

ATMOSPHERIC CHEMISTRY AND CLIMATE CHANGE: EPISTEMOLOGICAL AND POLITICAL ASPECTS

CONTEXT

Today's global environmental ontology and governance are bound to atmospheric chemistry by at least three aspects:

1. First of all, they inherit a cognitive and observational tradition on air pollutant localisations and lifetimes and on air composition, as well as technical ways of managing risks correlated to air pollution on a scientific expertise basis.
2. Then, atmospheric chemistry, whose complex ontology is now being integrated not only in small scale numerical models but also in Earth System models, creates links between many environmental objects, among them climate change: from the 1970s on, atmospheric chemistry has taken part to the building of a "chemical geo-biosphere"; as for works on "linkages" between previously independently-defined risks (especially smog, acid rain, ozone hole, climate), they have been numerous since the 1990s.
3. Finally the kind of global "atmospheric engineering" that is now arising is unthinkable without atmospheric chemistry: first, because it requires a risk assessment from atmospheric chemistry; second, because global "atmospheric engineering" experiences of thought are linked to ways of constructing such objects and narratives as nuclear winter and stratospheric ozone decay; finally, because it develops a rather old – though rare – way of practicing atmospheric sciences by experimental modification of atmosphere (e.g. "cloud seeding"). Besides, geoengineering is now mentioned in both climate change international expertise and ozone hole scientific international expertise.

PART I

A HISTORICAL PERSPECTIVE ON AIR POLLUTION EXPERTISE
AND THE BIRTH OF ATMOSPHERIC CHEMISTRY AS A DISCIPLINARY FIELD

This first Part provides a historical perspective on atmospheric chemistry as disciplinary and expertise knowledge from the 1950s to the present day. It targets at discussing the building of a specific ontology of atmospheric chemistry, the consequences of the production of quantitative "air quality standards" and the involvement of public experts (negotiations with the Industry, whistleblowing, etc.).

It is based both on secondary literature about air pollution and environmental policies (smogs, nuclear aerosols, acid rain, ozone studies), and on some archival material (scientific publications and UN reports mainly).

PART II

ATMOSPHERIC CHEMISTRY AND
CLIMATE CHANGE GOVERNANCE

This second Part constitutes a historical and anthropological work on the practices of atmospheric chemists in global expertise (global biogeochemical cycles, nuclear winter, ozone hole, climate change), with special emphasis on climate change.

This part of my work is mainly based on readings of international atmospheric chemistry expert reports. I also undertake a series of interviews of atmospheric researchers (mainly in France), in order to better understand research policy evolutions and changes in practices.

PART III

ATMOSPHERIC ENGINEERING

The last part of my work is a contribution to the very recent field of studies on "geoengineering", which creates new markets, announces new kinds of cultural representation of atmosphere, and constitutes a possible technoscientific future to atmospheric sciences.

My approach is mainly historical and philosophical (discourses analysis). I mainly study the scientific and policy arena where this question is rising. Discrepancies between different countries constitutes another analytic case study.

METHODOLOGY AND GOALS

Expert-informed global atmospheric governance are made possible by peculiar political and technological configurations, which highly depend mostly on: faith in scientific measurements, models and objectivity used to build scientific narratives; technological trajectories, which are led by contingent collaborations and artifacts, by norms and standards of pollution management and by market; (geo)political and economical stakes.

My work is part of the growing interdisciplinary field of Science (and Technology) Studies, which have already produced precious studies on those themes, but none about global atmospheric chemistry.

My project targets at providing historical perspectives on concepts, practices and institutionalization of atmospheric chemistry, in order to allow a reevaluation of today's expertise on climate change and on pollution control strategies. Most attention is given to the expertise, the "normalization", the "technologization" and the globalization of the atmospheric pollution issues.

THESES AND PRELIMINARY RESULTS

1a. The first steps toward a scientific control of air pollution were made in the 19th century by industrial engineers in chemistry. Later on, emerged a new figure of history: the public expert on air pollution. As the main approach was to reconcile industrial prosperity and public health, those public experts got involved a lot in negotiations and propositions with the Industry. More recently, quantitative air quality standards and cost-benefit quantities became crucial arguments in favour of air pollution abatement policies, and new stakeholders became more influential.

1b. Two main research programs led to the constitution of a disciplinary academic field called "atmospheric chemistry" in the 1960s-80s. On the one side, studies of trajectories of industrial, nuclear and transport emissions of pollutants in the low atmosphere; on the other side, studies of gas (especially ozone) in the middle atmosphere and high atmosphere.

2a. International academic collaborations on atmospheric chemistry intensified in the last two decades, as well as large scale modelling. Moreover, atmospheric chemists also got involved a lot in studies on "linkages" between different environmental issues. The results of these evolutions are both a larger scope of policy options and a growth in uncertainties and stakeholders.

2b. Climate Change governance and tools of governmentality inherited a lot of the ozone hole's. In addition to this, the stratospheric ozone international experts have thought more and more their stratospheric ozone issue as linked to global climate change.

Régis Briday

regisbriday@yahoo.fr

Supervisors: Sophie Godin-Beekmann (LATMOS)

& Amy Dahan (Centre Koyré)