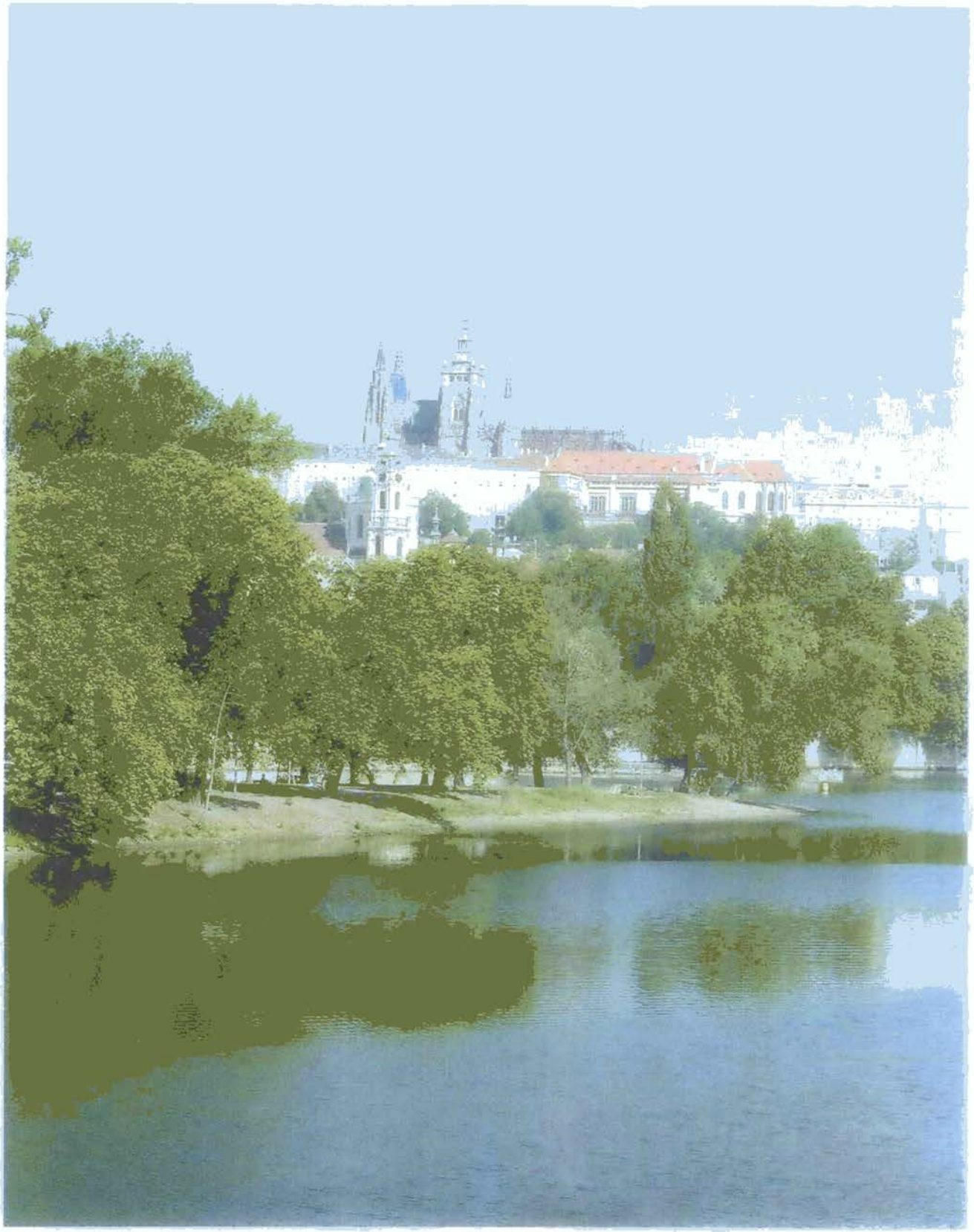

THE 16TH MEETING OF THE PARTIES TO THE MONTREAL PROTOCOL ON SUBSTANCES THAT DEPLETE THE OZONE LAYER
UNEP
2004



The Vltava River and Prague Castle are the symbols of the Czech Republic's Capital

MESSAGE
OF THE PRESIDENT
OF THE CZECH REPUBLIC
H.E. Mr VÁCLAV KLAUS

The Czech Republic has the honour to host the Sixteenth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer in Prague in November 2004. It is for the first time when the Czech Republic will be the place of the session of the highest body of the one of the most important global environmental agreements. The Vienna Convention for the Protection of the Ozone Layer of 1985 and the Montreal Protocol on Substances that Deplete the Ozone Layer of 1987 are the first global agreements covering in integrated manner the issue of the preservation of the Ozone Layer - so vital for the life on the Earth, the issue of the quality of air, safe management and transboundary movement of chemicals and environmentally sound management of waste.

Czechoslovakia and its part, the present Czech Republic, belonged in 1980s to the largest producers and consumers of the regulated substances under the Montreal Protocol in Central Europe in 1980s. The Sixteenth Meeting of the Parties to the Montreal Protocol is taking place only few days after the Fifteenth Anniversary of the Velvet Revolution of 17 November 1989 when the radical political, economic and social changes resulted also in the establishment of a very efficient system for the improvement of the state of the environment in the Czech Republic. Czechoslovakia became a Party to the Vienna Convention and the Montreal Protocol in December 1990 and the independent Czech Republic on 1 January 1993.

The Czech Republic succeeded with the technical support and investment project for the phase-out of the ozone depleting substances under the Global Environment Facility in the middle of 1990s to meet its core obligations arising from the Montreal Protocol and consequently to accept new globally agreed reduction and implementation targets set by the London, Copenhagen, Montreal and Beijing Amendments to the Montreal Protocol.

We should highly appreciate the commercial, industrial and refrigerated transport sectors of the Czech Republic, which expressed their willingness and proved their commitment by actions to introduce new technologies and products not using the substances that deplete the Ozone Layer. Now these sectors are able to export their highly sophisticated non-ozone depleting technologies to other countries on commercial basis and also to provide assistance in the preservation of the Ozone Layer through the system of the Official Development Assistance of the Czech Republic.

For me as an economist by the profession, the Montreal Protocol is a wonderful example how it is possible to seek an alliance between the latest scientific research on the state of the Ozone Layer and a policy making, taking into an account the social and economic impact on production and consumption sectors in developed and developing countries. This kind of co-operation resulted in stabilizing the ozone hole and in starting of its recovery. The Montreal Protocol with its enforcement, implementation and financial mechanisms could serve as an inspiration for the other global environmental conventions and protocols.

I wish to all participants the very successful negotiations and good results of the Sixteenth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer and a nice stay in the capital city of Prague and in the Czech Republic.

Sněžka – the highest mountain of the Czech Republic

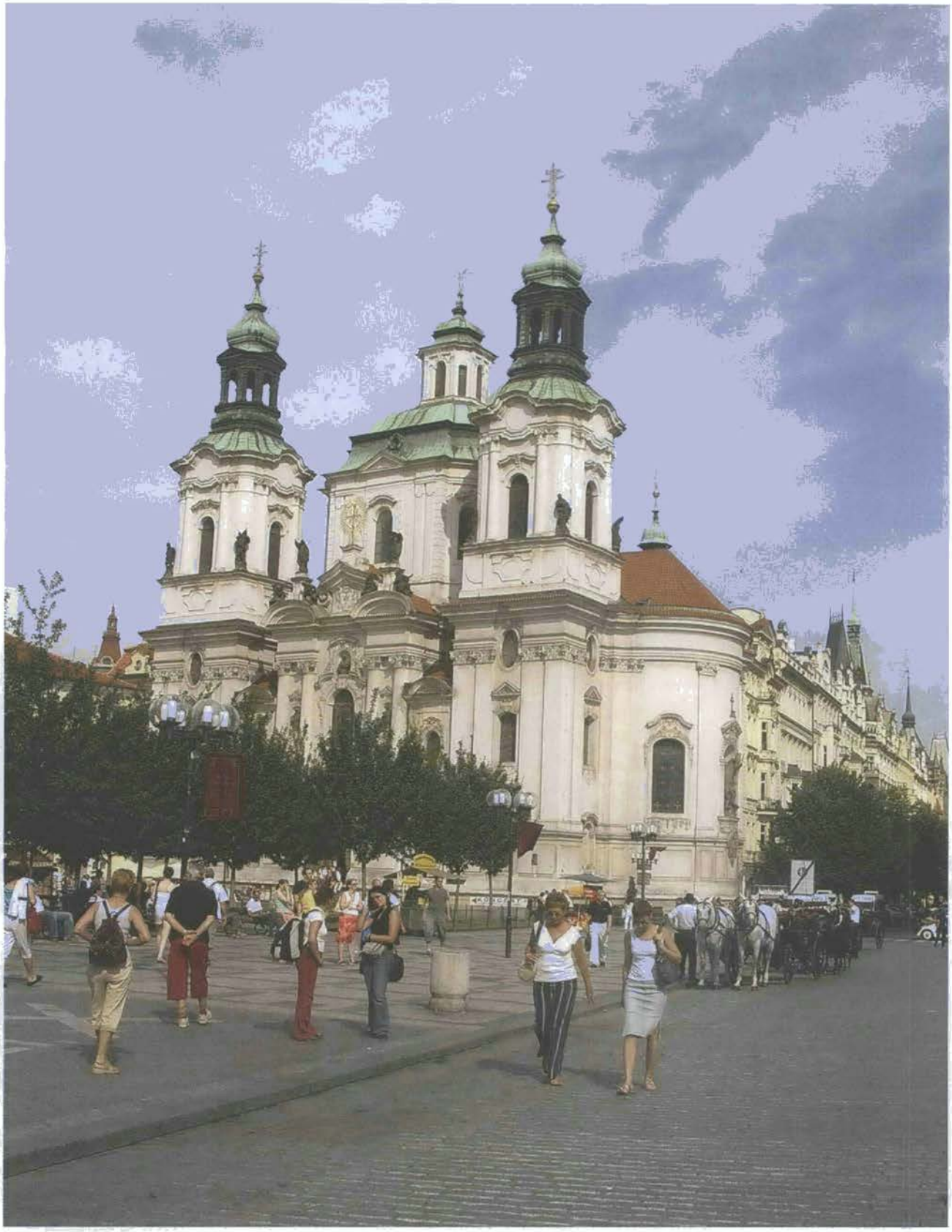
MESSAGE
OF THE MINISTER
OF THE ENVIRONMENT
OF THE CZECH REPUBLIC
Mr LIBOR AMBROZEK, MP

It gives me a great pleasure that the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer accepted at the last ordinary meeting in Nairobi in November 2003 my offer to host the Sixteenth Meeting of the Parties in the centre of Europe, in the capital of the Czech Republic – Prague.

The meetings of the Parties to the Montreal Protocol have proved to be resourceful over the years. They provide a forum for review of implementation of the Montreal Protocol and adoption of decisions that will assist in its further implementation. This meeting should not be exceptional. The Czech Republic was honoured to preside over the Fifteenth Meeting and First Extraordinary Meeting of the Parties, an opportunity that enabled my country to re-dedicate its commitment to completely phase out ozone-depleting substances and to share experience with other Parties. The Czech Republic that from the very beginning of 1990s adopted all necessary legal, economic, implementation and enforcement measures, succeeded in meeting its obligations under the Montreal Protocol during the last years. The Czech Republic was the first country in the Central and Eastern Europe that had accepted all amendments to the Montreal Protocol. Only thanks to the close co-operation of the state administration, private sector, non-governmental organisations and international support the Czech Republic succeeded to comply with the requirements of the Montreal Protocol and its Amendments. The Czech Republic is sharing its experience with other countries, in particular with the Eastern European countries and developing countries through its official development assistance programme.

The achievements gained at the last meetings of the Parties should inspire all of us to keep up the momentum of complying with the ozone depleting substances phase out until the task is completed. I believe we all have come to Prague with a good will, collegial and cooperative spirit to decide on the important issues. I wish to comment all Parties to the Montreal Protocol for the efforts being made to implement and comply with all control measures on ozone-depleting substances which the Parties agreed over the years. However, let us not forget that we still face a number of challenges. We should promote the protection of the Ozone Layer in a more integrated manner as it is recommended by the World Summit on Sustainable Development. The Montreal Protocol experience and lessons learned should be shared with the global conventions and protocols covering the issues of climate change, chemicals, waste management and transboundary movement of chemicals and hazardous waste in order to make the protection of the environment more efficient.

Let me once again welcome all participants in the Czech Republic. I believe the successful outcome of this meeting will set a positive tone to the next meetings, to the promotion and implementation of the goals of the Montreal Protocol in the context of fulfilment of the Millenium Development Goals and recommendations of the World Summit on Sustainable Development.



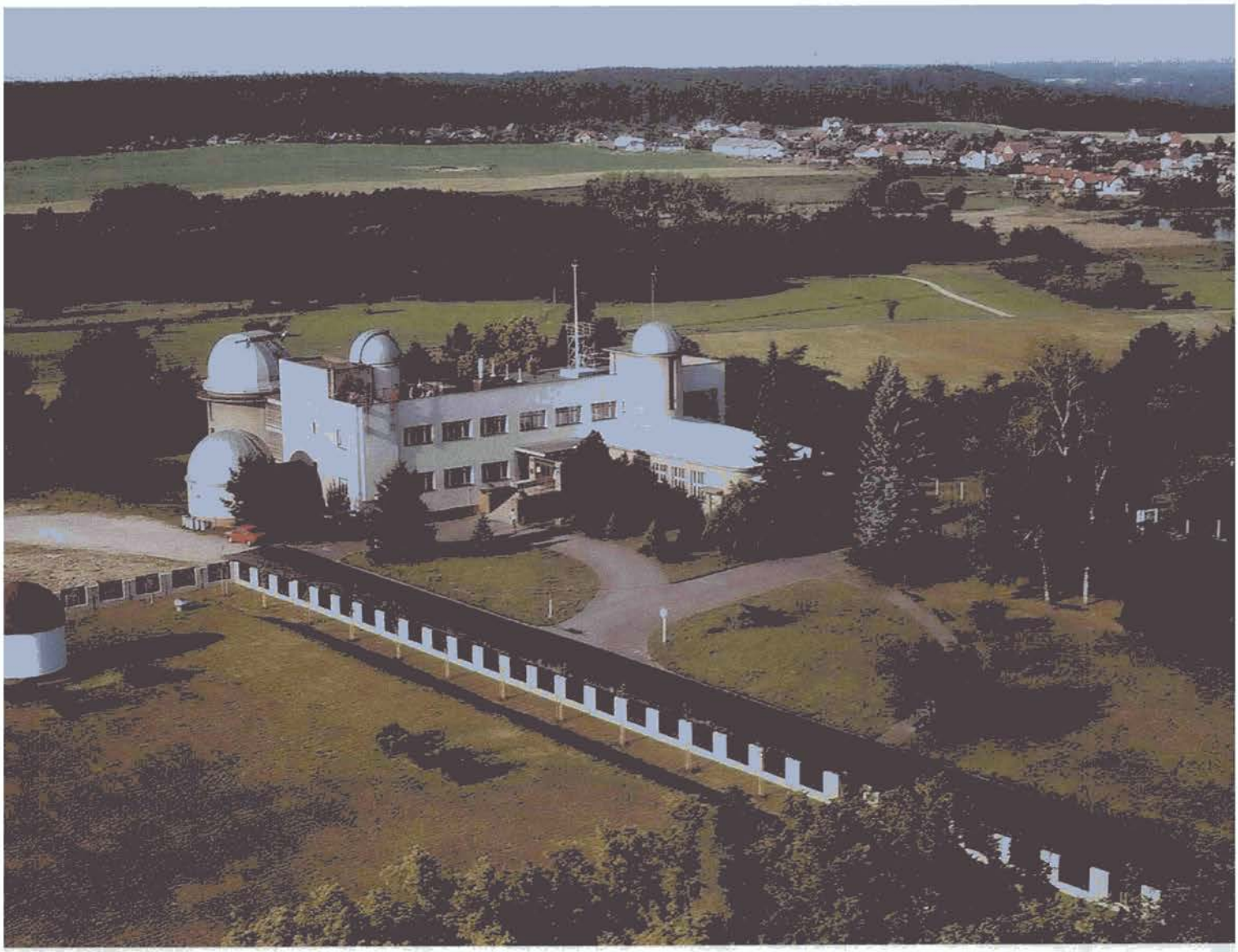
The Old Town Square of Prague is the most visited place by tourists

MESAGE
OF THE CITY MAYOR
OF PRAGUE
Mr PAVEL BÉM

Dear Ladies and Gentlemen,

I would like to welcome you to Prague, the capital of the Czech Republic. We feel honoured to host the meetings of the contracting parties to the Montreal Protocol that can be considered as one of the best examples of a successful international treaty considerably contributing to the renewal of the ozone layer. The Montreal Protocol has a symbolic meaning as well. This was the very first time that the world has successfully combined its efforts to preserve the ozone layer when addressing the global environmental issues. Therefore, the Montreal Protocol can serve us as an ideal example how to cope with other global risks.

I believe that the meetings in Prague will considerably contribute to the implementation of all necessary measures needed for the preservation of the Earth's ozone layer. Also I would like to wish all the participants a pleasant experience in our beautiful and ancient metropolis in the heart of Europe.



The Solar and Ozone Observatory of the Czech Hydrometeorological Institute in Hradec Králové

The Ozone Layer

- the Science and the Public in the Czech Republic

Karel Vaníček

1. Introduction

The long-term monitoring and analyses of stratospheric ozone is one of the international research tasks that are anchored in the Vienna Convention for the Protection of the Ozone Layer (1985). Its main purpose is to identify natural and man-made changes of the ozone layer and thus allow policy makers to assess the real efficiency of the Montreal Protocol (1987) and its amendments.

Observations and investigation of the condition of the ozone layer over Central Europe started in the Czech Republic (Czechoslovakia) in the sixties of 20-th century at observatories of the Czech Hydrometeorological Institute (CHMI), the governmental institution established under the Ministry of the Environment of the Czech Republic. The monitoring programme has been carried out under the auspices of the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP).

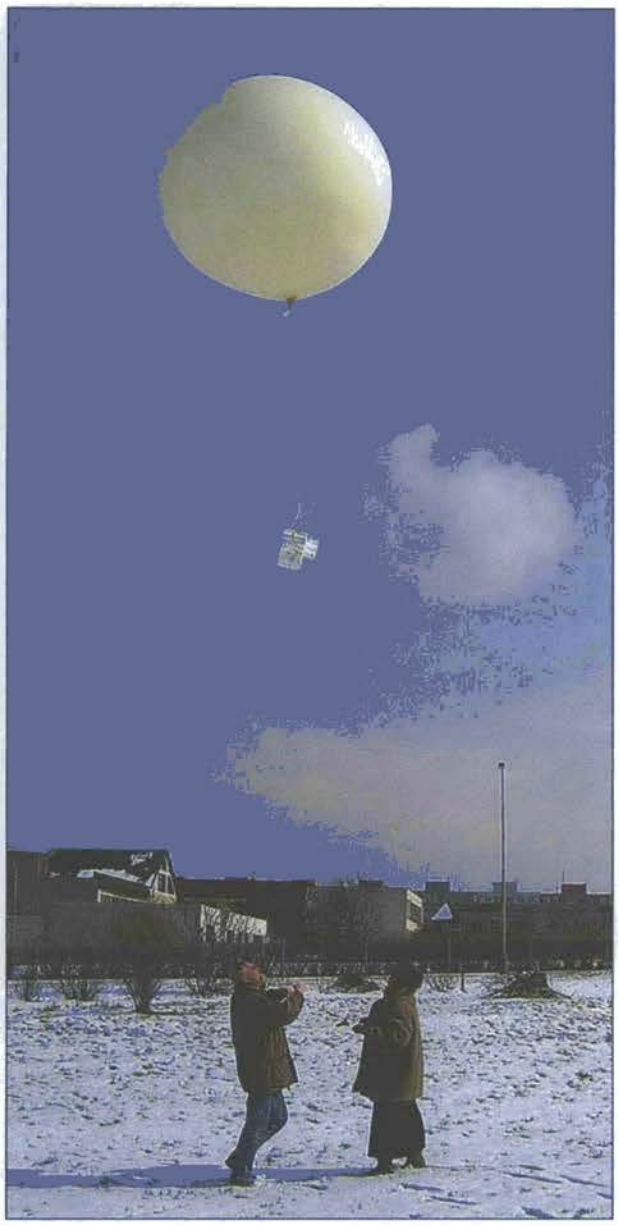
The Czech ozone monitoring and research activities have expanded significantly during the last decade. Long-term high-quality series of ozone measurements are frequently used for trend analyses and for validation of satellite observations. The participation of Czech experts in calibration campaigns helps to maintain ozone monitoring network mainly in the European region. Some new technologies developed by experts from the CHMI are implemented at remote ozone stations of the Global Atmosphere Watch (GAW) Programme of WMO as a contribution of the Czech Republic to building scientific capacities in developing countries.

Depletion of the ozone layer is followed by increasing of the biologically harmful UV solar radiation reaching the Earth surface even in the mid latitudes. This was the reason why the monitoring of stratospheric ozone has been extended by measurements of UV in the territory of the Czech Republic. The high-quality UV observations from the CHMI are regularly deposited into international WMO and EU data bases and also used in the operational UV warning system for the public.

The majority of above mentioned monitoring and research activities performed in the Czech Republic are included into international programmes established mainly by WMO and supported either by the Czech Grant Agency or by EU funded projects.

2. Monitoring of the ozone layer in the Czech Republic

Systematic daily ozone observations have been performed since 1962 when measurements of total column ozone (thickness of the ozone layer) started at the Solar and Ozone Observatory of the CHMI in Hradec Králové (SOO-HK). First the Dobson D074 and later the Brewer B098 ozone spectrophotometers have been used for measurements. Both instruments are regularly calibrated towards international standards of WMO and produce the first-class quality data. The interrupted data series of total ozone from the SOO-HK has been re-evaluated in 2003 and belongs to the best quality ground data sets now available to the scientific community through the World Ozone and UV Data Centre (WOUDC) of WMO in Toronto. The B098 as the only spectrophotometers in the Czech Republic also measures spectral intensities of UV radiation and thus serves as a reference instrument for the UV public warning system in the country.

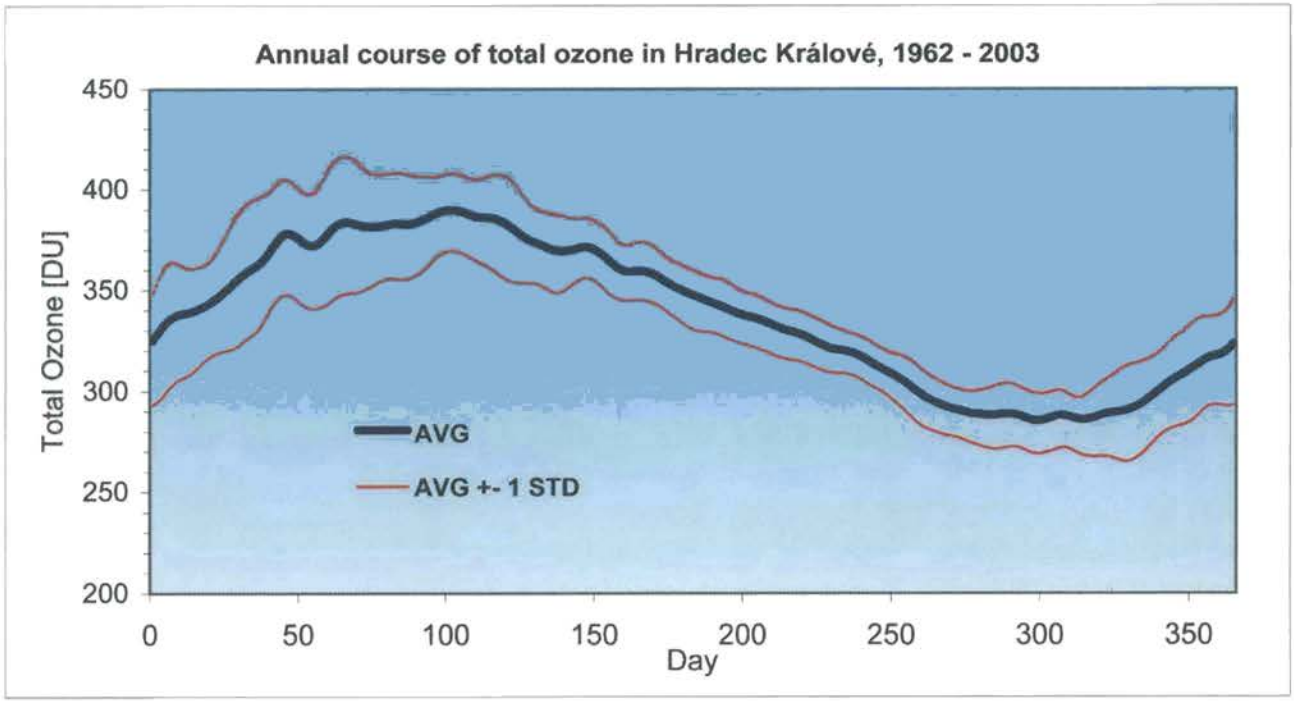


The lunch of the ozone sonde at the Aerological Observatory in Prague

High-resolution vertical profiles of ozone concentrations up to 30 km above the ground are measured with balloon-born electrochemical ozone sondes launched at the Aerological Observatory of the CHMI in Prague - Libuš (AOP). The first ozone soundings started at the AOP in 1979. In 1982 the regular measurements of vertical ozone profiles have been implemented - three times per week (on Monday, Wednesday and Friday) from January to April. During the first period (1979-1991) the electrochemical Brewer-Mast ozone sondes were used. There was a complete change of the aerological system for Vaisala DigiCORA facility at the AOP in 1992. Since that time the Electro-Chemical Concentration Cell (ECC) ozone sondes have been used. The ozone sonde data are compared/corrected by the total ozone observations from the SOO-HK to reach the highest accuracy of the vertical profiles.

According to commitments accepted under the Vienna Convention the ozone observations taken at above mentioned Czech observatories are submitted into the WOUDC to serve as free-available open data files to the world scientific community. The data are also used for scientific studies carried out under research projects either by Czech scientists or by their partners.

The Dobson ozone spectrophotometer D074 operated at the Solar and Ozone Observatory of the CHMI in Hradec Králové

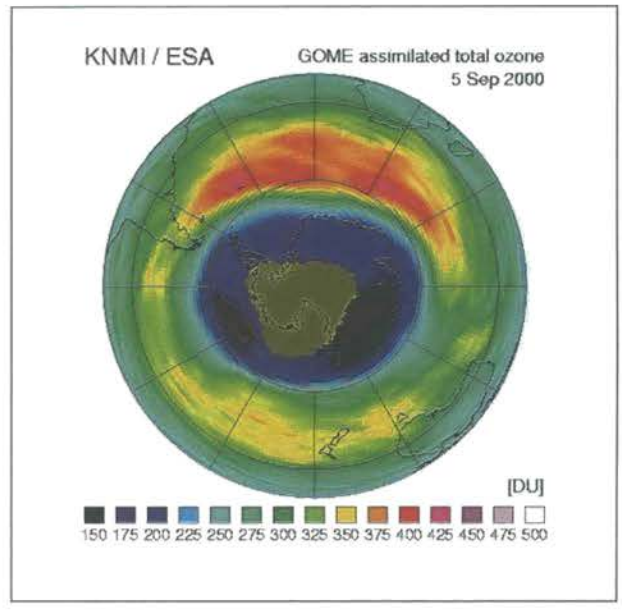


A typical annual course of the thickness of the ozone layer in the mid-latitudes as measured at the Solar Ozone Observatory of the CHMI in Hradec Králové

3. Long-term depletions of stratospheric ozone in Central Europe

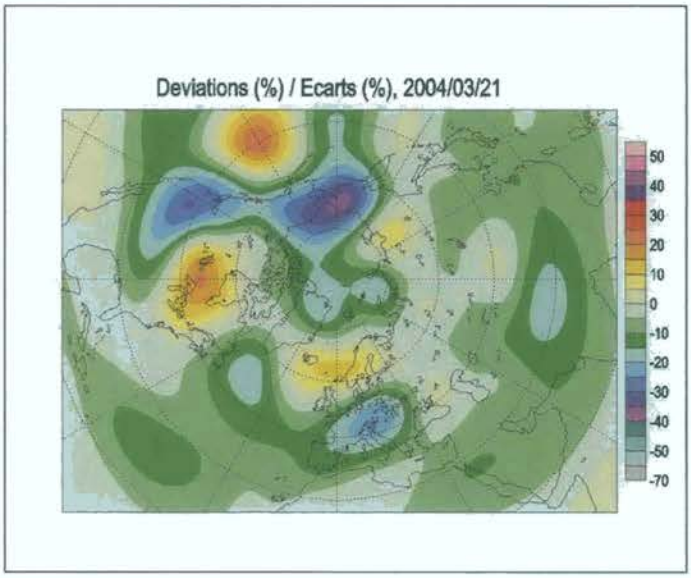
The global distribution of ozone is significantly different in both hemispheres because of specific patterns of stratospheric circulation. The Southern polar and mid latitudes are mostly influenced by a big depletion of the ozone layer known as the "ozone hole" attributed to influences of chemical ozone depleting substances. In North mid latitudes the ozone layer is frequently disturbed by smaller fast moving "ozone mini-holes" of the dynamical origin and by penetration of air masses with lower amount of ozone. In the winter/spring period the advection from Arctic regions brings air with chemically reduced ozone that was the main reason of negative trends of stratospheric ozone in the recent decades. In the summer season the ozone layer is attenuated due to penetrations of the naturally ozone-low content air from the subtropics.

Long-term ozone observations carried out by the CHMI confirm the above statements over Central Europe. In the pre-ozone-hole period the thickness of the ozone layer oscillated in a natural way in all seasons. Since the second



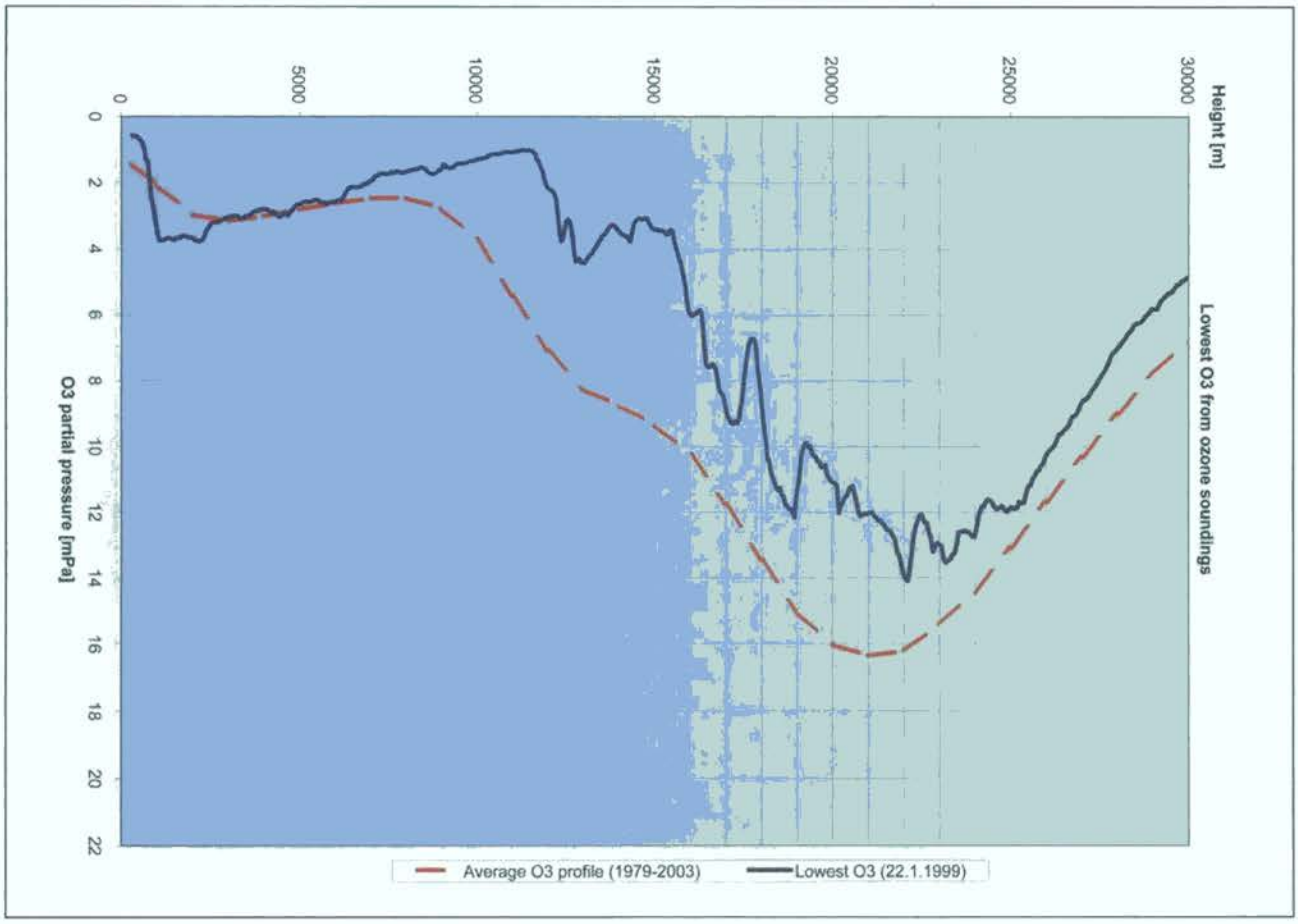
The Antarctic ozone hole as seen by the GOME satellite facility

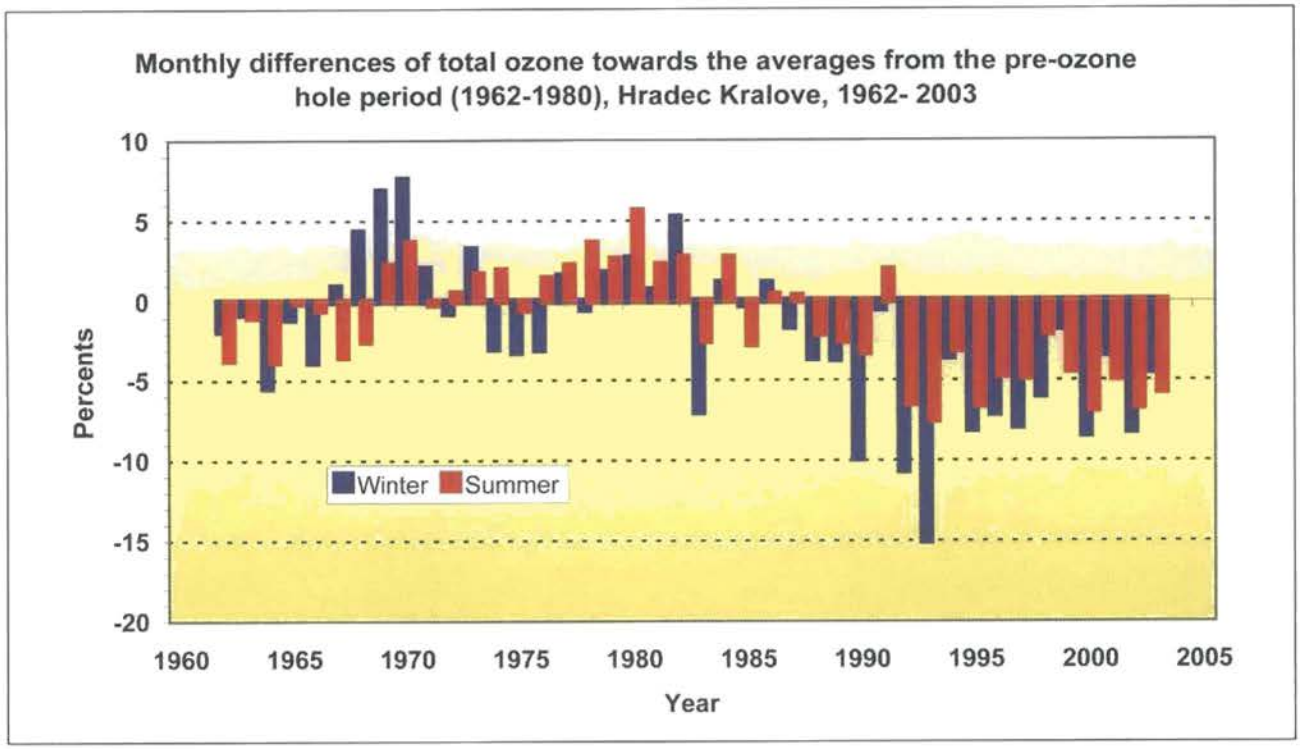
half of the nineties the attenuation of the layer has been continuing till present - first in the winter/spring and later also in the summer seasons. At present an extensive scientific effort is put on estimation of the magnitude of anthropogenic and natural contributions to these changes of the ozone layer and identification of its recovery.



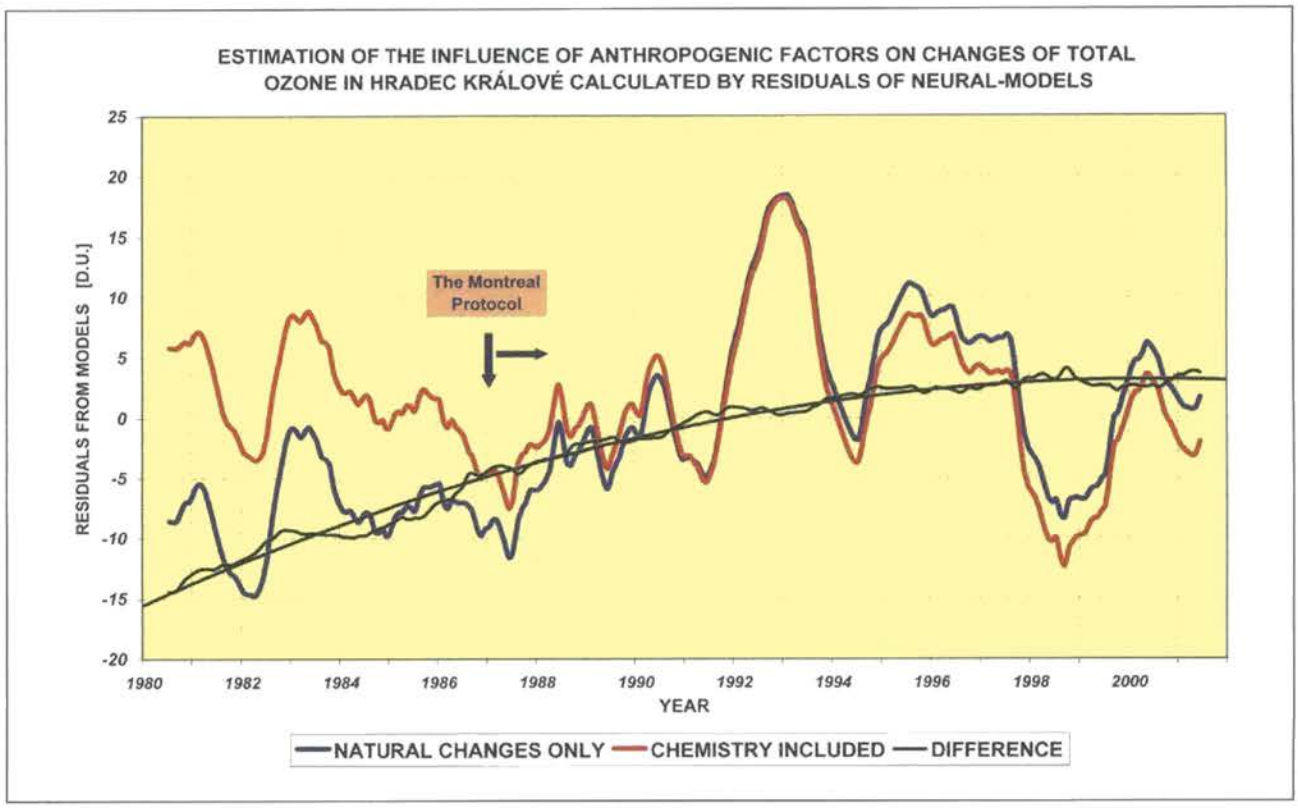
Ozone mini-holes over the Northern hemisphere - WOUDC/MSC Ozone Mapping Centre

The average and the reduced ozone profile measured at the Aerological Observatory in Prague





Attenuation of the ozone layer over Central Europe before and in the ozone-hole period



Estimation of chemical contribution to ozone losses over Central Europe by residuals of neural-network models developed in the CHMI.

4. Research activities and international co-operation

In the Czech Republic monitoring and analyses of changes of ozone in the atmosphere have been carried out under several national grants provided mainly by the Grant Agency of the Czech Republic. In recent years international research and development projects have become more important as they allow a deeper integration of the Czech ozone and UV related scientific activities into global and regional programmes. The WMO-GAW Programme and projects funded by the European Commission should be mentioned above all. The following are the scopes where the Czech research groups actively contribute to the international science:

- Creation and maintenance of long-term and high quality ground observations of the ozone layer in Central Europe
- Validation of satellite ozone observations
- Analyses of compatibility of ozone observations performed by different types of instrumentation
- Calibration and maintenance of the European ozone monitoring network
- Investigation and modeling of relation between regional ozone and UV changes
- Development of software and IT tools for ozone stations in developing countries
- Participation in scientific and advisory teams of WMO

Czech contributions to national and international ozone and UV projects

The Grant Agency of the Czech Republic
„Measurement and Analyses of the Biologically Active UV Solar Radiation in the Territory of the Czech Republic", 1997-1999
„Development and Implementation of Technologies for the European Ozone Calibration Centre", 2001-2002

The Ministry of the Environment and the Czech Hydrometeorological Institute
"Technical Assistance in the field of Meteorology, Hydrology and Air Quality", 1997 - 2001
"Development of the Network for Monitoring of the Ozone Layer in Developing Countries", 2004-2006

WMO - The Global Atmosphere Watch Programme
Ground-based ozone data bases
IT and technological products for the global network capacity building in developing countries

The German Meteorological Service and the Czech Hydrometeorological Institute
A joint programme on maintenance of the Regional Dobson Calibration Centre for Europe

The European Commission, DG-XII
"The COST-713 Action: UV-B Forecasting", 1996-2000
"The European Database for UV Climatology and Evaluation", 2000-2003
"The Chemical and Dynamical Influences on Decadal Ozone Chamge", 2002-2005
"The Stratosphere Climate Links with Emphasises to UTLS", 2004-2009
"The COST-726 Action: Long-term Changes and Climatology of UV Radiation Over Europe", 2004-2009

Training of operators from ozone stations at the Solar and Ozone Observatory in Hradec Králové

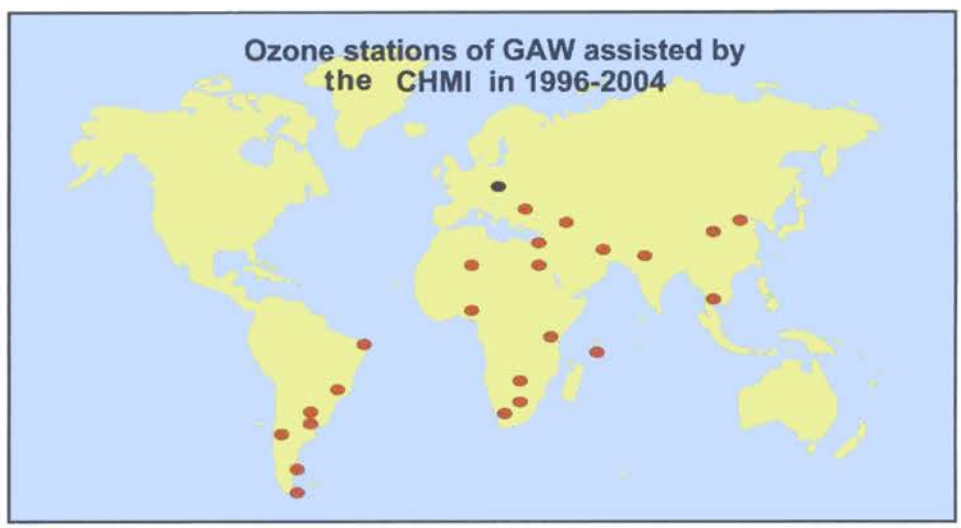
WMO calibration of Dobson ozone spectrophotometers from Africa assisted by the CHMI at Dahab, Egypt, 2004

5. Assistance to partners in developing countries

For more than eight years the CHMI has assisted to ozone stations of the GAW network located in developing countries. The support is provided in co-operation with the WMO - Environment Division and the UNEP - Secretariat of the Vienna Convention and the Montreal Protocol. The CHMI contributes mainly in the following scopes:

- Development of software and IT tools for processing and telecommunication transfer of ozone observations
- Training of operators of ozone spectrophotometers - either at the SOO or at particular stations
- Calibration of instruments at WMO regional campaigns
- Repairs and installation of instruments at stations

Almost 23 stations in 17 countries have been directly assisted by training of personnel and installation of IT products by the CHMI since 1996. In 2004 a special project dedicated just to these activities has been established under the auspices of the Czech Ministry of the Environment, the Czech Ministry of Foreign Affairs and the CHMI. The project is included into the Czech Official Development Assistance Programme and is supported by 60.000 USD for 2004-2006. Its realization represents a contribution of the Czech Republic to the implementations of the goals of the Vienna Convention in developing countries, in particular the decision VI/2 on ozone related monitoring and research activities.



Ozone stations of the GAW network assisted by the CHMI

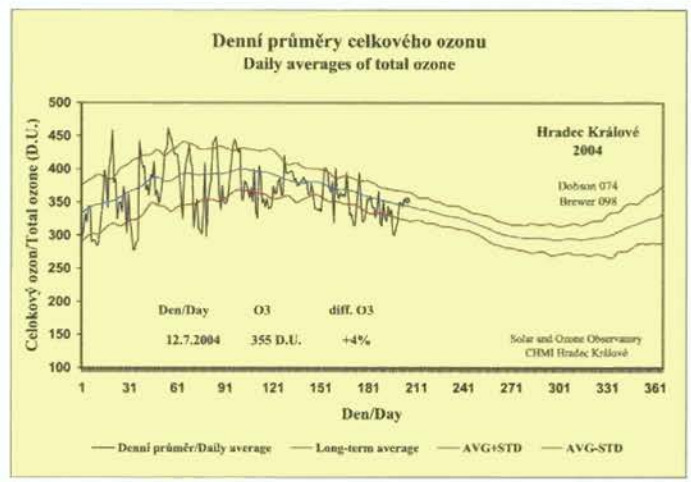
UV solar radiation

and ozone losses

Michal Janouch

1. Introduction

Solar radiation is an important natural factor, forming the Earth's climate and having a significant influence on the environment. Stratospheric ozone is the most important atmospheric gas affecting ground-level UV radiation and exhibits both temporal and geographical variations. The ultraviolet part of the solar spectrum plays an important role in many processes, which are under way in the Earth's biosphere. Though it has several positive and beneficial effects, however if the UV radiation exceeds certain "safe" thresholds, it may become very harmful. If the amount of UV radiation becomes too high, the self-protection ability of some biological materials is exhausted and the subject may be severely and non-reversibly damaged. The adverse effect of the UV radiation has been already many times confirmed. This also concerns the human organism, in particular the skin and the eyes, as well as many other natural ecosystems.



Daily averages of total ozone over the Czech Republic

2. UV solar radiation – a review

The UV region covers the wavelength range 100-400 nm and is divided into three bands: UVA (315-400 nm), UVB (280-315 nm), UVC (100-280 nm).

As sunlight passes through the atmosphere, all UVC and approximately 90% of UVB radiation is absorbed by ozone, water vapour, oxygen and carbon dioxide. UVA radiation is less affected by the atmosphere. Therefore, the UV radiation reaching the Earth's surface is largely composed of UVA with a small UVB component.

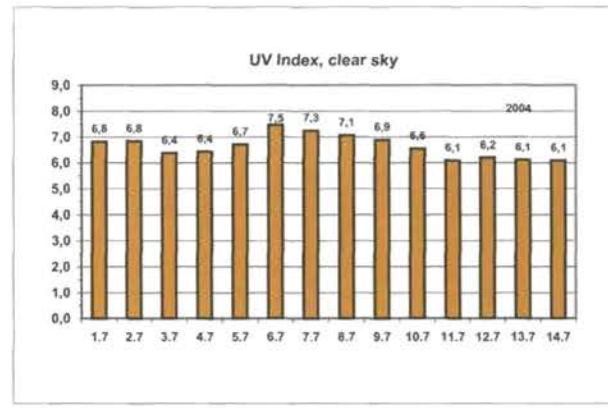
The most important factors affecting the UV radiation reaching the Earth's service are:

- Sun height—the higher the sun in the sky, the higher the UV radiation level. Thus UV radiation varies with time of day and time of year, with maximum levels occurring when the sun is at its maximum elevation, at around midday (solar noon) during the summer months.
- Latitude—the closer the equator, the higher the UV radiation levels.
- Cloud cover— UV radiation levels are highest under cloudless skies. Even with cloud cover, UV radiation levels can be high due to the scattering of UV radiation by water molecules and fine particles in the atmosphere.
- Altitude—at higher altitudes, a thinner atmosphere filters less UV radiation. With every 1000 meters increase in altitude, UV levels increase by 10% to 12%.
- Ozone—ozone absorbs some of the UV radiation that would otherwise reach the Earth's surface. Ozone levels vary over the year and even across the day.
- Ground reflection—UV radiation is reflected or scattered to varying extents by different surfaces, e.g. snow can reflect as much as 80% of UV radiation, dry beach sand about 15%, and sea foam about 25%.

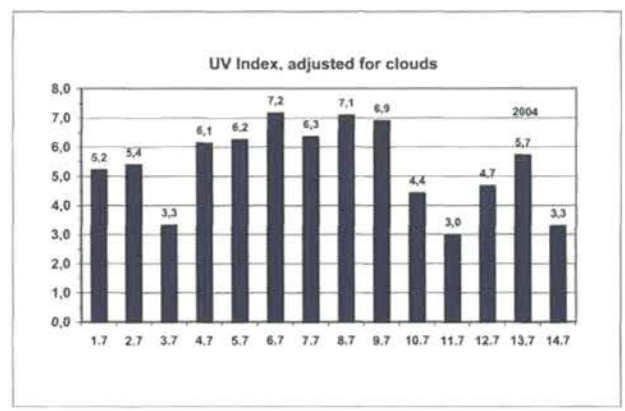
3. Definition of the UV Index – a parameter for the public

The UV Index has been standardized and published as a joint recommendation by the World Health Organization (WHO), the World Meteorological Organization (WMO), the United Nations Environment Programme (UNEP) and the International Commission on Non-Ionizing Radiation (ICNIRP). The UV Index :

- is a unit of measure of UV levels relevant to the effects on human skin (UV induced erythema)
- is defined as the effective irradiance obtained by integrating the spectral irradiances weigted by the CIE (1997) reference action spectrum up to and including 400 nm normalised to 1.0 at 297 nm
- is expressed numericelly as the equivalent of multiplying the time weighted average effective irradiance (W/m2)



Forecasted clear sky UV Index



Forecasted UV Index, adjusted for clouds

4. Monitoring of UV radiation in the Czech Republic

Systematic daily UV measurements have been performed since 1994 at the Solar and Ozone Observatory of CHMI in Hradec Králové (SOO-HK) by means of the Brewer spectrophotometer (B098). The UV Biometer is used at the SOO-HK and Observatory Košetice (GAW station). The instruments are regularly calibrated towards international standards and produce the first-class quality data. The B098 is the only spectrophotometer in the Czech Republic for measurements spectral intensities of UV radiation and thus serves as a reference instrument for the UV public warning system in the country.

5. UV Index forecasting

Operational UV Index forecasting has already been implemented in the Czech Republic since 1995 at the SOO-HK. The information on the UV Index is given as forecasted and as measured value and is a part of UV and ozone report for the public. The main warnings are in the spring and summer when the sun is high in the sky and people are outside a lot. This helps to reduce sunburn and, in the longer term, health problems such as skin cancer.

6. UV Index and you in the 21st century

The measurements show that long-term changes of the stratospheric ozone layer may modify the UV radiation. An expected recovery of the ozone layer in the middle of the 21st century should also allow for a stabilization of the UV radiation. The negative impact on human health can be eliminated for example by UV Index information. In any case, this century will be in terms of a more active and individual control of UV exposure, at least for the large photosensitive part of the population.

Skin effects

of ultraviolet radiation, photoprotection and prevention

Karel Ettler

Introduction

The skin is the barrier of human body against environmental influences. Its condition indicates a health state of each man. Most people enjoy to look pretty, fresh and attractive but the fashionable skin design (suntanned) cannot be an equivalent of the health. Sunbathing used to be for tens years a hobby for many holidayers (even for them who are not able to tan). The results of such activity come immediately - painful sunburn till vesicle reaction. But the most severe are the late effects - skin photoaging and skin cancer.

One of the endangering factors of increasing sunlight exposition is thinning stratospheric ozone layer which naturally filters ultraviolet (UV) radiation incident to the Earth surface. Measurement and information about its state is very required function of hydrometeorological service.

Effects of UV radiation on the skin

Sunshine incident to Earth surface contains ultraviolet (UV-A and UV-B) radiation (290-400 nm), visible (400-760 nm) and infrared (IR) radiation (760-3000 nm). Visible radiation doesn't damage the skin in common conditions. Infrared radiation may cause its overheating. The object of measurements, monitoring and polemic discussions is the ultraviolet radiation.

The skin can deflect or scatter UV radiation. Only particular part of UV radiation permeates through the skin to the individual cells. Depth of penetration depends on wave length of radiation: the higher the wave length is the deeper radiation penetrates. E.g. UV-B permeates to epidermis, UV-A permeates to dermis, visible and infrared beams permeate even to subcutis.

The energy of radiation must be absorbed to cause any biological effect. The pale skin of Caucasions deflects about one half of incident visible and short waves of IR radiation. UV radiation is mostly absorbed by proteins and other component of epidermal cells (e.g. DNA).

Solar irradiation of skin invokes many biological effects, which can be either helpful or harmful. Small amount of UV-B is needed to transform vitamin D in skin. Higher amount of UV causes serious damage – erythema, inflammation, pigmentation. Repeated exposures of UV cause subacute (photodermatoses, photoimmunosupression) or chronical changes - photoaging or photocarcinogenesis.

Along the white population, inflammatory erythema is the most noticable acute skin response to UV irradiation and is connected with classic signs of inflammation: higher temperature, pain and swelling. Erythema usually appears in some hours after irradiation (sometimes during irradiation), culminates in 12 - 24 hours and disappears in 2-3 days. Erythema is a good indicator of photobiological skin processes (because of good monitoring possibilities) and it is used for photoprotection capacity measurement of the skin. The most erythemogenic are UV-C and shorter UV-B.

Other skin reactions after UV irradiation includes thickening of epidermal horny layer and pigmentation. Immediate pigment darkening (IPD) starts during UV exposition with maximum immediately after exposition. IPD means oxidation of present skin melanin striking in dark pigmented skin with a special gray shade. IPD appears especially after UV-A exposition. IPD disappears after a few minutes; after higher dose of radiation it can lasts some days and combines with delayed pigmentation.

Fig.1: Photoaging of the skin with elastoidosis, komedons and keratoses

Fig. 2: Actinic keratosis of upper lip, basal cell carcinoma of nose

Fig. 3: Basal cell carcinoma in the middle, surounded by senile warts

Delayed pigmentation represents new synthesis of melanin in epidermis and is perceptible after 72 hours, survives for weeks even months.

Natural photoprotective factors of individual skin allow to divide population into skin types. It requires knowledge of reaction skin after 1 hour exposition of spring midday sunlight.

Phototype	Skin response
I.	always burn, never tan
II.	burn, sometimes tan
III.	sometimes burn, tan
IV.	never burn, always tan
V.	brown skin
VI.	negroes

Some effects of UV radiation can appear in the skin immediately after exposition. Photosensitivity usually accompanies photodermatoses. Some endogenic factors could provoke the most frequent photodermatosis - polymorphic light eruption. A contact with some photosensitizing substances like drugs (antibiotics, anti-inflammatory drugs), plants, cosmetics (deodorants, perfumes) or chemical sunscreens can induce skin phototoxic or photoallergic reaction.

Chronic skin changes are usually induced by repeated long-time expositions to UV radiation. Chronic skin changes relate to frequent acute damages also photoimmunosupression support skin cancer development. Other chronic side effect of UV exposition is photoaging (fig. 1).

Photoaging is not only accelerating of chronologic intrinsic aging of the skin. It represents a lot of macro- and microscopic skin changes (especially in skin phototype I) like wrinkles, dry "leather" skin with many benign, praemalignant and malignant tumors.

Investigations on nude mice skin confirm UV-B radiation to be the most carcinogenic. UV-A acts also photocarcinogenic but with thousand times lower efficiency. That is why action spectrum efficiency curve for photocarcinogenesis is similar to curve for erythemogenic efficiency of UV radiation. These skin damages could be enhanced by use of phototoxic drugs (e.c. psoralens increase risk of squamous cell carcinoma incidence after photochemotherapy PUVA). Chronic UV exposition (with high whole life cumulative dose) could start growth of some skin tumors including actinic keratoses (suggested to be praecancerosis, fig.2), basal (fig.3) and squamous cell carcinoma and others. Malignant melanoma (fig.4) (with high metastasis potency and adverse prognosis) appearance depends rather on severe sunburn episodes (even if they happened during childhood).

Dermatological investigation of the skin

Dermatological investigation involves history of the skin affection and a clinical investigation. Skin photosensitivity tests are necessary for confirmation in photodermatoses. Manual or digital dermatoscope (fig.5) is useful in pigmented lesions evaluation, histological analysis of removing tissue usually resolves diagnostic difficulties.

Fig. 4: Malignant melanoma

Fig. 5: Manual dermatoscope for skin pigmented lesions evaluation

Skin photoprotection

Shadow and clothing

The shadow affords a natural and effective photoprotection (hat, parasol, trees, etc.). Textiles photoprotection depends on the color (darker absorbs more light but could overheat). Thin, white or wet garments protect less. Artificial materials (nylon, dacron, etc.) are less transparent for UV radiation than cotton. The compression is an important factor in stretch garments. Some textiles are labeled by UPF (UV protecting factor). UPF over 50 signs high protection.

Sunglasses (better with UV filter tested) are necessary for eyes photoprotection.

Sunscreens

Sunscreens are substances applied directly on the skin (solutions, gels, creams, lipsticks, etc.) with photoprotection ability (absorb or scatter UV radiation). The best sites for their application are the most exposed areas - nose, ears, lips. The sunscreens capacity is defined by SPF (sun protecting factor). The higher SPF is the more efficient photoprotection affords (SPF multiplies the "safe" time of sunlight exposition).

Photoprotection properties depend on its active part - filter. Organic (chemical, absorbers) and inorganic (physical, mineral pigments) substances or natural oils (chemically not exactly defined) are distinguished. Topical sunscreens with high or very high SPF (total sunblocks) introduce usually mixtures containing both organic and inorganic filters.

a) Organic (chemical) filters absorb light energy in UV-B (and mostly in UV-A) region and the UV absorption leads to their internal conversion (problems with photostability). Contact photoallergy could limit using of some substances (aminobenzoates, benzophenons, cinnamates) as filters but new safer ingredients are dermatologic tested (Mexoryl XL, Tinosorb).

b) Inorganic (mineral pigments) filters scatter and reflect incident UV and visible radiation depending how large their particles are. Titanium dioxide, zinc oxide, magnezium oxide, talcum are mineral substances without allergenic potency. Mineral filters in higher concentration are more difficult to spread on the skin where the white shade is cosmetically unpleasant.

c) Natural oils (aloe extracts, jojoba oil) have lower SPF. Their emollient and antioxidative properties are useful.

Application of topical sunscreens has to be careful according to instructions. That the protection achieved is often less than that expected depends upon a number of factors: application thickness and technique; type of sunscreen applied; resistence to water immersion and mechanical abrasion; and when, where and how often sunscreen is re-applied.

Information about actual UV-index or "safe" time on the sun for each phototype is required for correct choice of SPF.

New trend in topical photoprotection is to enhance repair of UV damage in human skin (using DNA repair enzymes like T4 endonuclease V). Human skin as a light-exposed tissue can be affected by photooxidative stress. Antioxidative defense of the skin could be supported by ascorbate. tocopherols and carotenoids additives in sunscreens.

Public education

Skin cancer has been the most frequent type of cancer in the Czech Republic since 1994 (more than 20 % all registered cancers) and steadily increases. The incidence of malignant melanoma is uncomfortable: 6 new cases of melanoma per 100 000 inhabitants in 1985 were duplicated in 12 years to 12 new melanomas per 100 000 inhabitants in 1997.

The main stress is given on prevention because of very adverse melanoma prognosis and not so successful therapy of advanced disease. Three stadiums of prevention are distinguished: a) primary prevention streams to avoid skin damage and tumor development; b) secondary prevention introduces early detection of melanoma and its treatment before metastasing; c) tertiary prevention includes further follow up of treated patient and restriction of new flare of his disease.

a) *Primary prevention* involves educational activities in media in which harmful effects of UV radiation and photoprotective possibilities are mentioned. Ecological campaign for ozone layer protection and solar and ozone information (prepared by the Czech Hydrometeorological Institute, Solar and Ozone Observatory in Hradec Králové) could warn population against harmful UV radiation. The fashionable trend of sunbathing could be diminished by this manner. Solaria checking and correct dermatological phototherapy indications may restrict exposition to artificial UV sources. (fig.6)

Fig. 6: Devices for dermatological phototherapy ▲ ▲▲ ▼

b) The main effort was concentrated on early detection of malignant melanoma in *secondary prevention.* This cancer grows up from pigmented naevus in almost 50 % cases. It is very important to inform ordinary citizen about self-investigation of these skin affections and as soon as possible to visit a dermatologist. The project called Euro-Melanoma Day is organized every year (always in May) in 14 European countries. The Czech Republic has been taking part in this project since 2001. Every dermatological ambulance which takes part in this project is opened for everybody with skin pigmented lesion in this Day. In 2001 it was 895 investigated persons (discovered 14 melanomas). In 2002 1826 persons were investigated (detected 47 melanomas). In 2003 2617 presons were investigated (detected 47 melanomas). These results are very encouraging for regulation of similar projects despite of many difficulties. This requires to assort huge press campaign, many news conferences and to constitute free phone line. Specialized websites are also established for this purpose:

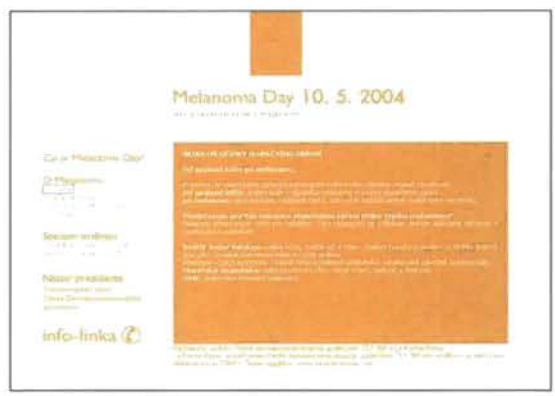


Fig. 7: Website Melanoma Day

www.melanoma-day.cz
www.melanoma.cz
www.euromelanoma.org

We believe that with concentrated effort of all cooperating forces unfavourable trend in skin cancer incidence will be stopped. We are sure everybody would care obviously for his health with responsibility.

The Czech Republic
and the Protection of the Ozone Layer

Jiří Hlaváček, Jiří Dobiášovský

The Czech Republic, country situated in Central Europe, is an example of the country that is succeeding with the implementation of international obligations and regulatory measures arising from the Vienna Convention for the Protection of the Ozone Layer of 22 March 1985 and the Montreal Protocol on Substances that Deplete the Ozone Layer of 16 September 1987.

The country that in the middle of the 1980s belonged to the most polluted countries of the European continent due to the negative impact of the developed heavy industry, mining sector and chemical industries, including the production and consumption of the ozone depleting substances (ODS), has become after the Velvet Revolution of November 1989 the promoter of radical and efficient protection of the environment as the part of sustainable development long-term perspective. The former Czechoslovakia produced almost 7.400 tons and consumed more than 10.700 tons of the ozone depleting substances now under the regulatory measures of the Montreal Protocol. More than 90 % of them were produced and 80 % consumed on the territory of the present Czech Republic, in particular chlorofluorocarbons (CFCs) used in various industrial applications including domestic, commercial and industrial refrigeration and air conditioning, flexible and rigid insulation foam, and in numerous applications such as aerosol propellants and solvents. Czechoslovakia became a Party to the Vienna Convention and to the Montreal Protocol on 30 December 1990 and the Czech Republic succeeded to them on 1 January 1993 when it became an independent state.

Civil society, in particular the non-governmental organisations, in early 1990 started the campaign for reducing and eliminating the production and use of the ODS. Thanks to their activities and positive response from the state administration and the business community, the first Ozone Layer protection legislation was drafted in the Czech Republic reflecting the development of international negotiations on the Ozone Layer preservation.

Since 1991, the ozone depleting substances consumption profile changed due to the effects of market forces, industrial restructuring, the regulatory environment, and general technological trends. A comprehensive Country Program for the Phase-out of Ozone Depleting Substances in Czechoslovakia was completed in November 1992 with the support of the Global Environment Facility that inter allia assisted to the adoption of the Act on the Ban of Production, Imports and Use of the Earth´s Ozone Layer Depleting Substances and on the Products Containing Them in July 1993 introducing efficient regulatory measures in the Czech Republic using also economic and fiscal instruments.

The State Environmental Fund of the Czech Republic, established in 1991, introduced the system of charges for the ODS use, introduced since June 1993 production and trade as well as the system of support for introduction of technologies using alternatives to the ODS. The Fund collected more than 10 million USD of the revenue that could be spent only on the protection of the Ozone Layer in 1994 – 2003. Now the main task ahead of the Fund is to support the effective system of collection of end-of-life refrigerators and other equipments containing CFCs and their management.

The Czech Environmental Inspection, established in 1991, became an authorised body to control the management of ODS, their production, imports, exports and reporting on their use. The Inspection is closely co-operating with the Czech Trade Inspection (ODS labelling, handling on the market) and the Directorate General of Customs. The Inspection is using effectively the tool of fines and penalties for failures to comply with the requirements of the national legislation and international obligations.

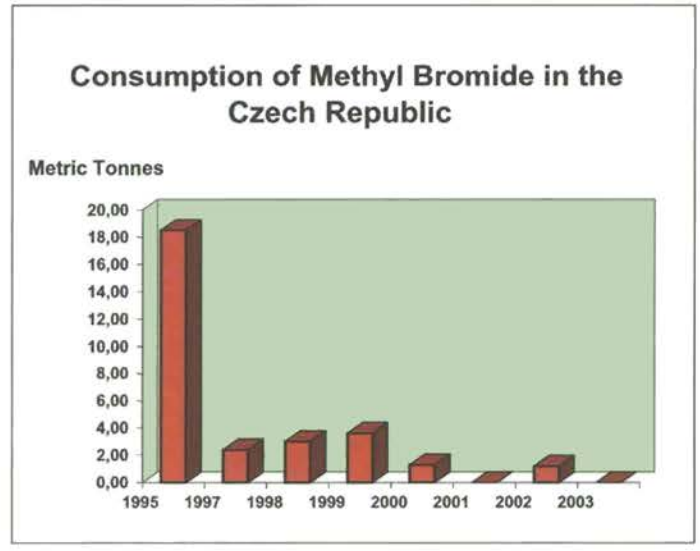
Technical Support and Investment Project for the Phase-out of Ozone Depleting Substances was executed in the Czech Republic in October 1994 – June 1996 through the grant agreement with the Global Environment Facility of total amount of 2.3 million US Dollars and the Government Programme for the Phase-Out of the Ozone Depleting Substances of 1.9 million US Dollars. The principal objective of the Project was to assist the Czech Republic in the phase-out of the ozone depleting substances produc-

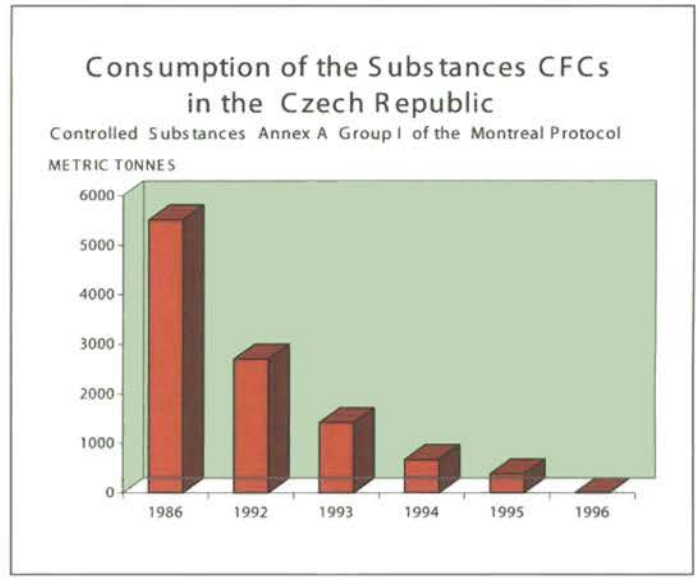
tion and consumption in a cost effective manner by the year 1996, as mandated by the Montreal Protocol and its London Amendment of 29 June 1990 and Copenhagen Amendment of 25 November 1992. Specifically this Project assisted the Czech Republic to initiate the phase-out of the production of CFCs, to phase-in the operation of a national network for refrigerant recovery/reclamation/recycling (CFC-11 and CFC-12) and to support applied engineering efforts to use ozone depleting substances in manufactured goods (mainly refrigeration and commercial/industrial cooling applications), thereby reducing both the immediate and future needs for regulated substances.

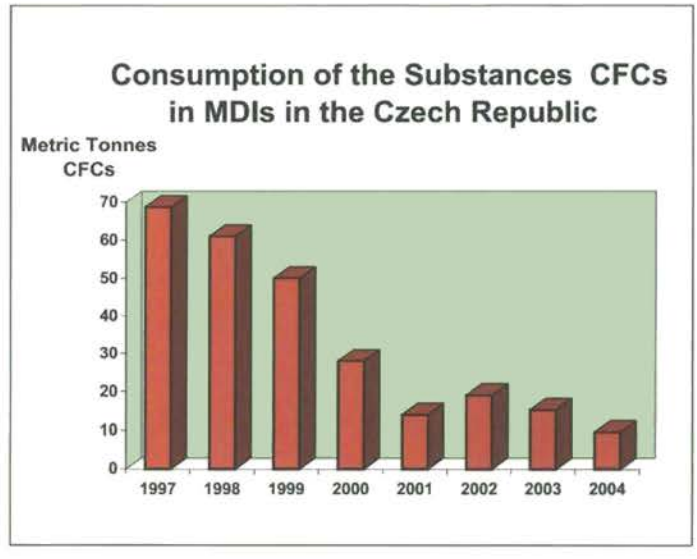
The private sector understood the transfer from the technologies using CFCs (almost 5.500 tons in 1986) as a challenge for more efficient incorporation of the restructured Czech industry, trade and services into the world market economy sound to the environment and human health. Of course, the public and private sectors had to invest immense financial resources into new technologies using alternatives to CFCs in spite of financial support through the Government Programme for Reducing and Elimination the Production and Use of the ODS and the GEF grant. Now the Czech Association of Refrigeration and Air-conditioning Technologies, covering almost 800 companies with total volume of operation of 500 million US Dollars, is assisting other countries in region to establish such kind of associations and to keep constructive dialogue with government, business sector and consumers. The Association pays a high attention to the excellent level of professionalism of experts and technicians dealing with maintenance of refrigeration technologies and equipments through the vocational training and professional preparation of technicians.

The successful implementation of the GEF Project resulted in adoption of the new Act on the Protection of the Ozone Layer of the Earth in April 1995 and in entry into force in the Czech Republic on 18 March 1997 of the London Amendment, tightening control schedules and adding ten more CFCs to the list of ODS, as well as carbon tetrachloride (CTC) and methyl chloroform, and Copenhagen Amendment, further tightening control schedules and adding controls on methyl bromide, hydrobromofluorocarbons and hydrochlorofluorocarbons (HCFCs).

The Act on the Protection of the Ozone Layer of the Earth that came into force on 1 January 1996 and its related legal and administrative mechanisms established officially in the Czech Republic the licence system for exports and imports of controlled substances and products containing them under the authority of the Ministry of the Environment and its National Ozone Unit. Therefore, the Czech Republic could accept the requirements of the Montreal Amendment of 17 September 1997 for introducing a licencing system for the import and export of ODS. The Montreal Amendment came into force in the Czech Republic on 3 February 2000.







Waste incineration plant for termic destruction of substances CFCs and HCFCs in Ostrava ▲ ►

At the end of 1990s, the Czech Republic was among the Parties to the Montreal Protocol that met their obligations under this important global environmental agreement without major difficulties. The Czech Republic positively responded to the new Beijing Amendment of 3 December 1999 on control of HCFCs production and bromochloromethane. The Amendment came into force in the Czech Republic of 25 February 2002. Only thanks to the close co-operation of the state administration, private sector, non-governmental organisations and international support the Czech Republic succeeded to comply with the requirements of the Montreal Protocol and its amendments. The Czech Republic was the first country in the Central and Eastern Europe that had accepted all amendments to the Montreal Protocol.

The Executive Secretary of the Ozone Secretariat, Mr Marco Gonzalez, when visiting Prague on 16 September 2002 on the occasion the International Day for the Preservation of the Ozone Layer and meeting with the Minister of the Environment of the Czech Republic, Mr Libor Ambrozek positively commented the results achieved by the Czech Republic.

The Vienna Convention and the Montreal Protocol as most effective multilateral environmental treaties are contributing not only to protection of the Ozone Layer but also to the improvement of general environment and health of the population in a broader context of sustainable development at global, regional and national levels as confirmed by the respective parts of the Johannesburg Implementation Plan, adopted by the World Summit on Sustainable Development. The goals of Montreal Protocol are demonstrating the inter-linkage of the issue of the protection of the Ozone Layer with other present priority issues such as environmentally sound technologies, changing production and consumption patterns, raising public awareness and improve environmental education, support of public and private partnership, that is resulting in adopting, enforcing and controlling respective environmental and trade legislation at local, national, sub-regional, regional and global levels.

In 2002, the Czech Republic adopted more integrated new Act on the Air Protection, incorporating also the provisions on the preservation of the Ozone Layer in the context of the Czech Republic membership in the European Union starting from 1 May 2004. The Czech Republic has identified as major tasks in present period in respect of the Montreal Protocol requirements to:

- establish the efficient system of the recovery of used controlled substances (recycling capacities for domestic refrigerators using most advanced technologies, the State Environmental Fund allocated almost 2 million US Dollars in 2001-2003 for the collection of end-life refrigerators according to the Strategy of CFCs Management of 2002),
- increase the volume of destruction of extracted ozone de-

pleting substances (in 2003 the technology of termic destruction was put in operation).
- reduce the leakage of controlled substances from the installation in operation (annual control of possible leakages from large refrigerating and air-conditioning equipments with used volume of 3 kg of controlled substances according to the Strategy of CFCs Management of 2002).
- increase the collection of halons (establishment of halon bank with modern recycling technology in 2003 according to the Halon Management Strategy of 2001).
- increase of the use of the Medical Dose Inhalers – MDI free of CFCs (according to the Strategy of the Czech Republic for Phase-Out of Medical Preparations Containing Chlorofluorocarbons of May 2001, the use of SALBUTAMOL is not allowed more in the Czech Republic).

In implementing the targets of the Montreal Protocol the role of the Czech private sector should be stressed in promoting the ozone layer friendly technologies comparable with highest international standards, in some technologies even higher. Many Czech companies export technologies for using alternatives to the ODS and for effective and safe management of CFCs and other ODS. The Czech private companies are now actively participating in the Czech Official Development Assistance Programme and in particular in the ozone depleting substances phasing-out projects bilaterally and multilaterally (in total volume almost 2 million USD) and are also executing commercial contracts mainly in the countries of Eastern and South Eastern Europe and in developing countries. The Czech Republic became regular, reliable voluntary contributor to the Multilateral Fund for the Implementation of the Montreal Protocol (in 1991 – 2004 almost 5.5 million USD) thus sharing the responsibility for the global state of the Ozone Layer.

The Czech Republic considers the election of its representatives to the highest positions of the Vienna Convention and of the Montreal Protocol (Vice-President and Member of the Bureau of the Twelfth and Thirteenth Meeting of the Parties to the Montreal Protocol, President and Member of the Bureau of the Fifteenth Meeting of the Parties to the Montreal Protocol and the President of the First Extraordinary Meeting of the Parties to the Montreal Protocol, Vice-President and Member of the Bureau of the Sixth Conference of the Parties to the Vienna Convention) and the hosting of the Sixteenth Meeting of the Parties to the Montreal Protocol in Prague in November 2004 as a international recognition of its national commitment to the preservation of the Ozone Layer.

Sharing Global Responsibility

for the state of the Ozone Layer

Hana Čermáková, Jiří Hlaváček, Jan Jelínek

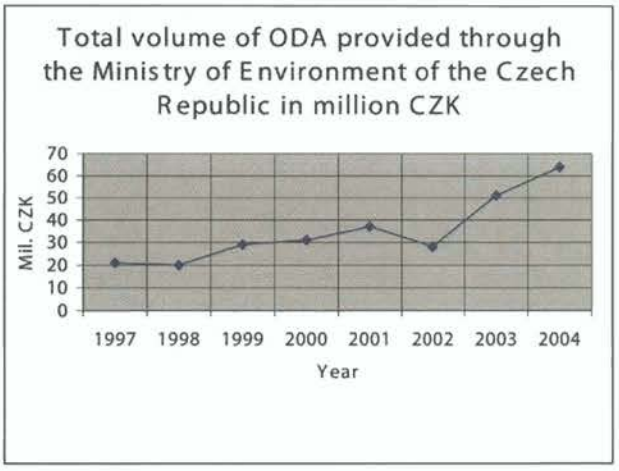
In 1996, the Czech Republic reintroduced in connection with its membership in the Organisation for Economic Co-operation and Development (OECD) its official development assistance programme based on principles comparable with policies of developed donor countries. Thus the Czech Republic has begun transformation from a recipient to a donor country.

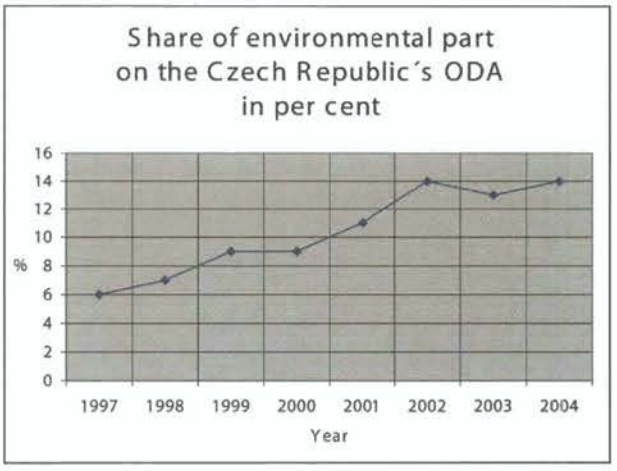
The overall goal of the Official Development Assistance of the Czech Republic is to contribute, in line with efforts of international community, to poverty alleviation in the less developed countries through the promotion of sustainable development. Poverty alleviation is a prerequisite of reaching globally sustainable development. The Czech Republic endorses multidimensional approach towards poverty alleviation that is understood not only in economical terms but also in its social and environmental aspects. The Czech Republic fully supports International Development Goals, which were adopted by the 1990s UN international conferences and confirmed by the 2000 UN Millennium Summit and by the 2002 World Summit on Sustainable Development.

One of the strategic goals of the Czech official development assistance is to support sustainable development with emphasis on its environmental pillar. Development assistance projects should directly or indirectly contribute to the improvement of environment and quality of life in the recipient countries. The Ministry of Environment has been participating in the Czech development assistance programme since 1997. Between 1997 - 2004 the Ministry co-ordinated preparation, implementation and evaluation of 53 projects in 32 countries in the total financial volume of 276 million CZK (approx.10.2 million USD).

Development projects mostly extend over several years and are focused as follows:

- implementation of the multilateral environmental agreements (protection of the ozone layer, combating desertification, protection of biodiversity etc.)
- environmental aspects of industrial activities (cleaner production, environmental management systems)
- sustainable use of natural resources including integrated management of water resources
- environmental geology (hydrogeology, natural risks assessment)
- clean up of contaminated sites, remediation of old ecological damages, waste management





In line with priorities the Ministry implemented several development projects related to the protection of the ozone layer:

The first project, called "Assistance in ozone depleting substances phase-out in refrigeration servicing sub-sector", was carried out by the Czech company EKOTEZ Ltd. / UNIDO in the Ukraine in the years 1998 - 2000 and its budget was 9.6 million CZK (275 thousand USD).

This was implemented as a multilateral project in co-operation with the UNIDO. Its goal was to transfer experiences of the Czech Republic in the field of leakage-free technology, handling refrigerants as well as substances depleting the ozone layer. In the last decade, the Czech Republic has acquired knowledge and experience in this field and at the same time has become a producer of the necessary technological equipment.

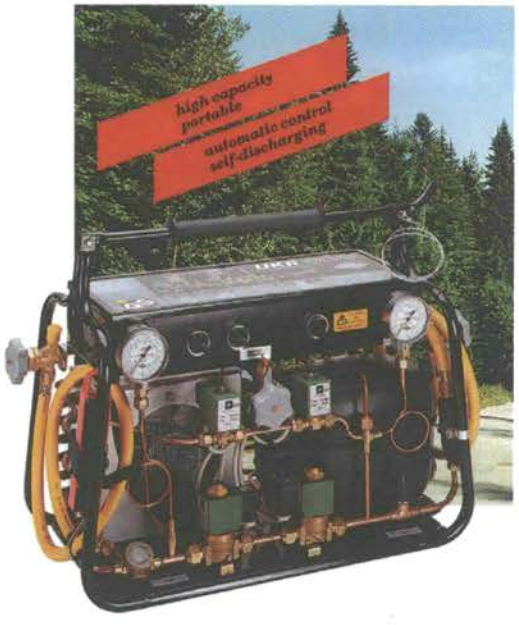
The project was targeted at specialized service centers working in the framework of the Ukrainian Association of Users and Suppliers of Cooling Technique. In the framework of the project, modern effective technology of handling refrigerants was introduced, delivery of necessary technology to equip the service centers was begun, and training seminars for service technicians were implemented. The project resulted in savings of up to 71 % of the CFC-12 leakages. The saving enabled reduction of import of the refrigerant that is used for repairs and service works on household and commercial refrigerators as well as air-conditioning systems. The project assisted Ukraine in fulfilling its obligations under the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer.

The second project implemented by EKOTEZ Ltd. under the name "Assistance in ozone depleting substance phase-out in refrigeration servicing sub-sector" was in Belarus in the year 2001. Its costs were estimated up to 2.3 million CZK (65 thousand USD).

The overall goal of the project was to prevent out-of-control refrigerant leakage, to reduce the discharge of regulated substances into the atmosphere where they subsequently cause depletion of the ozone layer. A pre-condition of this goal was to train and equip so-called "pilot teams". These have been professionally and technically competent to undertake the removal of refrigerants, to introduce refrigerant recycling and to disseminate the acquired knowledge. Laminar, the local supplier of the cooling technique received the adequate technology for six service teams needed for reclaiming, recycling, and for simplified regeneration of regulated refrigerants. Laminar operators and representatives of other organizations received theoretical as well as practical training and technical documentation. The project assisted Belarus in fulfilling its obligations arising from the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer.

In the years 1998 - 1999 and 2001, the Czech company Horak Brothers Ltd. carried out another project under the name "Use of non -ozone depleting substances based technologies for agricultural products storage". The recipient country was Lithuania and the total budget was approximately 8 million CZK (230 thousand USD).

The goal of the project was to acquaint Lithuanian users, technical and assembly workers with the benefits of using non-ozone depleting substances based technologies for agricultural products storage. In the framework of the project, delivery of sample cooling and freezing chambers was implemented. The chambers were built of special insulation polyurethane panels the production of which is



The first European recovery unit produced by EKOTEZ - Type UKR90

The recovery and charging unit produced by EKOTEZ - Type Twin 1

▲ *The cooling circuit*
◄ *The freezing chamber*

based on principles of non-CFCs defoaming process. The technology delivery was carried out based on recommendations of the Lithuanian Ministry of Agriculture. The appointed recipients were the poultry farm Vilniau Pauksynas, the vegetable producer Pagiriai Siltnamiai and the association of fruits and strawberry growers in Anyksciai. As a part of the project, seminars and training of technical personnel were implemented. To acquire the practical experience, an assembly of chambers and cooling circuits were demonstrated. The project assisted Lithuania in fulfilling its obligations the Montreal Protocol on Substances that Deplete the Ozone Layer.

The newest phasing out project "Phase-Out of Ozone Depleting Substance" was launched this year of 2004 and will be carried out by EKOTEZ Ltd. in the Ukraine. This project is related to the former ones and in fact is based upon the already acquired knowledge and experience with the implementation of similar projects. The estimated budget for this three years project is 7.318 million CZK (270 thousand USD). This project will be solely financed by the Czech Republic. The main goal of this project will be to prevent and lower out-of-control leakage of the regulated substances into the atmosphere, where they subsequently deplete the ozone layer, to support the lowering of the CFCs consumption, to train the local technical personnel and experts in fields of new cooling and refrigerating technologies, to disseminate the acquired knowledge of removal and recycling of refrigerants and finally to elaborate a reclaiming network for refrigerants in the Ukraine.

The main reason for carrying out this project in Ukraine is the fact that there is a lack of knowledge (theoretical as well as technological) and a lack of training necessary for the changeover from the currently used obsolete refrigerating technology to new types of refrigerants within the whole territory of Ukraine. The problem is also hampered by the unfavorable economical situation that delays the modification and change of the refrigerating technology and the service devices.

The output of this project will be an expansion of the service network for the reclaiming of current household and commercial refrigerating and air-conditioning devices, which work predominately on the basis of CFC technology. The training seminars for the service technicians, how to manipulate and service the refrigerating equipments and devices, will be also a part of the project output.

The Czech Hydrometeorological Institute (CHMI) is another institution that has been active within the framework of the Official Development Assistance of the Czech Republic guaranteed by the Ministry of Environment. CHMI, in co-operation with the World Meteorological Organization, provided development assistance in the form of multilateral project "Technical Assistance in the Field of Meteorology, Hydrology and Air quality" in 1997-2001, which was predominantly focused on countries in the Eastern and Southern Europe.

The project was aimed at actual environmental problems in the field of meteorology, climatology, and hydrology and air quality. In the framework of the project, different training courses were implemented with the focus on adjusting and calibration of equipment. At the same time a transfer of a climatic database system developed by CHMI was executed. The total cost reached 305 thousand USD.

Sazka Arena - The venue of the World Championship in ice hockey 2004 uses ammonia and R 134 as a coolant

A new project called "Maintenance of the Network for Monitoring of the Ozone Layer in Developing Countries" was launched in 2004. The duration of this project is foreseen until the end of 2006 with the total cost amouning to 1.52 million CZK (60 thousand USD).

Its main task is to continue in the assistance of CHMI to other meteorological institutions in developing countries and to further the development of their national programs for monitoring the ozone layer to meet the voluntary commitment of the Czech Republic responding to the request by the 6th Conference of the Parties to the Vienna Convention of November 2002 and by the World Meterorological Organization. The main output of this project is a fundamental improvement of quality of ozone observations mainly in tropical and subtropical regions that is essential for the estimation of long trends and for validation of satellite ozone observations. This year CHMI will assist following countries: Algeria, Botswana, Egypt, Kenya, Nigeria, Seychelles and South Africa.

The Czech Republic also provides the assistance by means of regular mandatory and voluntary contributions to the budgets and funds of the multilateral environmental programs and agreements. Annually these contributions amount to 3 million USD, including 0.13 million USD to the Environmental Fund of the United Nations Environment Programme (UNEP), 0.33 million USD provided to the Multilateral Fund for the Implementation of the Montreal Protocol on Substances that Deplete the Ozone Layer, 0.1 million USD to the World Meteorogical Organisation and 1 million SDR to the Global Environment Facility (GEF).

Through its bilateral contribution to the Multilateral Fund the Czech Republic supported the Regional Network for Article 5 countries in Europe/Central Asia (Albania, Armenia, Bosnia and Herzegovina, Georgia, FYR Macedonia, Moldova, Romania, Serbia and Montenegro, Kyrgyzstan and Turkey). The main objective of this network is to strengthen the capacity of National Ozone Units in the region for sustained compliance with the requirements and goals of the Montreal Protocol. By strengthening local expertise, and providing an opportunity to work together with other countries, networking activities promote the accelerated low-cost phase-out of ODS. Within the framework of the network, consultation meetings are being organized. The Czech representatives take an active part in the meetings sharing their experience with network members.

The protection of the ozone layer is one of the priorities of the Czech environmental development assistance and the Ministry of the Environment of the Czech Republic is prepared to assist other countries in complying with the requirements and targets of the Montreal Protocol.

The Association of refrigerating and air-conditioning technology

Bohuslav Špaček

The Association of cooling and air-conditioning technology is the only professional corporation of Czech and foreign companies, entrepreneurs, institutions and specialists in the field of a cooling, air-conditioning and heat-pump technology in the Czech Republic.
The association had 882 members by 30 April 2004s; thereof 11 honorary members, 82 individual members and 789 companies. It was founded in 1990 with only 42 members. The membership has incorporated practically most companies from the branch of cooling and air-conditioning technology and heat pumps in the Czech Republic. An idea of the economic importance can be seen from selected information on the turnover in the branch of the cooling technology of the 280 biggest companies that are members of our Association, which employed 5500 employees and had a turnover of 9,4 billions CZK in 2003. The turnover of all our members reached an estimated 12 – 13 billions CZK in 2003.
The membership constitutes partly individual members of all professions in the branch (e.g. designers, planners, assembling and service engineers, technicians etc.) and partly employees of companies (planning offices, assembly organizations, services enterprises, manufacturers, operators, state proving stations, universities, training schools, research institutes etc.).

For securing the proficiency of association members, the following divisions have been set up:
- *service*
- *production*
- *scientific-technical*
- *planning*
- *air-conditioning equipment*
- *heat pumps*
- *industrial cooling*

and a commission for education and training.

Among the basic activity spheres of the association belong
- *securing and providing technical and economic assistance*
- *organizing exchanges of experience*
- *improving proficiency and qualification of our members*
- *distributing regular information in the form of periodicals*
- *publication activities*
- *participating in the drafting of legislation, which regards the interests of the members*
- *issuing address-books of entrepreneurs and organizations that are active in the field*
- *influencing standardization throughout the Technical Standardization Commission*
- *providing consultation and viewpoints*
- *participating in all areas of recycling, regenerating and substituting of cooling agents*
- *securing information on foreign products and technologies*
- *training repairmen that are registered with the Association.*

This broad engagement of the Association activities with accentuation on the information and education mission enables the Association to influence in advance the technical development, construction and production of manufacturing enterprises and, of course, also the readiness of the service technicians for the new technologies.

We regard the realization of the obligations in the sphere of the air protection resulting from the requirements of the Montreal Protocol and also the Kyoto Protocol as one of the most important tasks in the near future.

Most activities for the securing of the obligations of the Czech Republic in the area of the cooling technology is carried out either directly members or in a close cooperation with the Association.

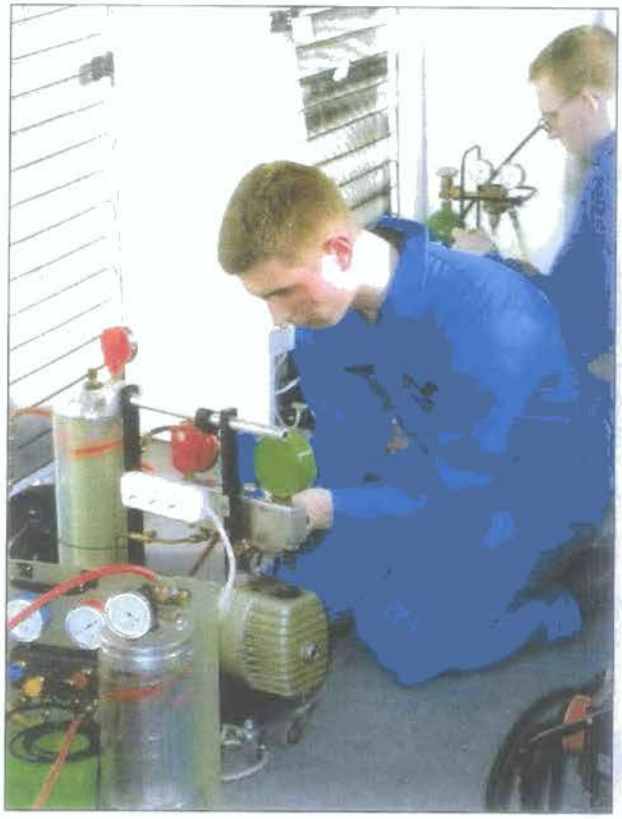
The association members have elaborated and implemented, in cooperation with the World Bank, in addition to other projects the only project for the introduction of a system for recycling and regenerating "R-12" in the Czech Republic since 1992. The Association was responsible for solving a partial task of that project called: "The scheme of training and examination of workers in the field of cooling and air-conditioning technology participating in the transition to the new cooling agents". The result was a formation of approx. 850 trained repairmen, who received so called "Green cards" as a certificate of their professional qualification. Nowadays these specialists take part at their own expense or with a contribution of the Association in regular prequalification trainings and verification of their

professional eligibilities for manipulation of controlled agents. Whereas the first courses of the training were focused on the problems of the protection of the Earth's ozone layer, the next stage that started in 2002 nowadays focuses on the training for the implementation of the obligations which will result from the adoption of the Kyoto Protocol.

A broader view of the acceptability of the individual coolants in particular systems from the point of view of the protection against the greenhouse effect which can be obtained through the TEWI factor, directs us into the area of the increasing energetic efficiency of cooling equipment and optimization of single components of the cooling circuits. This attitude is also reflected in the production enterprises, where the companies have focused on the achievement of outstanding energetic parameters within the framework of the needed capacity and temperature ranges through fully ecologic coolants starting from the simple condensation units up to the multi-compressor machines with complicated and sophisticated control systems. For instance, the company Tesco, which runs a chain of supermarkets, uses a cooling technology of one of our members with conjugated compact condensation units and with modern control, regulating and monitoring systems, enabling an optimal ecological and economical operation of refrigeration and freezing distribution devices and refrigerating and freezing units owing to the a special construction within the framework of its own technical development as well as the utilization of components from renowned manufacturers together with a number of successful applications.

These days we have practically solved the question of how to cease the service of systems based on the CFC coolants;

The cooling facility in Sazka Arena



The training of a repairman

starting with the training of the service network over the corresponding technological processes and instrumentations up to the questions regarding the substitution of the coolants and systems for a disposal of equipment based on CFC agents. These were pulled out of operation, as well as the CFC agents itself. We are similarly preparing the professional public for the regulation of HCFC agents, which were already abandoned by the responsible manufacturers who put in place the new ecological coolants. In advance we are also trying to address the questions resulting from the use of natural coolants (either the classic ones e.g. ammonia and hydrocarbons or even the rediscovered ones such as CO_2).

Our target is that the members of our Association are well prepared for all existing and newly formulated tasks, which will go hand in hand with the new requirements for the environmental protection stemming from the adoption of Montreal, Kyoto or other Protocols.

EKOTEZ®

ESTO Cheb s.r.o.

CHKT

THE 16TH MEETING OF THE PARTIES TO THE MONTREAL PROTOCOL ON SUBSTANCES THAT DEPLETE THE OZONE LAYER

The Czech Republic and the Protection of the Ozone Layer
A special edition on the occasion of the 16th Meeting of the Parties
to the Montreal Protocol on Substances that Deplete the Ozone Layer

Published by Ministry of the Environment of the Czech Republic,
Vršovická 65, CZ 100 10 Prague 10

Authors of the text:
Hana Čermáková, Jiří Dobiášovský, Karel Ettler, Jiří Hlaváček, Michal Janouch,
Jan Jelínek, Bohuslav Špaček, Karel Vaníček

Photographs:
Archives of the Ministry of the Environment the Czech Republic,
the Czech Hydrometeorological Institute and the Association of Refrigerating
and Air-conditioning Technology

Editor: Jiří Hlaváček
Printed and bounced by: Computer design studio, Prague
First edition, Prague 2004, Number of copies: 1, 500
ISBN: 80-7212-311-4,