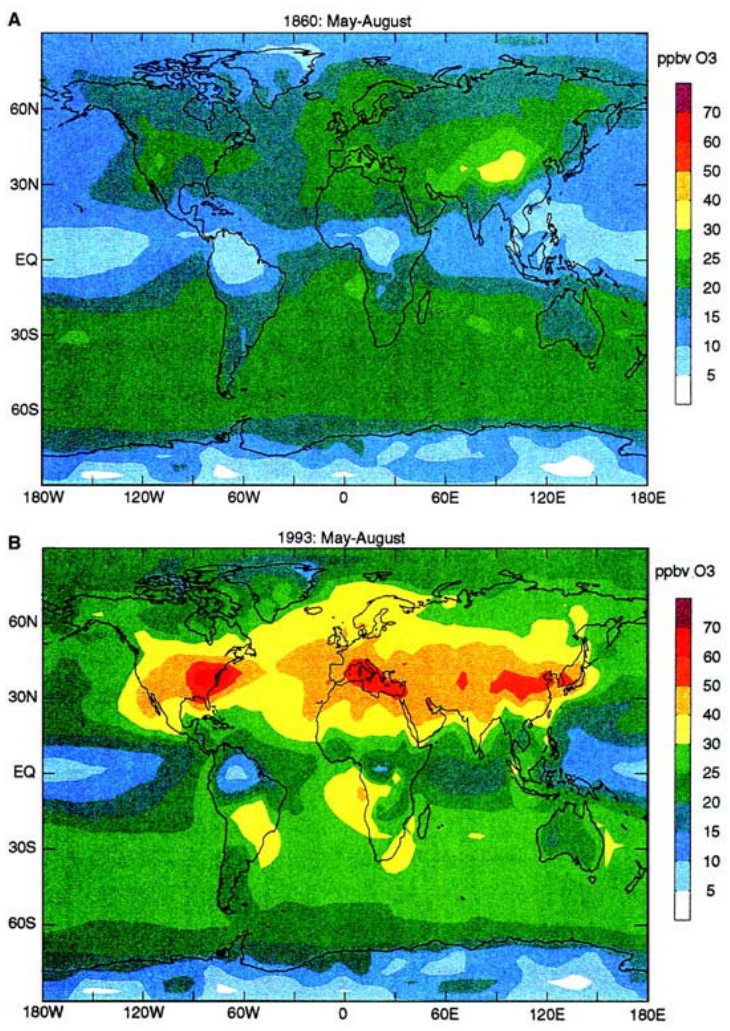
IUPAC Advancing Worldwide Chemistry

Division VI – Chemistry & the Environment

Atmospheric Chemistry: Problems and Projects

1. INTRODUCTION

Atmospheric chemistry is part of atmospheric sciences. Much of it is concerned with pollution of air by pollutants. A pollutant is any component which affects AIR QUALITY. Polluted air is when the concentration (fraction, amount) of any pollutant exceeds some agreed limit. Other problems are CLIMATE CHANGE known also as "global warming" or "greenhouse effect", OZONE AND PHOTO-OXIDANTS which addresses the ozone layer and oxidizing capacity of the atmosphere, the problem of air in and around MEGACITIES (and cities in general). All these problems can be treated as local, regional or global.



2. AIR QUALITY

Air quality and air pollution research needs the assessment of the gas composition including particulate matter (PM), aerosols and clouds, all meteorological parameters and the radiative effects on and between them. Knowing them the effect on human health, the impact on agriculture and on natural ecosystems can be established. Also important are senseable properties as quality indicators such as UV/VIS/IR absorption, heat and electrical capacity, visibility, light, odour, noise and allergenicity.

3. CLIMATE CHANGE

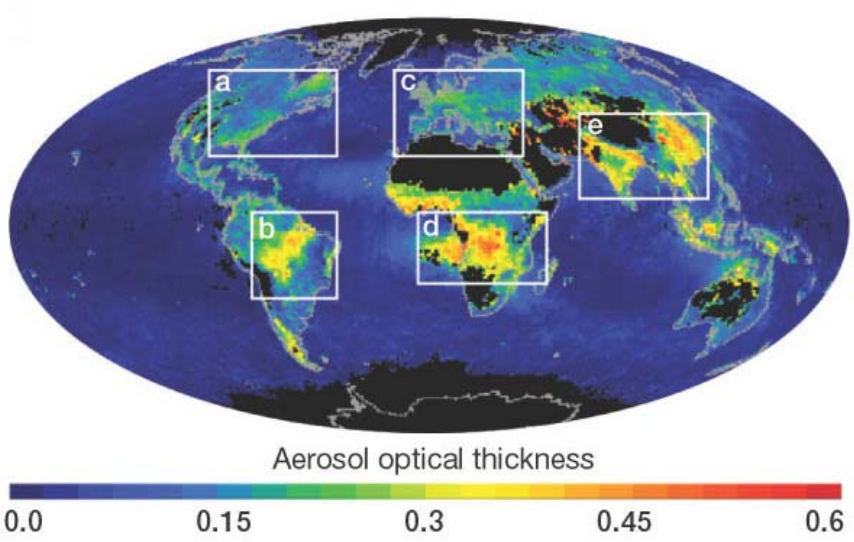
The impact of global air pollution on climate is an important focus in atmospheric chemistry. It includes investigation of greenhouse gases, of aerosol effects on clouds and radiative effects on aerosols. Aerosols, which are spread globally but have a strong regional imbalance change global climate through their indirect and direct effects on radiative forcing.

4. OZONE AND OXIDANTS

The ozone layer depletion and rise of tropospheric ozone are still of major concern. Prompt and continuing progress towards ozone shield recovery requires that emissions of halocarbons must be reduced faster than is apparent from current atmospheric observations. On the other hand the continued rise of ozone concentrations near ground may have a negative effect on crop yields in the next decades. Of concern is also the rising oxidizing capacity of the atmosphere.

5. MEGACITIES

These days we are witnessing a key moment in the history of mankind – for the first time more people are living in cities than outside them. Cities concentrate 50 % of worlds population on 2 % Earth's land. They are centers for production of heat, solid waste as well as water and air pollution. According to projections cities will absorb all of the population growth over the next three decades.



Fine particles satellite view from N. America and Europe (a, c), fires in S. America and Africa (b, d) and pollution in Asia (e).

6. CURRENT PROJECTS

Glossary of atmospheric chemistry

Project: 2003-030-1
Task Group Chairman: T. Cvitas cvitas@joker.irb.hr
Members: J.G. Calvert, L. Klasinc and T. M. Tavares
Objective: Prepare a glossary along the recommendations given by the ISO and ICTNS.
Description: A comprehensive Glossary of Terms pertinent to atmospheric chemistry was published by IUPAC more than a decade ago (Calvert, *Pure Appl. Chem.,* **62** (11), pp.2167-2219, 1990). This project will update that glossary to include terms that have become important subsequent to publication of that document (as well as omissions) and as necessary amend or elaborate previously presented definitions.

Air pollution models in environmental management and assessment

Project: 2003-058-1
Task Group Chairman: O. Hertel Ole.Hertel@dmu.dk
Members: J. Brandt and J. Fenger
Objective: Air pollution models are strong and necessary tools in environmental mamagement. The aim is to describe the methodology behind application of mathematical models in various assessments of air pollution impacts. The book provide guidelines for avoiding incomplete or even incorrect answers when models are applied. How to select the right type of models for a given purpose and ensure they work properly with appropriate input data of the needed quality etc?