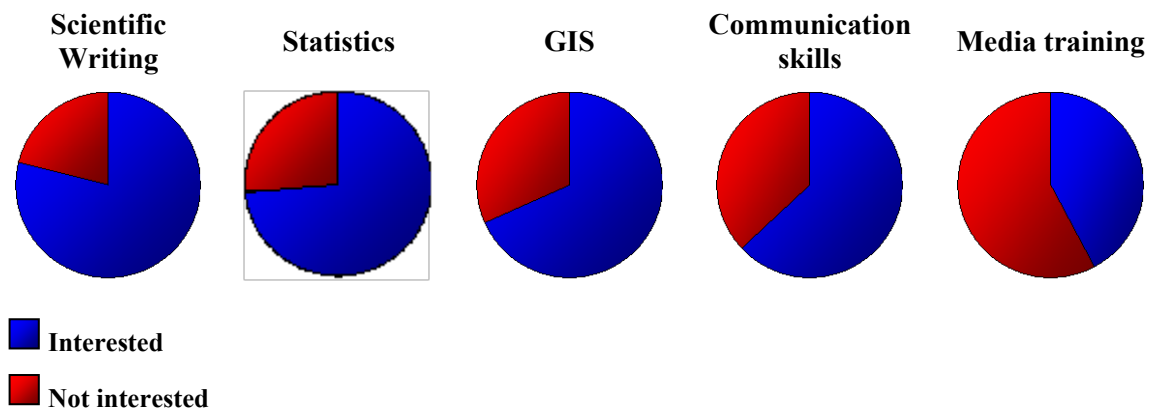
Figure 4: Interest in general training activities (in decreasing order of interest)

Additional general training activities suggested by the respondents included the analysis of measurement and modelling data, comparison of model output with measurements or with other models, training in R software, project management and improving the integration between Work Packages.

Young scientist supervisor survey results

Ten of the respondents to the young scientist survey provided details of their supervisor/manager. Of these, six supervisors/managers responded to the additional supervisor survey.

Many of the specific training needs identified by the young scientists (Table 1) were also identified by the supervisors/managers, suggesting good communication between them and/or a coherent understanding of their role in ÉCLAIRE. Additional training needs were also identified by the supervisors/managers of the young scientists (Table 2).

Additional general training activities suggested by the supervisors/managers included chemistry/biology of air pollutants, post-processing of large datasets, improved C++ techniques and career planning.

Table 2: ÉCLAIRE training activities suggested by the supervisors/managers

Mostly measurement	Mostly modelling	Mixture
Measuring techniques of organic nitrogen deposition	Modifying an existing DGVM to perform model runs	Climate, atmospheric composition, vegetation dynamics and trace gas emission/deposition interact
Measuring techniques of biogenic VOC emissions	Vegetation growth modelling	Measuring and modelling C and N balances at ecosystem level
Remote sensing using spectroradiometric techniques		

2.2. Preliminary proposal for the Year 2 Summer School

Potential topics

Fourteen of the respondents to the young scientist survey suggested topics (27) that they would like to be included in the programme of the Summer School in Year 2 of ÉCLAIRE (Table 3).

Topic proposal

A common theme running through the suggestions is the measurement and modelling of exchange processes (highlighted in blue in Table 3) and so this could be a potential core theme for the Summer School. This core theme could be coupled with an analysis of upscaling effects (plant-canopy-ecosystem-landscape-region-country-Europe-global) and advanced statistical analysis to cover two of the other identified training needs.

Structure

The structure of the Summer School should have practical and theoretical components, ideally with hands-on experience of field equipment and making use of datasets collected and analysed during the event; e.g. field measurement data of deposition fluxes that are then used in the statistical analyses sessions.

Location and timing

Ideally the Summer School should be held in a location with good transport links and access to sufficient experimental facilities in order to carry out the practical sessions. Once the Summer School topic(s) is finalised, discussions will be held with organisations that specialise in that topic(s) in order to select the most appropriate hosts.

Summer Schools are generally held during the period June-September although it is preferable to avoid the main holiday period of August.

Table 3: Suggested topics for the ÉCLAIRE Summer School

Topic
Statistics
Ecosystem modelling
Nitrogen processes (ammonia). How to understand nitrogen processes using models. How to improve nitrogen process descriptions in models
Training in the Open source EMEP CTM model and training in how to generate weather data for running the EMEP model (e.g. using the WRF model)
GIS
Communication Skills
Plant ecophysiology and why interactions with ozone is not only a matter of dose; A lessons learned section; modelling stomatal conductance and ozone dose section
Work at different scales and integrate over scales (from stomata to landscape: estimating exchange and representing it); parameterisation and modelling of exchange
Ways to improve cooperation between young researchers involved in the project
Development of new common techniques to assess the ecosystems' responses to air pollution
Intercomparison of different modelling approaches simulating effects of environmental changes
Soil-plant-atmosphere exchange measurement and modelling at leaf, canopy and ecosystem scales
Soil water modelling
Bridging the gap between measurements, remote sensing and modelling
Statistical methods for evaluation of data and analysis of data
Project management;
Communication of results to the wider public
Aerosol particle (deposition) measurement
Statistics (data analysis)
GIS mapping and modelling
Networking
Create homepage
Initiation of collaboration projects
Media (print, online, TV)
Communicating our work through workshops or in schools
NO_x measurements: benefits and disadvantages of different techniques for various ecosystems.
Comparison between the different monitoring methods used within the ÉCLAIRE project. Advantages and weakness, method of comparisons

Topics in blue	Proposed topics for Year 2 Summer School
Topics in green	Suggested topics for additional training activities

2.3. ÉCLAIRE Training Plan Proposal

The Summer School proposed above will provide scientific training on the modelling and measurement of exchange processes, methods of upscaling and intermediate/advanced statistical analyses. In order to complement this training, the following additional activity is suggested in order to fulfil the other training requirements identified from the young scientist survey.

Suggested theme	Time-scale	Comments
Modelling ecosystem impacts of air pollution and climate	Year 2	See suggested topics highlighted in green in Table 3

This Training Plan needs to be a dynamic document that can be updated to reflect any developments in the training requirements of young scientists in the project. For example, based on the survey responses, training maybe required in other topics such as soil water modelling or remote sensing.

A mechanism is therefore required where young scientists can highlight their training needs and, depending on the interest level from other young scientists, a training activity can be organised or potential training providers suggested. This could be done through a training request form on a Training section of the ÉCLAIRE website. Planned and completed training activities can also be displayed on a training calendar, which can then alert other young scientists of future training opportunities.

Although the young scientist survey highlighted interest in general training activities, especially writing skills and statistics, it is not proposed that these activities are organised by the ÉCLAIRE Training Work Package (WP23) or funded through the training budget. It is more efficient if these activities are organised locally by individual partners using their own resources, thus allowing the ÉCLAIRE training budget to be used on centrally organised activities such as Summer Schools. However, tracking of general training activities (e.g. via a training calendar) and advice can be provided through WP23.

2.4. Synergy with other projects/initiatives

There is considerable synergy between the objectives of ÉCLAIRE and those of other projects/initiatives. The most notable of these are:

- **FP7 IP PEGASOS**
  (Pan-European Gas-AeroSOls-climate interaction Study)

- **IGBP Project iLEAPS**
  (Integrated Land Ecosystem-Atmosphere Processes Study)

- **COST Actions**:
  - o **ES0804** (Advancing the integrated monitoring of trace gas exchange Between Biosphere and Atmosphere)
  - o **ES0903** (Spectral Sampling Tools for Vegetation Biophysical Parameters and Flux Measurements in Europe)
  - o **FP0903** (Climate Change and Forest Mitigation and Adaptation in a Polluted Environment)

There is potential to organise activities jointly with these projects/initiatives and close contact will be maintained with them during the proposal and organisation of ÉCLAIRE training activities.

2.5. Indicators of success and monitoring

In order to assess the success of the Training plan in meeting its objectives, it is necessary to define measurable indicators that can be evaluated throughout the period covered by the plan.

Since the principal objective of the Training Plan is to provide the skills and knowledge necessary for young scientists to meet their project objectives, the most suitable indicator is the contribution the training activities have made to the accomplishment of these objectives. This can be assessed through post-training questionnaires sent out a set time-period (e.g. one year) after the training activity. The training calendar suggested in Section 5 could be used to coordinate this activity.

The attainment of the secondary objective of the Training plan (interaction with other researchers with similar training needs) can be evaluated through an end-of-project survey that assess the level of interaction the young scientists have experienced following the training activities and possible future collaborations that may be produced as a result.

2.6. Next steps

Once the Training Plan is adopted by the Executive Steering Committee, the first task will be to set-up the Training section on the ÉCLAIRE website where planned training activities (both those organised by ÉCLAIRE and by other projects/initiatives) can be posted and where young scientists can highlight their training needs.

Parallel tasks will also be initiated that will develop the proposal for the Year 2 Summer School (including discussions with the Young Scientists' Forum) and maintain close contact with other projects/initiatives to identify mutual training needs and joint training activities.

3. Milestones achieved:

The development of the ÉCLAIRE Training Plan does not constitute a project milestone although its adoption by the Executive Steering Committee constitutes Milestone MS118.

4. Deviations and reasons:

The completion of the Training Plan has been delayed by approximately 3 months. This delay has been partially due to the completion and defence of the coordinators PhD and partially due to delays setting up the Young Scientists' Forum page on the project website, from where the young scientists' survey was coordinated. Although the delay is regrettable it is hoped that lost time can be made up by a quick adoption of the plan and a quick set-up time of the Training section on the ÉCLAIRE website.

5. Publications:

No publications have arisen from this deliverable.

6. Meetings:

No meetings were necessary for this deliverable since all discussions were carried out through email exchanges.

7. List of Documents/Annexes:

None