

How to become a PhD student?

Clappier Alain



A PhD is not an usual exam...



...where you have to answer,
alone,
in a short time,
to **specific questions,**...

...and where your answers are evaluated
by a **unique professor.**

For a PhD you have to defend your work in front of a jury...



...it can be very formal, like here in Utrecht (Netherlands)...

For a PhD you have to defend your work in front of a jury...



...but at the end, the jury simply decides if you can be part of their tribe, the tribe of the doctors.

During your PhD you are not alone...

...you are supported by a supervisor...



... who will be also part of your jury.



The human relationship with the supervisor is certainly one of the key issues to enjoy his PhD...

...but it is difficult to give general rules because they are **different kind of supervisors**, each of them having different view on what should be done for a PhD...



1. The one who is telling you what you have to do every day.



2. The one who is like a friend and gives you an entire freedom...

... but do not forget he is part of your jury.



3. The one you will never see because he is very busy with his teachings...

...and his travels to present your work in international conferences.

In any case, you will have to deal with a supervisor.

Different kind of PhD:

1. The PhD “old fashion”

you work during 3 years (or more)...



...then, you write your PhD in 3 months (or more)...



...you finally produce 300 pages (or more).



Different kind of PhD:

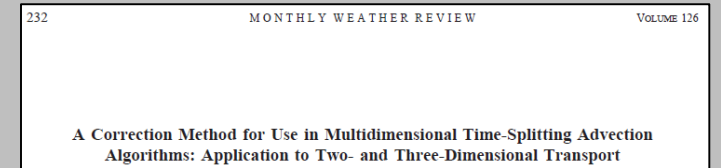
2. PhD based on scientific articles

The thesis is scheduled in such a way that each chapter (with the exception of introduction and conclusion) can be published in a scientific journal.

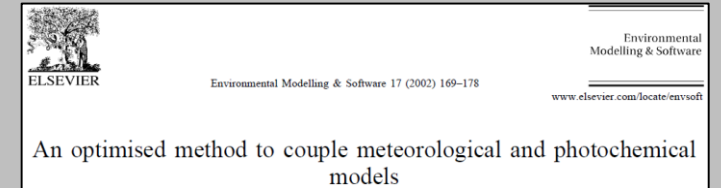
The thesis is written as the research produces results.

Chapter 1: Introduction

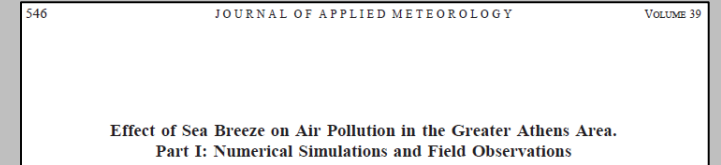
Chapter 2



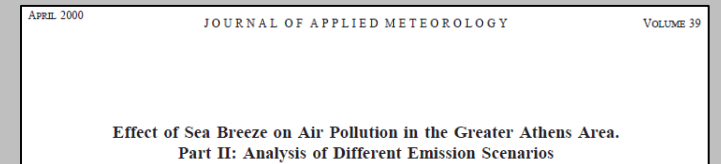
Chapter 3



Chapter 4



Chapter 5



Chapter 6: Conclusions and perspectives

Authorship of the publications.

Normally, an author is an individual judged to have made a substantial intellectual or practical contribution to a publication and who agrees to be accountable for that contribution. This would normally include anyone who has:

- a. made a significant contribution to the conception or design of the project or the acquisition, analysis, or interpretation of data for the work; **AND/OR**
- b. drafted the work or reviewed/revise it critically for important intellectual content.

The person who wrote the main part of the article

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Atmospheric Environment 37 (2003) 4217–4231

ATMOSPHERIC ENVIRONMENT

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On the impact of urban surface exchange parameterisations on air quality simulations: the Athens case

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The person who drafted the work

The PhD student is not alone, he not only has a supervisor, but he will also have to shown its ability to work with other scientists to solve problems they could not solve alone.

What a supervisor is generally expecting from a PhD student?

- The PhD student should be able to solve scientific problems alone. When this is not possible he should be able to find other scientists and organize their work to complete its missing competences.
- The PhD student should be able to communicate its research results in the most simple way as possible to the international community (in English), writing articles and participating to conferences as speaker.
- The PhD student is supposed to assume some duties for the university and his supervisor like the organization of seminars, the participation to teaching activities etc...

How build a PhD project?

What is the difference between a research project and an engineering project?

An engineer is supposed to understand and apply complex existing scientific methodologies in a known context...

...while a researcher is supposed to invent methodologies to solve and study problems which have not been solved yet.

Innovation is certainly the main issue for a research topic.

How to find a research topic for a PhD?

Acquire a good overview of the area of interest, reading scientific articles (and other media), participate to scientific conferences, talking with other scientists...

-> this avoids reinventing the wheel



MONTHLY WEATHER REVIEW
A Correction Method for Use in Multidimensional Time-Splitting Advection Algorithms: Application to Two- and Three-Dimensional Transport

A. CLAPPIER

Laboratoire de Pollution de l'Air et des Sols, Swiss Federal Institute of Technology, Lausanne, Switzerland

(Manuscript received 3 September 1996, in final form 24 April 1997)

two years after



-> this helps to target a relevant contribution that effectively complements the work already done in this area.

AN URBAN SURFACE EXCHANGE PARAMETERISATION FOR MESOSCALE MODELS

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cited by more than 300 other scientific articles since 2002



Boundary-Layer Meteorology **104**: 261–304, 2002.
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How fix the a project schedule ?

1. Chair the work into work packages since the beginning,
2. Define clear deliverables (=results) each work packages should provide and when.

Because researchers try to tackle problems which have never been solved, there is a high risk they could not succeed to provide deliverables

The researcher should find, in any situation, the capability to readjust and modify its schedule.

An example: the Cuban project

Effective methodology for the assessment of integrated energy strategies

Partnership

Two laboratories of the Swiss Federal Institute of Technology of Lausanne



Two Cuban partners:



One Colombian partner:



WP.1: Emission inventory (EPFL LASIG – CITMA CubaEnergia)

The emission release in Cuba will first be evaluated using a top-down methodology based on the Emission Database for Global Atmospheric Research (EDGAR). A more accurate estimation will be obtained by using the emission factors resulting from WP.2 and applying the EMISSENS model.

Output 1.1: Emission inventories for Cuban with a zoom on Havana.

WP.2: Measurement campaign (CITMA InsMET – National University of Colombia in Bogota)

A measurement site will be chosen in a representative street of La Havana. Measurement of PM and NO₂ as well as traffic counting will be performed.

Output 1.2: Measured hourly air pollutant concentrations (PM and NO₂) and traffic fluxes (all vehicles).

WP.3: Emission factors and contributions (National University of Colombia in Bogota - CITMA InsMET)

A Computational Fluid Dynamics (CFD) model will simulate the atmospheric circulations in the street chosen for the measurements. The model results as well as the measurements will then be used to retrieve bulk emission factors for the vehicles circulating in La Havana.

Output 1.3: Bulk emission factors for Cuban vehicles.

WP.4: Air quality simulation and Source/Receptor relationship (EPFL LASIG – CITMA CubaEnergia – JRC in Ispra)

Meteorological simulation will be performed using the Weather Research and Forecasting Model (WRF) Then, the emissions resulting from WP1 will be used to simulate air quality with the CHIMERE model.

The CHIMERE model will simulate different emission abatement scenarios. These scenarios will be used to estimate algebraic relations (i.e. Source/Receptor relationship) between the emissions and the concentrations of pollutants. The S/R relationship will consequently allow performing fast calculation of the pollutant concentrations resulting from an emission abatement which is necessary for the multi-objectives optimization process (See WP.8). The calculation of the S/R relationship will be based on the methodology developed for the integrated assessment model RIAT developed by the JRC (Carnavale et al., 2012).

Output 1.4: Simulated pollutant concentration levels over Cuba with a focus on Havana.

Output 1.5: Maps of pollutant concentration

Output 1.6: Simplified model (i.e. Source/Receptor relationship) to calculate the impact of different abatement strategies.

WP.5: Listing of resources, technologies and indicators (EPFL IPESE – CITMA CubaEnergia)

A large part of the technologies which are generally used in developed countries are not accessible in Cuba partially due to the embargo.

In a first phase, it is essential to select resources, technologies and final products which can reasonably be implemented in Cuba (e.g. fuels, biofuels, biogas plants, solar panels, etc.) with the support of CubaEnergia. In this phase the most interesting energy system scenarios are also defined, always with the support of CubaEnergia. Accounting to the evolution of the political situation of Cuba (embargo relaxation), several more protective scenarios will be considered.

In a second phase, the indicators relevant for the decision making process are defined. The indicators can be economic (e.g. the operating and investment costs related to the introduction of new technological options) or environmental (e.g. the level of different types of pollutants). Within this list, the most important indicators are highlighted as objectives for the final multi-objective optimization (WP7). The other indicators are considered as additional criteria to aid the decision making process.

Output 2.1: A list of resources, technologies, indicators, and scenarios which are the most relevant in the Cuban context.

WP.6: Integrated Energy System model (EPFL IPESE – CITMA CubaEnergia)

Each technology retained for the evaluation is represented in terms of its performance (energy and mass balance), environmental impact (emissions) and cost (investment cost and cost of use). The most uncertain parameters are identified and their uncertainty is quantified as far as possible.

The energy system model (built with the proposed technologies and considering locally available resources) is developed in order to quantify the system performance in terms of the indicators defined in WP5.

Resources, technologies and final products modeled previously are used to build the energy system model through the computer aided platform for conceptual design developed at IPESE.

The source/receptor relationships developed in WP4 is then integrated allowing to calculate the impacts on air quality of scenarios and indicators defined in WP5.

Output 2.2: A database of models representing the technological options relevant to the Cuban context.

Output 2.3: A methodology relating the energy system design and impact on air quality.

Output 2.4: An evaluation of the performance indicators for the most relevant scenarios.

WP.7: Multi-Objective Optimization (EPFL IPESE – CITMA CubaEnergia)

Multi-Objective optimization is carried out considering the technologies and the objectives previously defined. The optimal solutions define the set of the most appropriate technological and environmental options and the sizes of the corresponding processes required to satisfy the energy requirement of the studied region. Moreover, this approach highlights the synergies between different technologies and tradeoffs between competing scenarios. The scenarios evaluated in the previous task will be used for comparison.

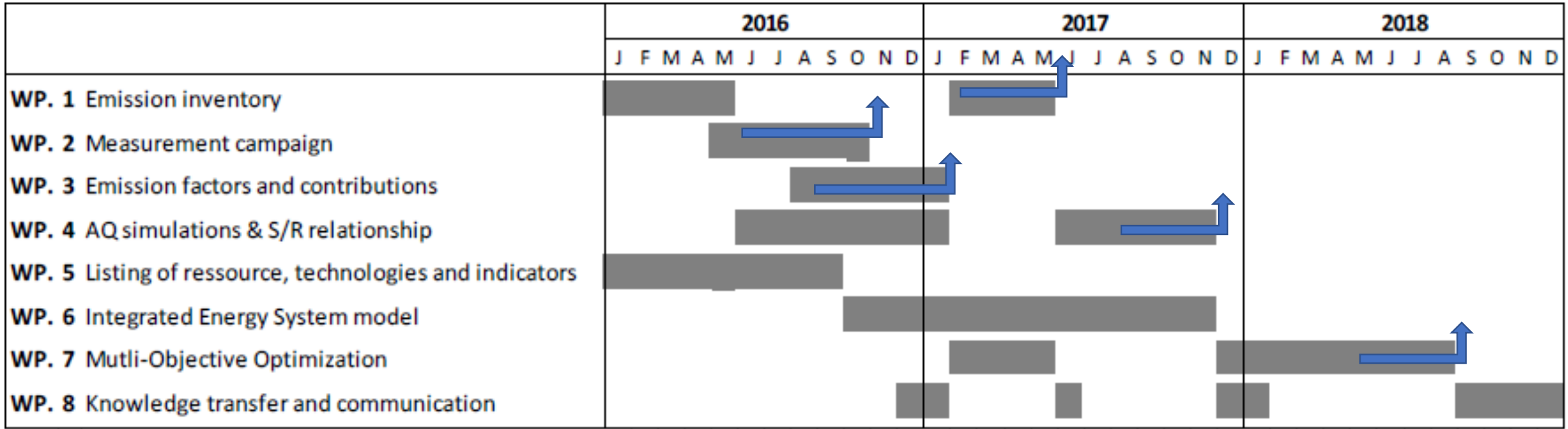
Output 2.5: A classification of optimal scenarios and their performances.

Output 2.6: A decision support tool for the energy planning of Cuba.

WP.8: Knowledge transfer and communication (EPFL IPESE& LASIG – CITMA CubaEnergia, InsMET & InsTEC)

The Cuban partner, CubaEnergia, will be able to autonomously use and further integrate technological options, available data and detail to the developed Data Integrated Assessment Methodology.

Output 2.7: Conferences and training courses for students and professionals.



 : potential publications (=PhD chapters) which can be produced during the project