

ROMANIA

In Romania, the scientific research concerning the ozone layer protection proves scientifically and technically the policies and strategies established by the Ministry of Waters and Environmental Protection and fulfills the obligations imposed on Romania as a signatory party to the international conventions on the ozone layer protection.

Romanian legislation framework regarding the ozone layer protection

- The Montreal Protocol on substances depleting the ozone layer (ODS)
- The Vienna Convention on the ozone layer protection
- The Amendment adopted in London
- The Amendment to the Montreal Protocol
- The National Committee for the ozone layer protection with the technical secretariat for the ozone layer protection.

Human activities cause a significant change in the atmospheric concentrations of several gas (CH_4 , N_2O and CFCs) sources. This change and its impact on the ozone layer should be studied together and not separately. The issue of climate change covers both the influence of CO_2 on climate and the influence of other minor atmospheric compounds. The changes in the atmospheric concentrations of the ozone and H_2O , CH_4 , N_2O , CFCs lead to a change in the thermic structure of the atmosphere. The increase and variations of the tropospheric ozone influence the climate and the way to estimate the total ozone.

The research directions and themes are carried on either within some national programmes of the ozone layer investigation and monitoring or within some sectorial programmes at the level of research institutes.

The technical Secretariat for the ozone layer protection harmonizes the national programmes with the sectoral ones.

At present, the depletion of the stratospheric ozone affects the global atmospheric by increasing the UV-B radiation at ground level. In Romania, the study of this phenomenon is one of the most important research objectives.

As a conceptual approach, the research goals have been selected both from the sphere of the activities for ODS alternatives and from the studies on the effects of the ozone layer depletion on terrestrial and aquatic ecosystems, on human and animal health as well as on climate system.

In Romania, there are numerous design and research-development units that deal with the ozone layer protection: The National Institute of Meteorology and Hydrology, The National Research and Development Institute for Environmental Protection - Bucharest, the Research Institute for Silviculture, the Research Institute for Sea Waters, research units from various fields of activity: human health, animal health, construction materials, refrigerating equipment.

Titles of research projects, directions of research and studies

- Studies and researches on the introduction of the chemical and technological alternatives for the decreasing of ODS emissions, in expanded and isolating materials (foam sector).
- Studies and researches for the use of the ecological agents in compressors for the re-equipment of the old refrigerating units and of the ecological agents mixtures used as ODS alternatives in different refrigerating units for food industry (refrigerating sector).

- Studies to replace CFCs with dimethyl ether in refrigerating equipment and to reduce the percent of CTC in mixtures from solvent field
- Studies and research concerning the implementation of chemical substituents and alternative technologies to reduce the emissions of ODS in the field of insulating and foam materials of constructions
- Studies and research concerning the use of ecological agents in the units of compressor-condenser with hermetic compressors for re-equipment of trade refrigeration
- Study on the impact of the National Programme for ODS removal on the production of refrigerating equipment
- Research concerning the possible use of some mixtures of ecological agents as substituents of ODS in different types of refrigerating devices
- Examples for the effects of the ozone layer change
- Study on the UV-B influence upon forest vegetation
- The effects of the ozone layer change upon the biodiversity and bioproductivity of the ecological systems from the ecotone
- The influence caused by the increase of the solar radiant intensity (especially UV-B) upon humans and animals: some skin and eye diseases
- Studies concerning the impact caused by the change of solar radiant intensity, especially UV-B, upon animal health
- Studies concerning the influence of UV-B radiation upon the productivity of aquatic ecosystems
- Biochemical processes in polluted marine waters influenced by solar radiation
- Continuous monitoring of the ozone amount
- Creation of a data base meeting the requirements of the world center for the ozone data collection from Canada
- Total ozone climatology and correlation with meteorological parameters
- Defining the ozone parameters in prognosis models

A few results obtained

The period from July, 1, 1999 to July, 1, 2000 was the year of the CFC consumption freeze at national level and the beginning of a new stage in phasing-out these substances in accordance with the obligations imposed on our country as a signatory party to the international treaties already mentioned.

With a consumption of 350 t CFC, Romania complied with the production and consumption limits established in the protocol .

Romania has registered progress as regards the implementation of the legal conditions for ozone by developing the required legislative and institutional framework.

Our country has established the control of the trade in ODS and some restrictions on the use of halogenated hydrocarbons.

The implementation of the transfer of 'clean technologies' has led to the reduction of ODS.

In 2000, the downtrend in total ozone continued; its value was 9.41% of the multiannual monthly means.

The mean monthly deviations of the total ozone in 2000 as compared to those in the previous 5 years are all negative. That proves the downtrend which is also intensified by the high negative values in summer.

Because the ozone concentration depends greatly on the atmospheric transport at high level, there may occur incidentally high ozone concentrations that bring about positive deviations. The relevant example is the evolution of the total ozone in 1998 considered as a normal year.

These phenomena occur at regional scale and should not be considered as a proof of the ozone layer restoration.

In 2000 the UV-B values are comparable to those in winter and spring, 1999. However, starting from the end of May and up to August, inclusively, the daily mean values of the sunny days are 1-2% bigger and the maximal values of June and July are 5-6% bigger than the corresponding values of 1999. This increase is caused mainly by the low content of water vapours in the entire atmosphere.

A climatological profile of the ozone was determined in the latitude of the Bucharest station.

Bucharest station belongs to the world monitoring network for ozone and is an important point in the south - eastern part of Europe.

The influence of the UV-B radiation on forest vegetation leads to the:

- reduction and perturbation of the seed germination of the resinous and deciduous species
- decrease of the emergence percentage (10-20%) at the seeds of resinous and deciduous species
- decrease of the strength to grow high and thick (as diameter) of the seedling coming from exposed/irradiated seeds
- morphological and structural changes in the foliage of the seedling coming from exposed/irradiated seeds
- it has been ascertained the fact that the UV-B radiation had the smallest values in April and September and the highest in June and July.

For the marine ecosystems

- in the N-V of the Black Sea the UV-B radiation gets to the soil and surface water on days when cloudiness is zero between 11 in the morning and 2 in the afternoon and its intensity is relatively maximal at a wavelength of 310-311 nm
- the high UV-B radiation had a destructive effect on some marine organisms and a stimulating effect on some plant organisms
- the protective effect exerted by seawater on marine ecosystems against increased solar radiation

The creation of a national monitoring network for tropospheric ozone was proposed under the form of a project in 1998.

The creation of the national project for tropospheric ozone might be the last stage of a research project carried out between 1994-1998.

The operational mode of the network: data collecting, analysis and processing as well as the information flux will be carried out in compliance with the AQC criteria.

This last stage was not achieved because of the lack of money.

The assessment of the results obtained from the research concerning the ozone layer protection has made possible the identification of the following needs:

- to better co-relate the national research programmes with the sectorial ones.
- to continue the activity of monitoring the ozone and related parameters
- to broaden knowledge on:
 - « long and short term evolution of the ozone layer and the interactions between climate change and the change in the ozone layer;
 - « the interactions between the processes from the troposphere and those from the stratosphere;
 - « the response/reaction of the aquatic and terrestrial ecosystems considered as unit and number as well as the response of some organisms or populations;
- « the ways to evaluate the UV-B effects on forest vegetation.

- the identification of the new possibilities of the international cooperation in the field
- the identification of the new financial sources for national research projects
