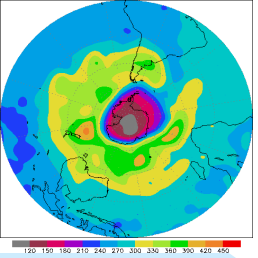

The Ozone Story

Presentation

Ozone Secretariat

UNEP

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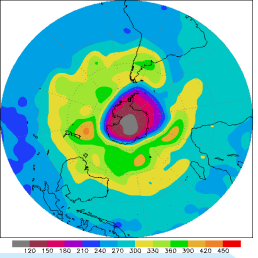
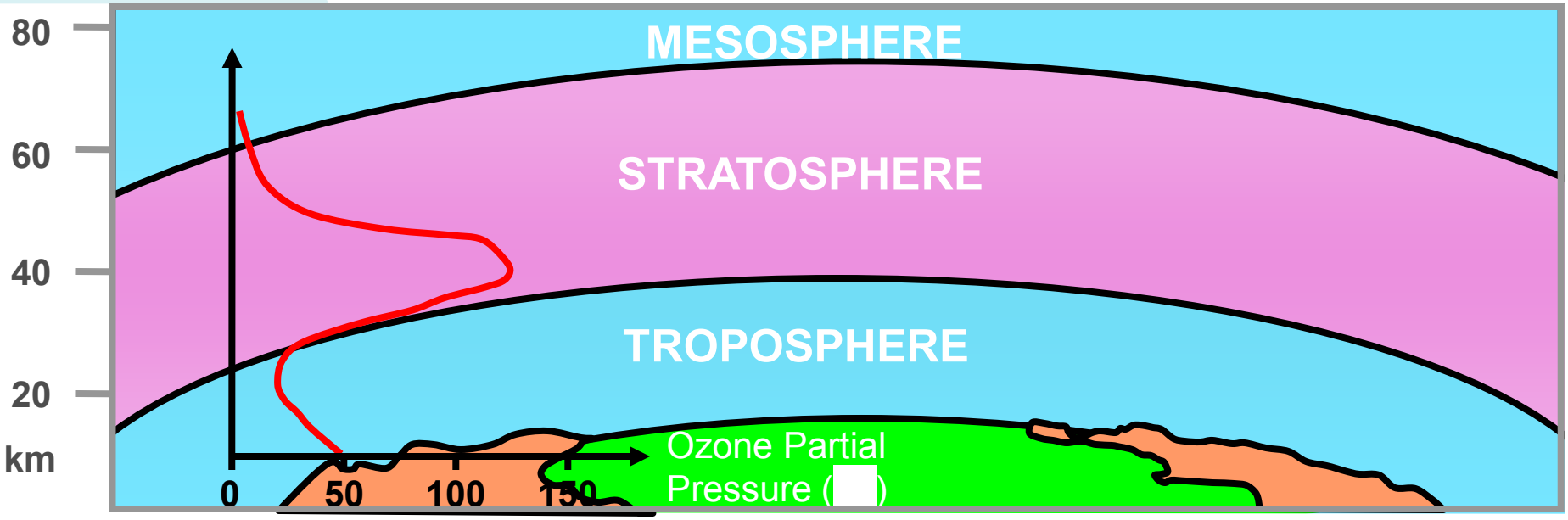


Ozone Distribution in the Atmosphere



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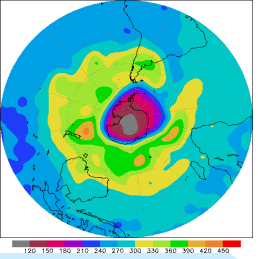

Scientific Background I
History

1839:	Ozone discovered by C. F. Schönbein when observing electrical discharges.
1850s:	Ozone shown to be a natural atmospheric constituent.
1880:	Experiments show that Ozone strongly absorbs Solar Ultraviolet (UV) radiation.
1913:	Proof that most of the atmosphere's ozone is located in the stratosphere.
1920:	G. M. B. Dobson (an Oxford Scientist) perfected an instrument to monitor quantitatively total atmospheric ozone.

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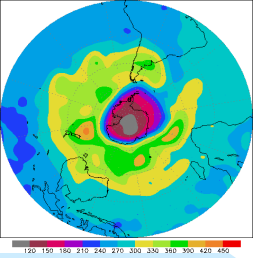

Scientific Background II
The Current Science

- The global Ozone layer recovery has been linked mainly to decreasing Chlorine and Bromine loading, but other factors such as the role of Green house gases and climate change are likely to contribute.
- Total Combined effective abundance of Ozone depleting compounds in the lower atmosphere peaked in 1992-1994 and since then it has been declining slowly.
- The abundance of HCFCs in the lower atmosphere is increasing.
- Chlorine abundance in the stratosphere is at or near its peak but Bromine abundance seems to be still increasing.

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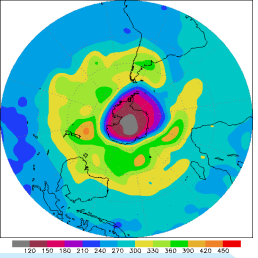

Scientific Background II
The Current Science (continued.)

- The ozone depletion in the Antarctic, the Arctic and the mid-latitudes is still continuing, due to past emissions of CFCs. It will peak in the next few years.
- The Montreal Protocol is working and Ozone depletion from the Protocol's controlled substances is expected to start recovering within the next decade or so.
- Even with full compliance of the Montreal Protocol, the Ozone layer will remain particularly vulnerable for the next decade or so. Failure to comply with the Montreal Protocol will delay or even prevent the recovery of the Ozone layer.

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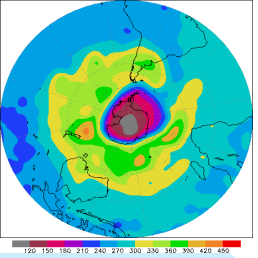

Why Protect the Ozone Layer?

- Ozone Depletion leads to excessive UV-B radiation.
- Excessive UV-B radiation leads to:
  - More skin cancers and eye cataracts.
  - Less productivity of plants.
  - Loss of immunity to diseases.
  - Adverse effects on plastics.

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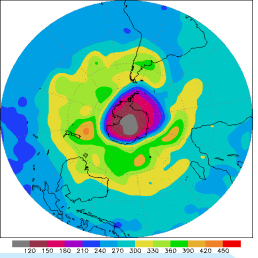

CFCs: Ozone Depleting Substances

1928: CFCs invented;

1950-70s: Consumption and use of CFCs rises rapidly during the 50s-70s period. Used in Aerosols, Refrigeration, Air Conditioning and Manufacturing of Foams.

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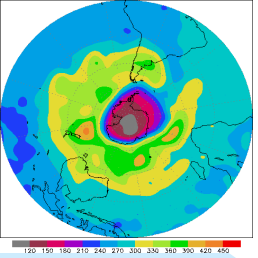

Scientific Activity on Ozone

1971: CFCs measured in the atmosphere.

1974: Rowland and Molina link CFCs with Ozone Depletion.

1977: Plan of Action on Ozone Layer established by UNEP in collaboration with WMO. UNEP sets up Co-ordinating Committee on Ozone Layer (CCOL).

1985: Findings on "The Ozone Hole" over the Antarctic (during spring) published by the British Antarctic Survey.

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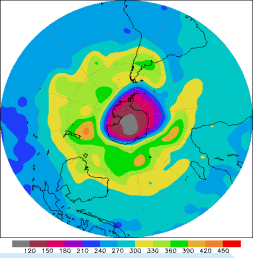
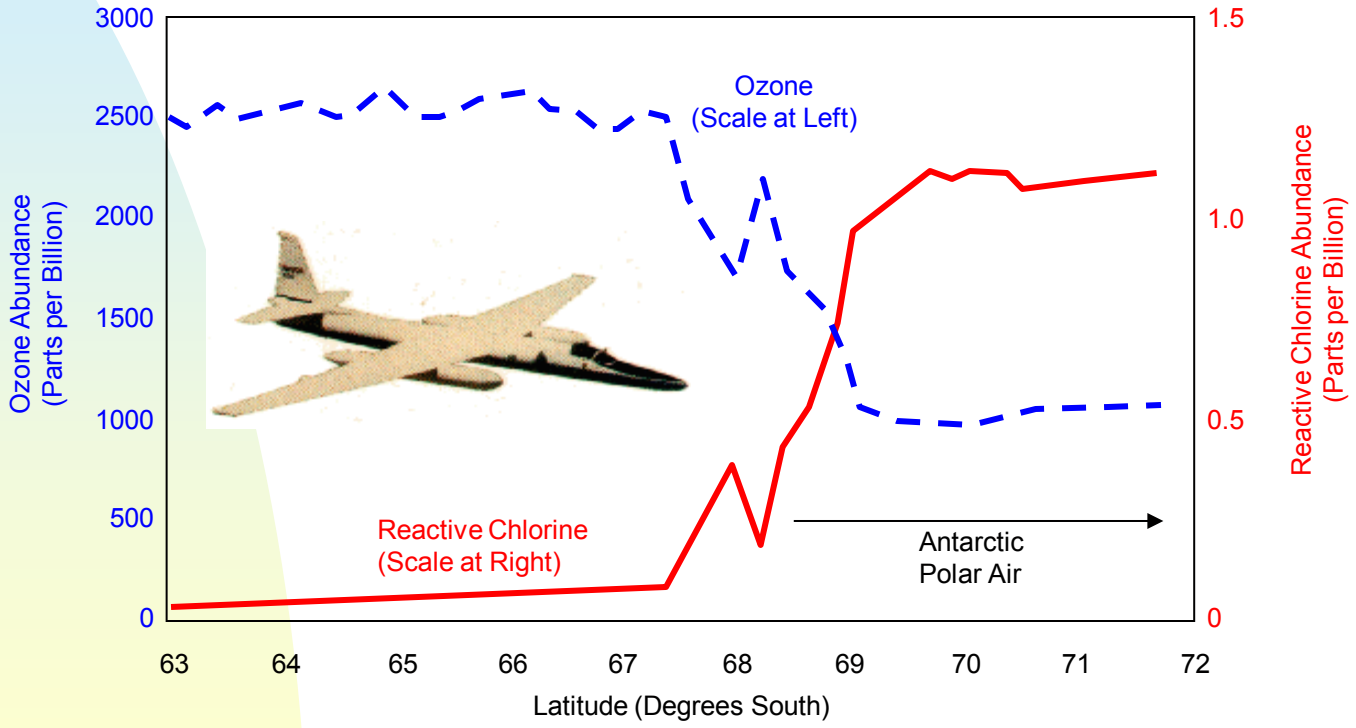


Measurements of Ozone and Reactive Chlorine from a Flight Into the Antarctic Ozone Hole, 1987 (Smoking gun..)



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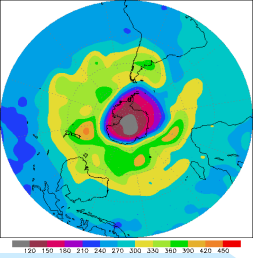

Scientific Activity on Ozone
(continued.)

1985: First Scientific Assessment of Stratospheric Ozone.

1987: Observations prove that the more the Chlorine in the Atmosphere, the less the amount of Ozone.

1989: Scientific Assessment of Stratospheric Ozone under the Vienna Convention and Montreal Protocol

1991: Scientific Assessment of Ozone Depletion under the Vienna Convention and Montreal Protocol.

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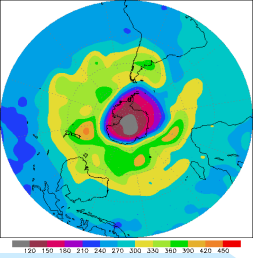

Scientific Activity on Ozone
(continued.)

1994: Scientific Assessment of Ozone Depletion under the Vienna Convention and Montreal Protocol.

1995: Nobel prize received by 3 scientists (Crutzen, Molina and Rowland) for pioneering the research on Ozone Depletion.

1998: Scientific Assessment of Ozone Depletion under the Vienna Convention and Montreal Protocol.

2002: Scientific Assessment of Ozone Depletion under the Vienna Convention and Montreal Protocol.

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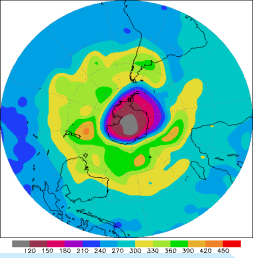

International Commitments

1985: Vienna Convention for the Protection of the Ozone Layer calls for voluntary measures to reduce emissions of ozone-depleting substances (ODS).

1987: Montreal Protocol on Substances that Deplete the Ozone Layer establishes a schedule to reduce the production and consumption of CFCs and Halons.

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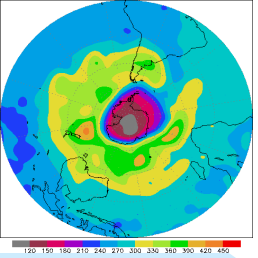

International Commitments
(continued.)

1990,92,95,97,99:

At meetings in London, Copenhagen, Vienna, Montreal and Beijing Parties approve adjustments and/or amendments to the Montreal Protocol to stipulate/accelerate the phase-out schedules and add additional ozone-depleting substances to the list.

1994: production and consumption of Halons by developed countries is stopped except for essential uses.

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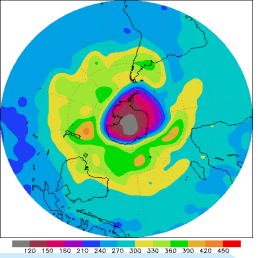

International Commitments

(continued.)

1995: The phase-out schedule of all ozone depleting substances applicable to developing parties is agreed by the parties with a ten-year grace period.

1996: Production and consumption of CFCs , carbon tetrachloride and methyl chloroform by developed countries stopped except for essential uses while consumption of HBFCs stopped for all parties

1997: A system for licensing the import and export of all ozone depleting substances becomes mandatory to all parties to the Montreal Protocol in order to control illegal trade.

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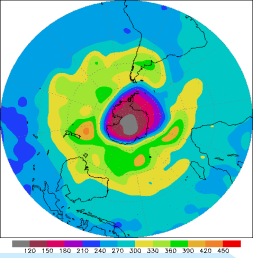
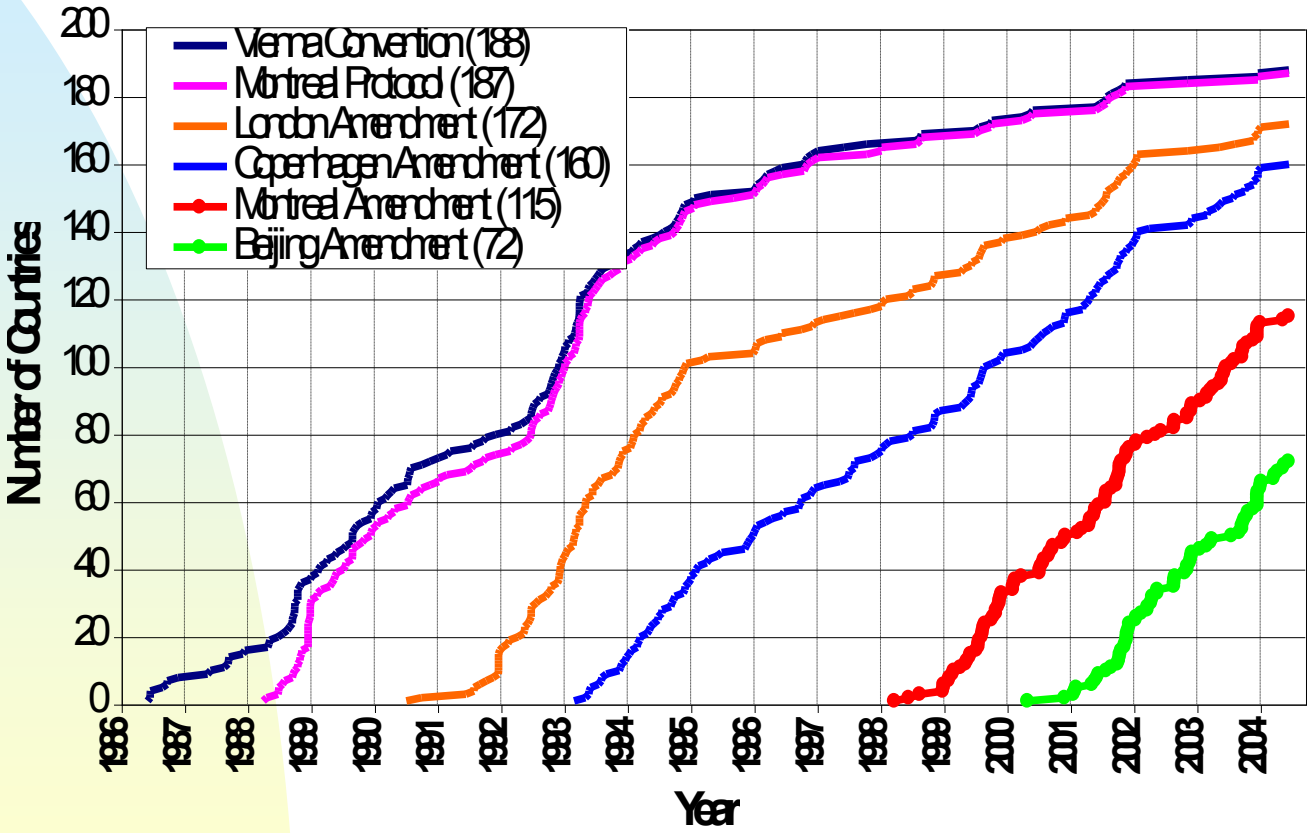


Ozone Protocol and Amendments Ratification Status

(Information sent to the Ozone Secretariat by the Depositary, UN Office of Legal Affairs, June, 2004)



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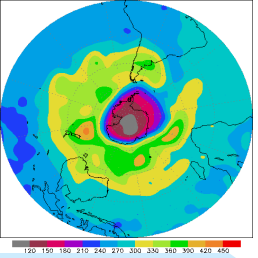

Ratification of the Montreal Protocol

(June 2004)

Countries that have NOT ratified the Montreal Protocol

Bhutan
Equatorial Guinea
Eritrea
Iraq
Andorra
Holy Sea
San Marino
Leste Timor

Countries that have NOT Ratified the Montreal Protocol (8Countries)

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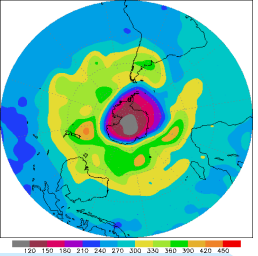
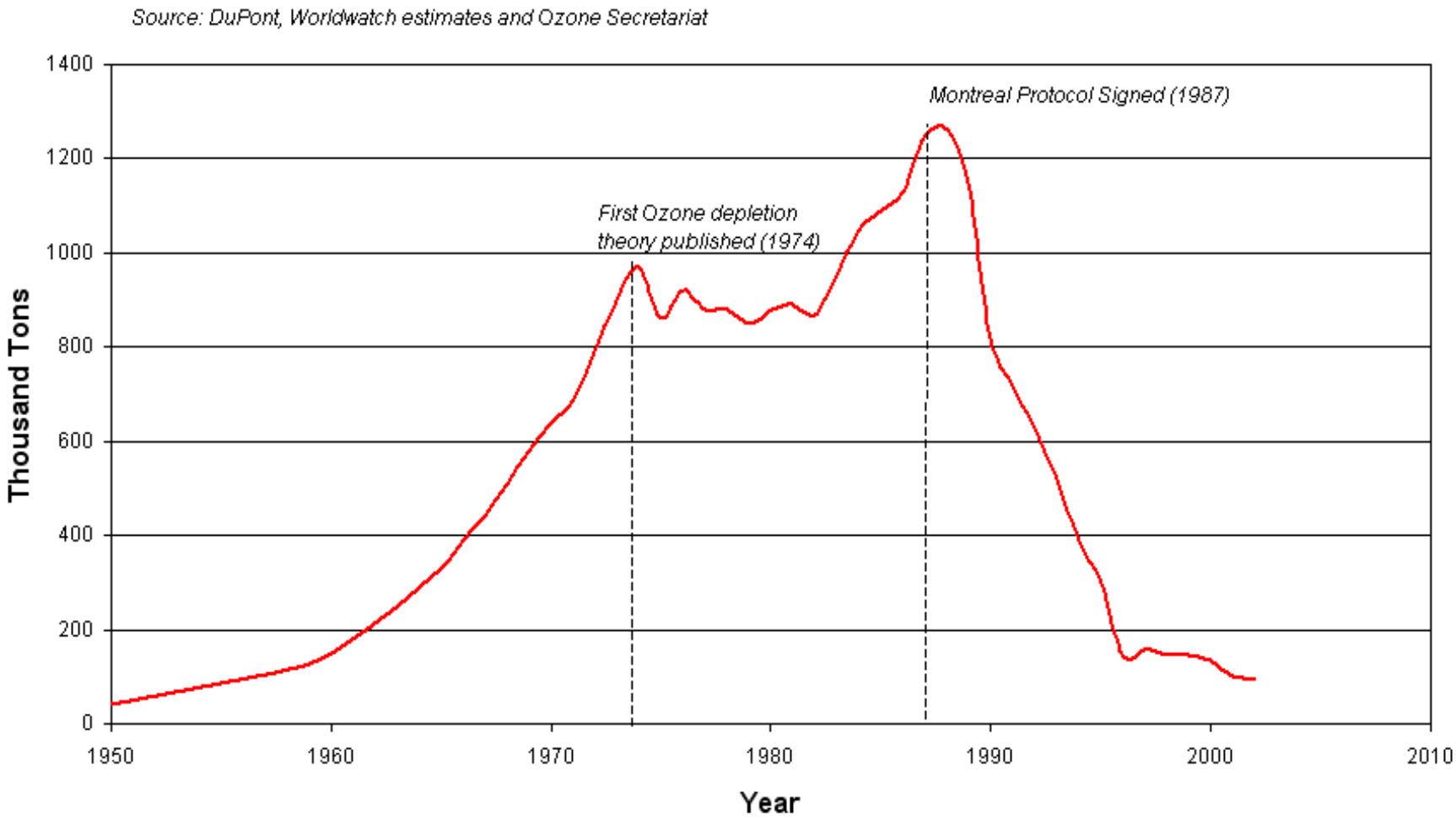


World CFC Production 1950 - 2002



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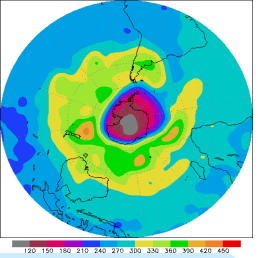

Financial Mechanism - The Multilateral Fund of the Montreal Protocol

1991: The Multilateral Fund established, with UNDP, UNEP, UNIDO and World Bank as the implementing agencies, to provide financial and technical assistance to developing countries (Article 5) to enable them comply with the control measures.

- The Multilateral Fund of the Protocol has been very successful. It has, between 1991 - 2004 disbursed close to $1.6 billion to more than 100 developing countries to phase-out more than half of their CFC consumption. It will continue assistance till the phase-out is completed.

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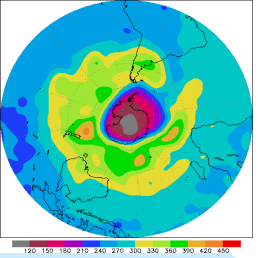

Replenishments of the Multilateral Fund of the Montreal Protocol since 1990

No.	Years covered	Amount	Cumulative	Year/ Venue
		millions US$		
1*	1991-1993	200	200	1991/Nairobi
2	1994-1996	455	655	1993/Bangkok
3	1997-1999	466	1,121	1996/Costa Rica
4	2000-2002	440	1,561	1999/Beijing
5	2003-2005	474	2,035	2002/Rome

*** In 1990, the Parties in Decision II/8 established on an interim basis a Fund of US$160,000,000 which was increased in 1991 to US$200,000,000**

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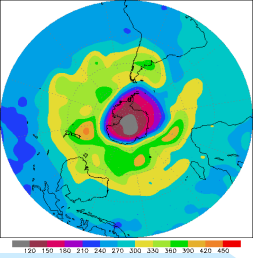
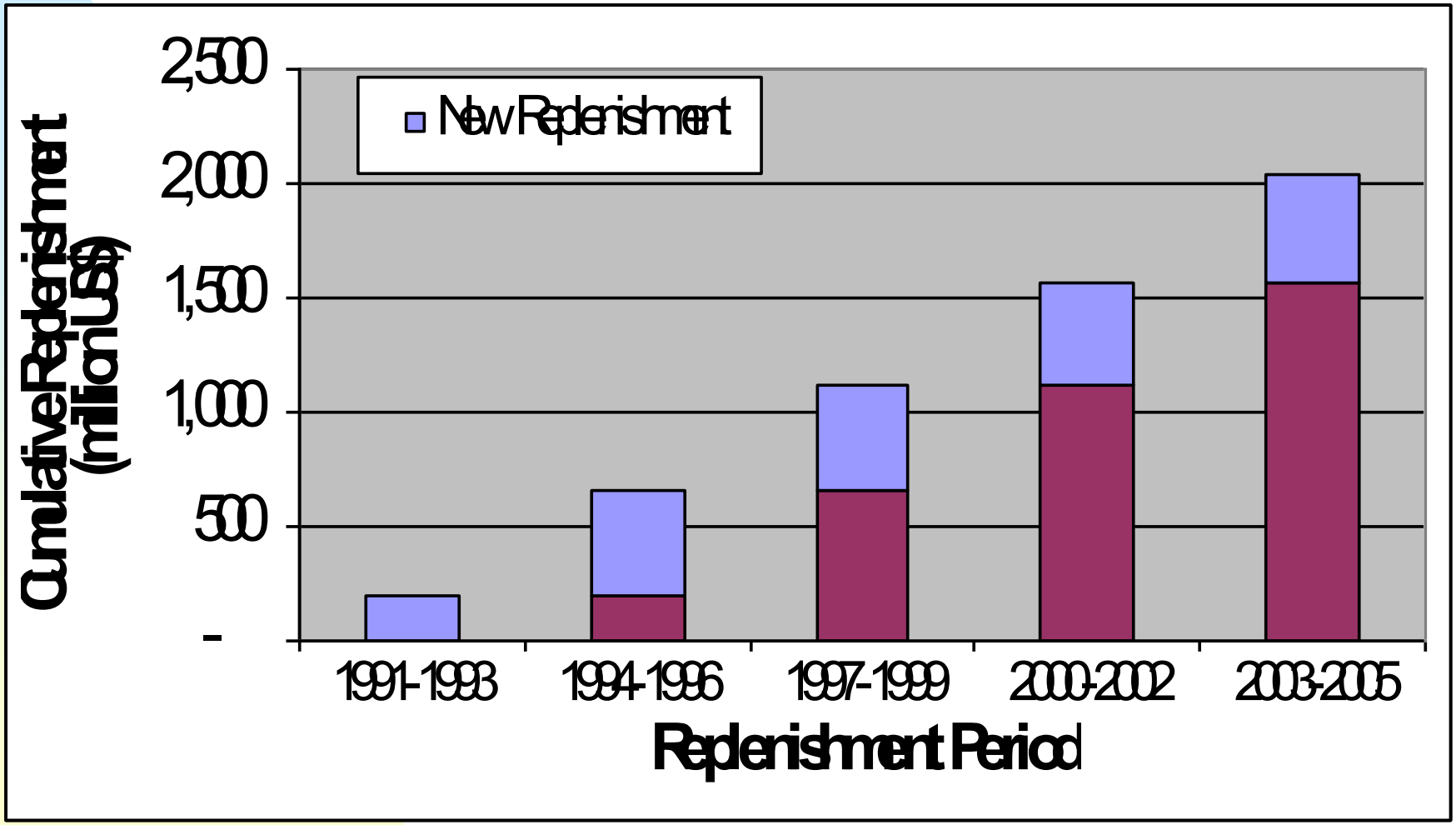


Cumulative Replenishments of the Multilateral Fund of the Montreal Protocol



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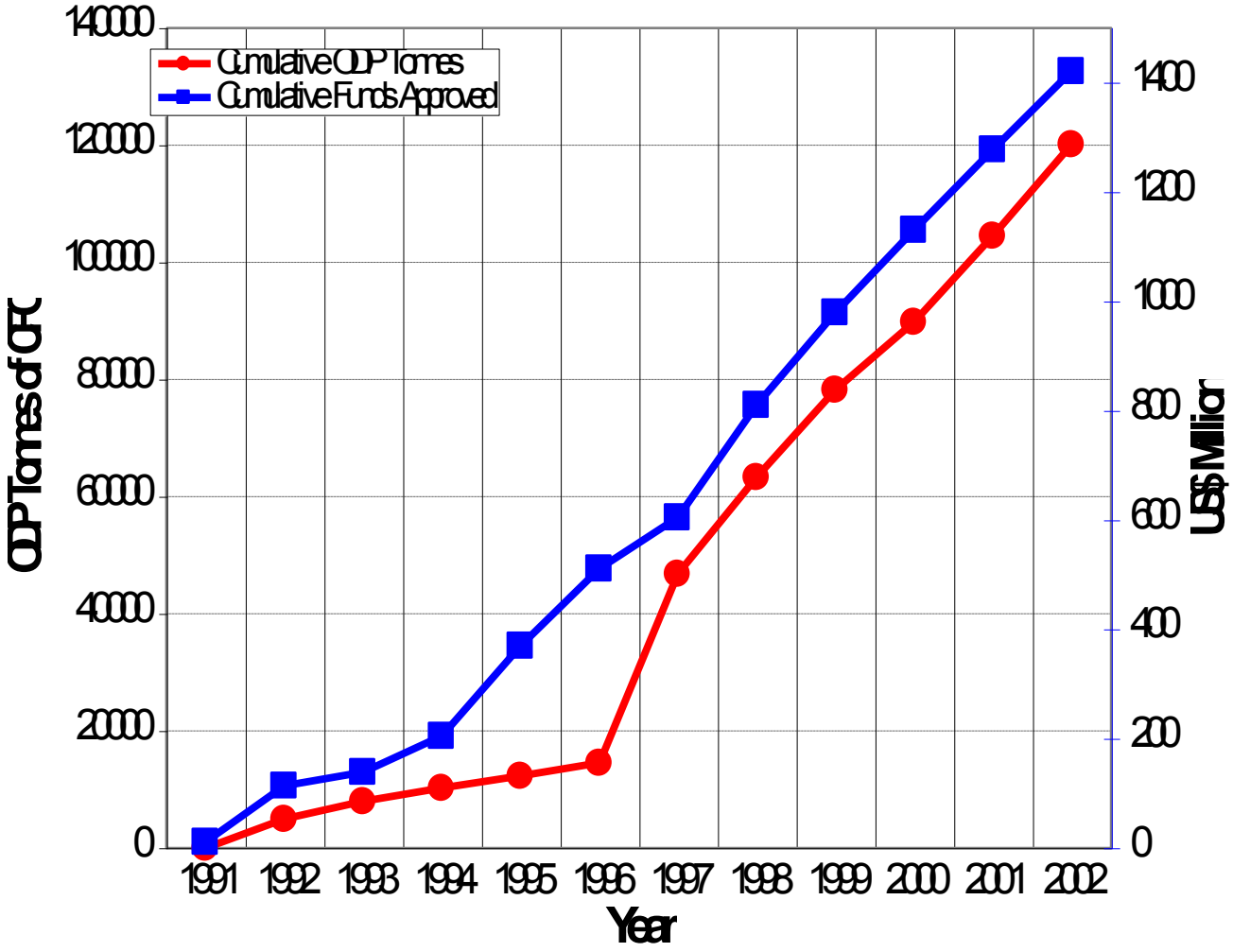
Cumulative Allocations and Provisions by the MLF and ODS Phased Out Since 1991

(Source: MLF Executive Meetings Reports)



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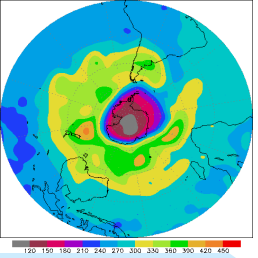

Funds Allocated to the Implementing Agencies by the Multilateral Fund of the Montreal Protocol (as at June 2004)

Agency	US$ million
1. UNEP	84.46
(Information clearing house, preparation of country programmes, institutional strengthening, networking and training)	
2. UNDP *(Technical assistance and Investment projects)*	452.47
3. UNIDO *(Investment projects)*	371.1
4. World Bank *(Investment projects)*	690.74
Total	1,598.77

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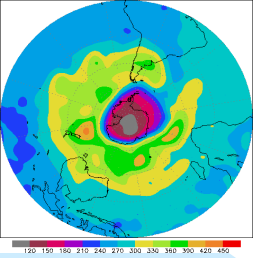

Countries with Economies in Transition (CEIT Countries)

- The Global Environment Facility (GEF) assisted the Russian Federation and other Eastern and Central Europe countries (CEITs) to implement the Montreal Protocol.
- Russian Federation phased out its CFC and Halon production and consumption in 2001.
- GEF approved over US$ 160 million to 18 countries.
- The countries that have been assisted: Armenia, Azerbaijan, Belarus, Bulgaria, Czech Republic, Estonia, Hungary, Kazakhstan, Latvia, Lithuania, Poland, Russian Federation, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

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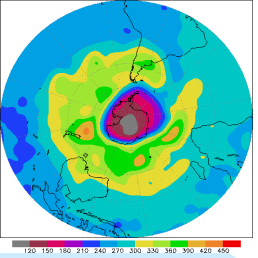

CEIT Countries (continued.)

- With support from GEF, consumption of CFCs in these countries has decreased from 146,000 tonnes in 1986 to about 630 tonnes in 2002. These countries have thus almost completed their phase-out of Annex A and B substances as provided by the Montreal Protocol.
- Additional funds of US$ 60 million ear-marked by GEF to CEIT countries for HCFC and Methyl Bromide phase-out.

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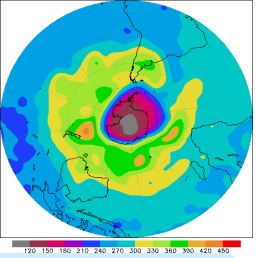

Achievements

- Global Production of CFCs and Halons fell by over one million tonnes (by 92%) between 1986 and 2002.
- Global Consumption fell in the same period by the same margin (92%)
- Atmospheric Concentration of Chlorine peaked in 1994 and is now declining.
- Millions of cases of Eye Cataracts and Skin Cancer averted
- Recovery of the Ozone Layer expected by the year 2050, if the Protocol is fully implemented by all Parties.

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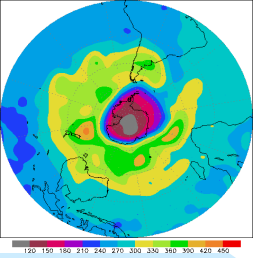
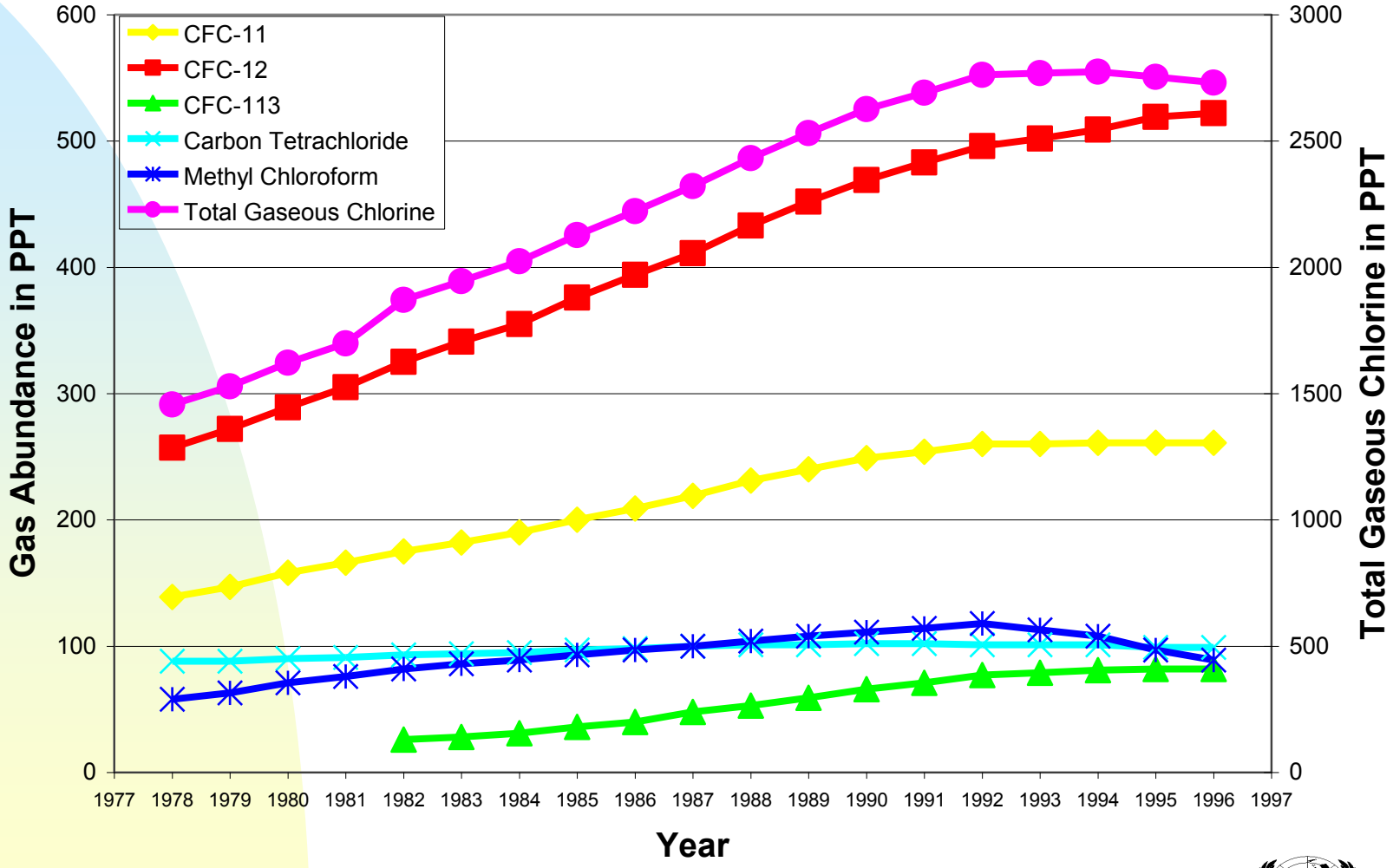


(Source: World Resource 1998-1999, WRI)



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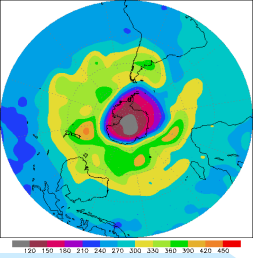
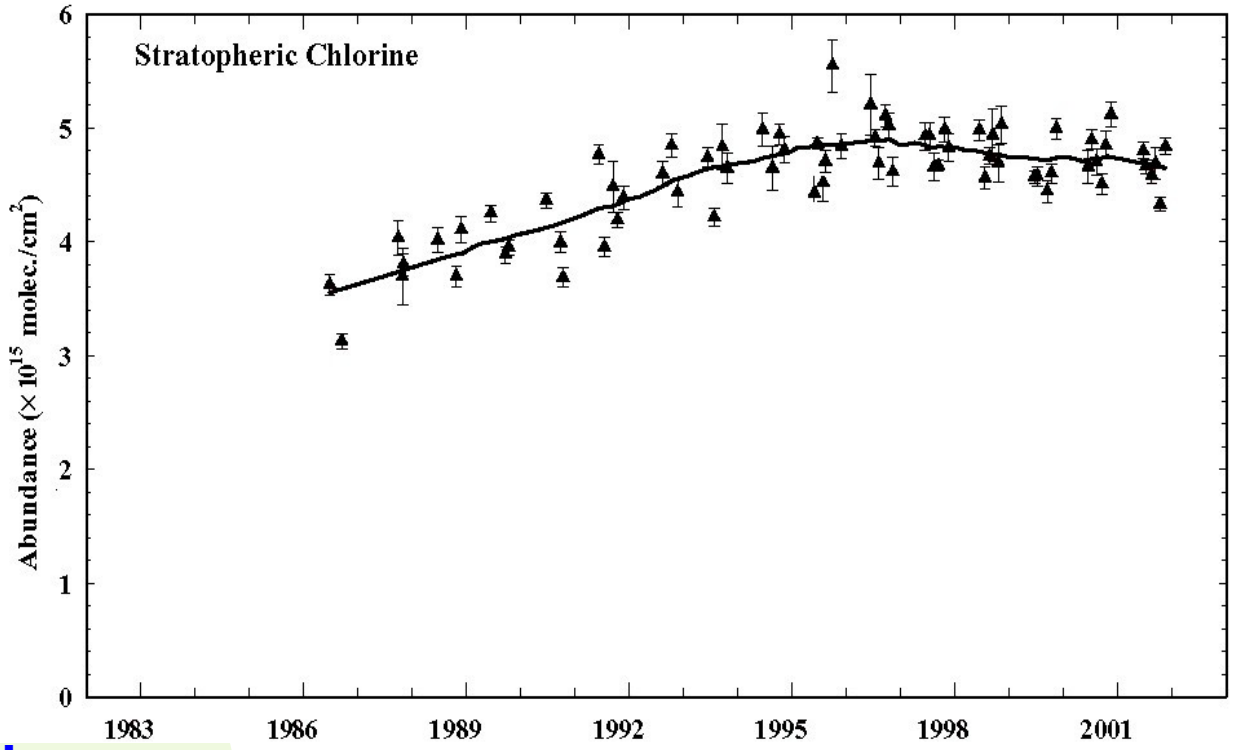


Total Chlorine Abundance in the Stratophere

Source: 2002 assessment of the Science Assessment Panel



Comments

- **Total chlorine abundance in the Stratophere is at or near its peak.**
- **Total chlorine and bromide abundance in the lower atmosphere peaked in 1992-1994 and continues to decline.**
- **Largely consistent with reported production of ODSs, CFC-11 abundance is near its peak, abundance of CTC and MCF is dropping but abundance of HCFC and halons is still increasing**

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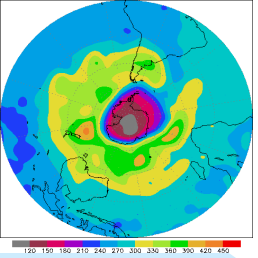
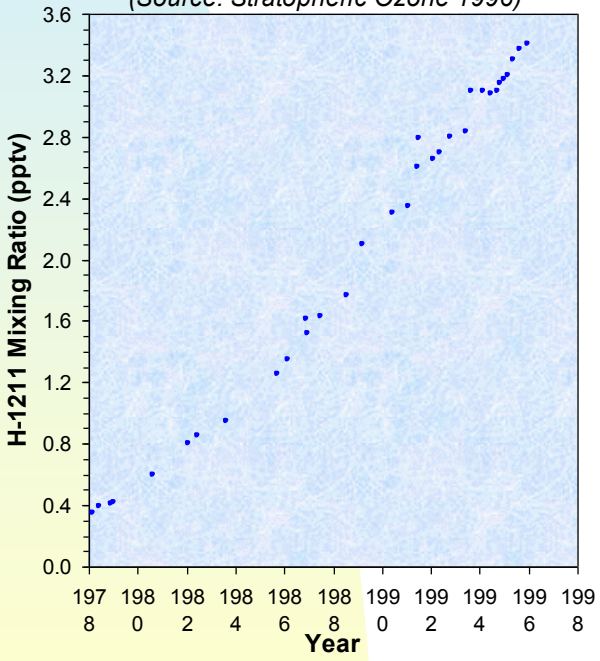


Halons in the Atmosphere

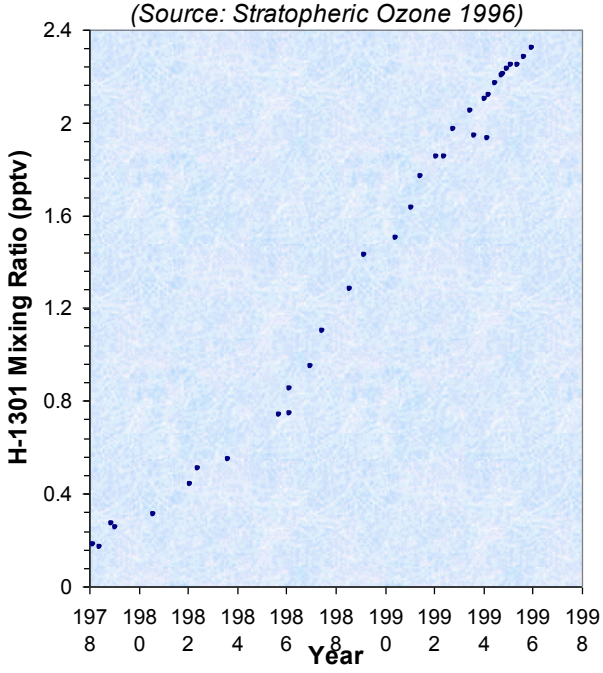
Measured Atmospheric Concentrations of Halon-1211 at Cape Grim, Tasmania

(Source: Stratopheric Ozone 1996)



Measured Atmospheric Concentrations of Halon-1301 at Cape Grim, Tasmania

(Source: Stratopheric Ozone 1996)



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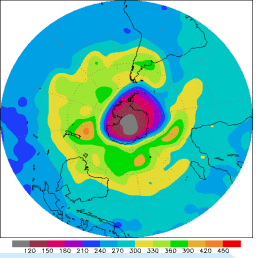

If there was no Protocol, ...

- The ozone depletion by the year 2050 would have been at least 50% in the mid latitudes in the northern half of the earth, 70% in the mid latitudes of the south, about 10 times larger than today. The UV-B radiation would have doubled in the north and quadrupled in the south in the same places. The ozone depleting chemicals in the atmosphere would have been 5 times higher.
- The implications of this increase would have been horrendous - 19 million more cases of non-melanoma cancer, 1.5 million cases of melanoma cancer, 130 million more cases of eye cataracts.

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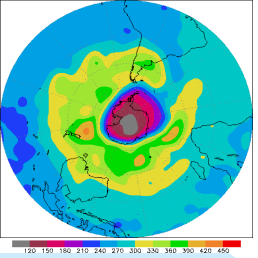
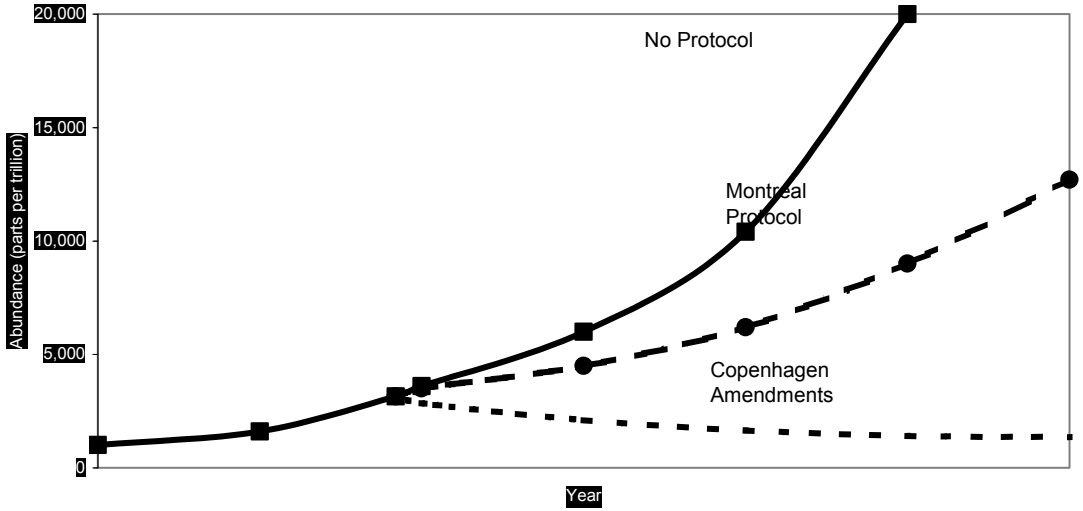
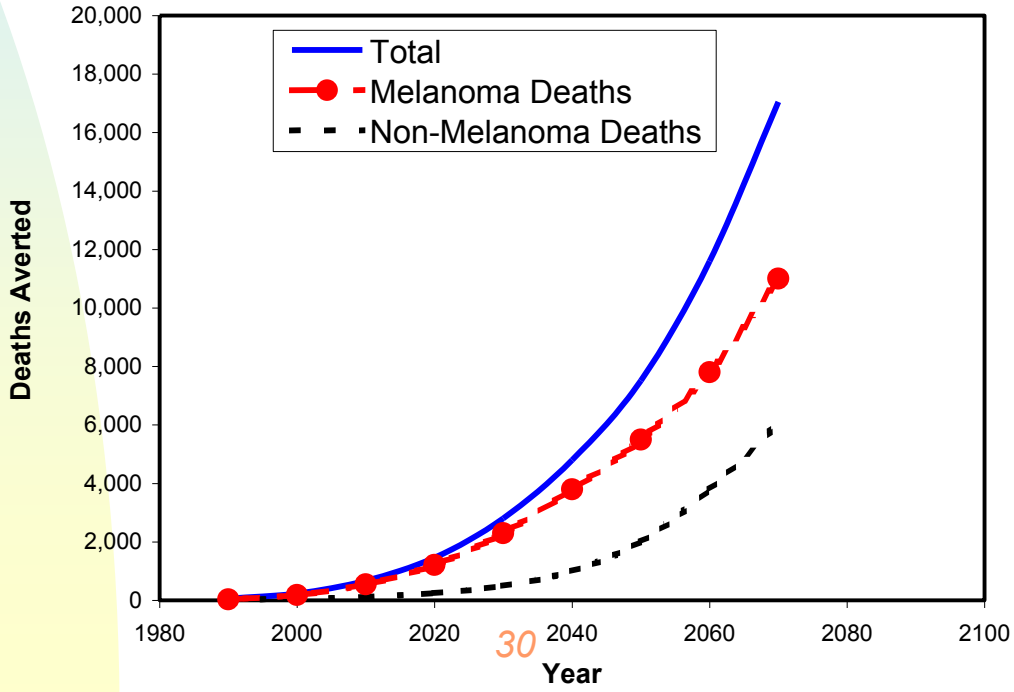


Larger Ozone Losses Avoided
Ozone-Damaging Stratospheric Chlorine/Bromine





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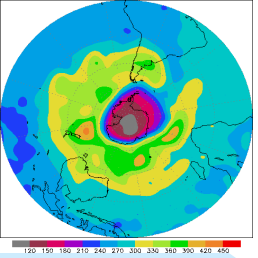

Challenges

- Many Parties are yet to ratify the Amendments to the Montreal Protocol.
- Meeting the control measures for production and consumption of CFCs in the developing countries:

1. The developing countries began their phase-out of ODSs with a freeze on CFCs from 1 July 1999, and a freeze from 1 January 2002 on Halons and Methyl Bromide.
2. In 2005, a 50% reduction in CFCs and Halons, and a 20% reduction in Methyl Bromide, is required.

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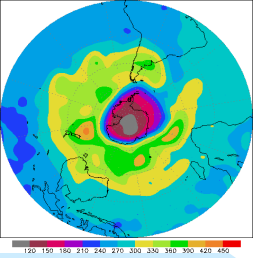

Challenges
(continued.)

- Meeting the control measure of complete phase- out of Methyl Bromide in the industrialised countries in 2005 and minimzing the quantities of Methyl Bromide used in those countries through Critical Use Exemptions.
- Flow of illegal CFCs to the industrialised countries is of concern. Developing countries are concerned about increasing flow to their countries of CFC-containing products, for example refrigerators, from countries, which have adopted Ozone-safe products. This will increase the demand for CFCs for maintenance of these products in developing countries implementation of ODS licensing system could check this problem.
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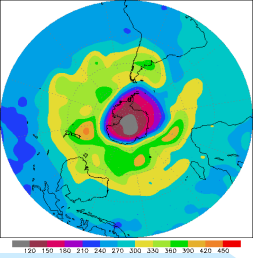

Challenges
(continued.)

- Global warming could increase ozone depletion. Also, HFCs, used as alternatives for CFCs in some applications, have global warming potential and are controlled by the Kyoto Protocol. These inter-connections need to be studied.
- Phase out of essential uses of CFC for MDIs and of critical uses of Methyl Bromide in Non-Article 5 parties

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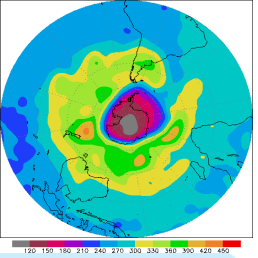
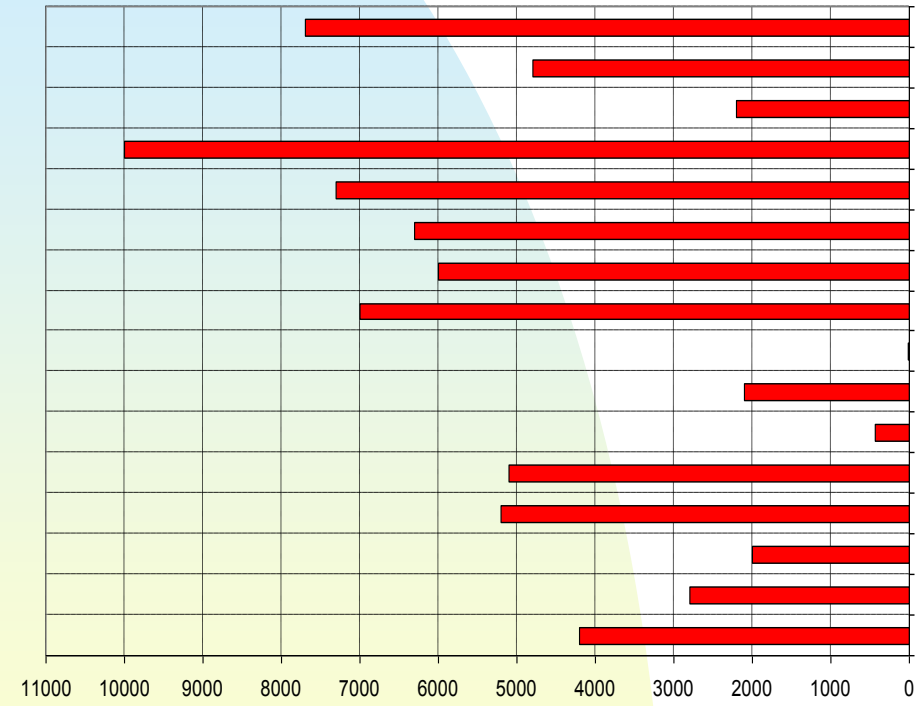
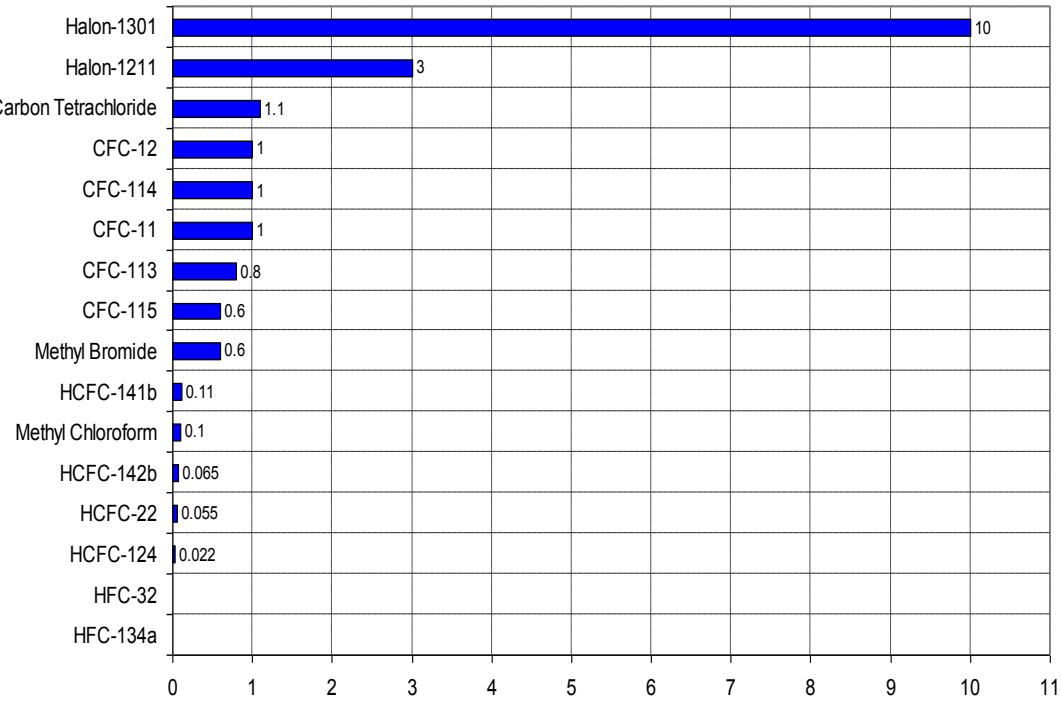


Global Warming Potential of some Ozone Depleting Substances and Alternatives



Global Worming Potential (20 Year, CO2 = 1)

(Source: Scientific Assessment of Ozone Depletion)



Ozone Depletion Potential (CFC-11 = 1)

(Source: The Montreal Protocol)

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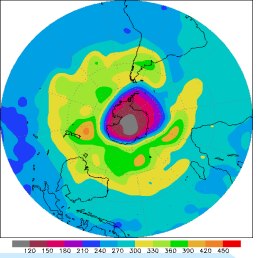

Key Decisions

- **Decision XI/9** on control of export of products and equipment whose continuing functioning relies on Annex A and Annex B substances.

- The decision recommends each Party to adopt legislative and legislative measures, including labelling of products and equipment, to regulate the export and import, as appropriate, of products, equipment, components and technology whose continuing functioning relies on substances in Annex A and annex B of the Montreal Protocol..

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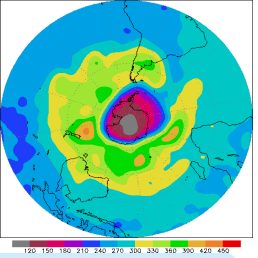

Key Decisions
(continued.)

- **Decision X/9** on establishment of a list of countries that do not manufacture for domestic use and do not wish to import products and equipment whose continuing functioning relies on Annex A and Annex B substances.

- On a voluntary basis, the decision invites Parties that do not manufacture for domestic use, products and equipment listed in the decision and do not permit the importation of such products and equipment from any source, to inform the Secretariat, that they do not wish to receive imports of such products and equipment.

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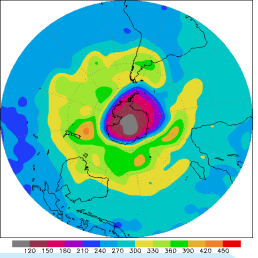

Key Decisions (continued.)

- The Secretariat maintains a list of such Parties which is updated and distributed to Parties on annual basis.

- **Decision XIV/7** on monitoring of trade in ozone-depleting substances and prevention of illegal trade in ODS. The decision, inter alia, invites Parties to report to the Ozone Secretariat fully proved cases of illegal trade in ODS to facilitate exchange of information. Such information received from the Parties will be disseminated periodically by the Secretariat to all Parties.

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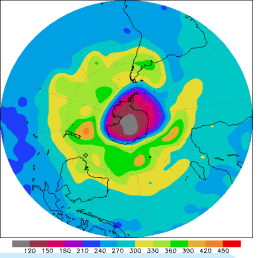

Licensing System

Article 4B (Licensing) of the Protocol

- Each Party is required to introduce a licensing system for import and export of ozone-depleting substances effective 1 January 2000 and report to the Secretariat on the establishment and operation of such a system within three months.

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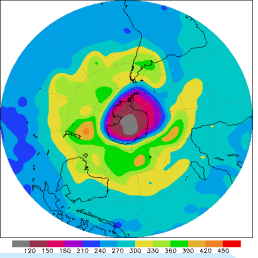

Compliance

- The effective implementation of the Montreal Protocol and the considerable achievement in phasing out ozone-depleting substances owes a great deal to:

  (a) Effective monitoring of compliance through the non-compliance procedure by the Implementation Committee and the Parties to the Montreal Protocol.

  (b) The financial mechanism of the Montreal Protocol through the Multilateral Fund as well as the Global Environmental Facility.

  (c) The Secretariat's monitoring of information reporting, follow up action and appropriate recommendations for measures to be taken by the Parties.

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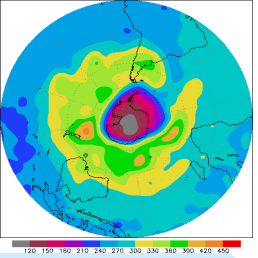

Developing Countries

- In 1986, the share of developing countries in the total production of CFCs was 5.2%. In 2002, it is 72%. For Halons it was 5.7% in 1986 while it is 100% now.

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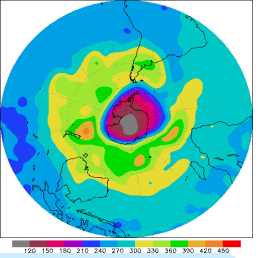

Lessons of the Montreal Protocol

- Precautionary principle
- Sustainable development
- Integration of science with policy
- Recognition of the special situation, of the developing countries
- Need for international cooperation to solve transboundary environmental problems
- Common but differentiated responsibility among parties
- Flexibility to take into account scientific and technological developments over time.

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