



WELCOME

TOPIC:

OZONE LAYER DEPLETION

Dr. Sanjoy Deka

A stylized, teal-colored silhouette of a mountain range is located in the bottom right corner of the slide, partially overlapping the dark blue background.

POINTS TO BE COVERED

- (a) Introduction
- (b) Measurement of Ozone
- (c) How is ozone getting depleted?
- (d) Formation and destruction of ozone
- (e) What are ODS?
 - (i) Ozone hole

What is Ozone ? How is it formed?



Ozone depletion?



Measurement of Ozone

- Dobson units: 1 ppb ozone
- Survey began in 1957 over the Antarctic
- Taken in October, springtime
- 1957-1970: 300 DU
- 150 DU by 1986

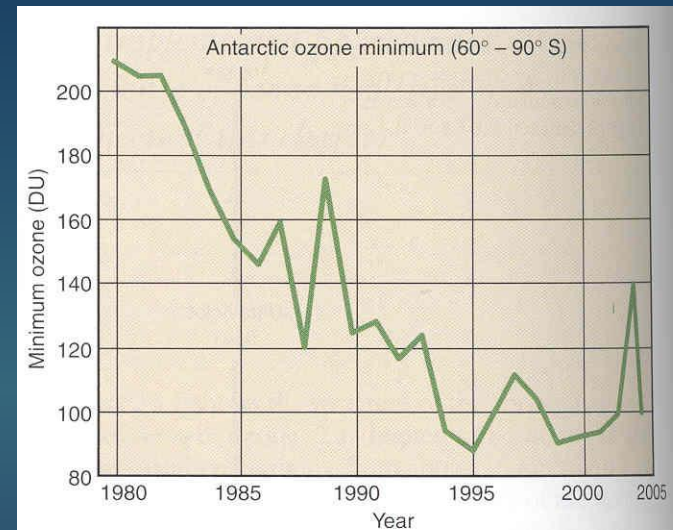



Figure 25.4 • Average Antarctic minimum ozone concentration, 1980 to 2003. Values in the 1970s were about 300 DU. Modified from NASA 2003. Antarctic ozone hole accessed 3/24/04 at http://jwoky.gsfc.nasa.gov/multi/min_ozone.gif.

How is ozone getting depleted?



ODS (Ozone Depleting Substances)

- CFCs
 - HCFCs
 - Methyl bromide
 - Halons
 - Methyl chloroform
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Formation and destruction of ozone

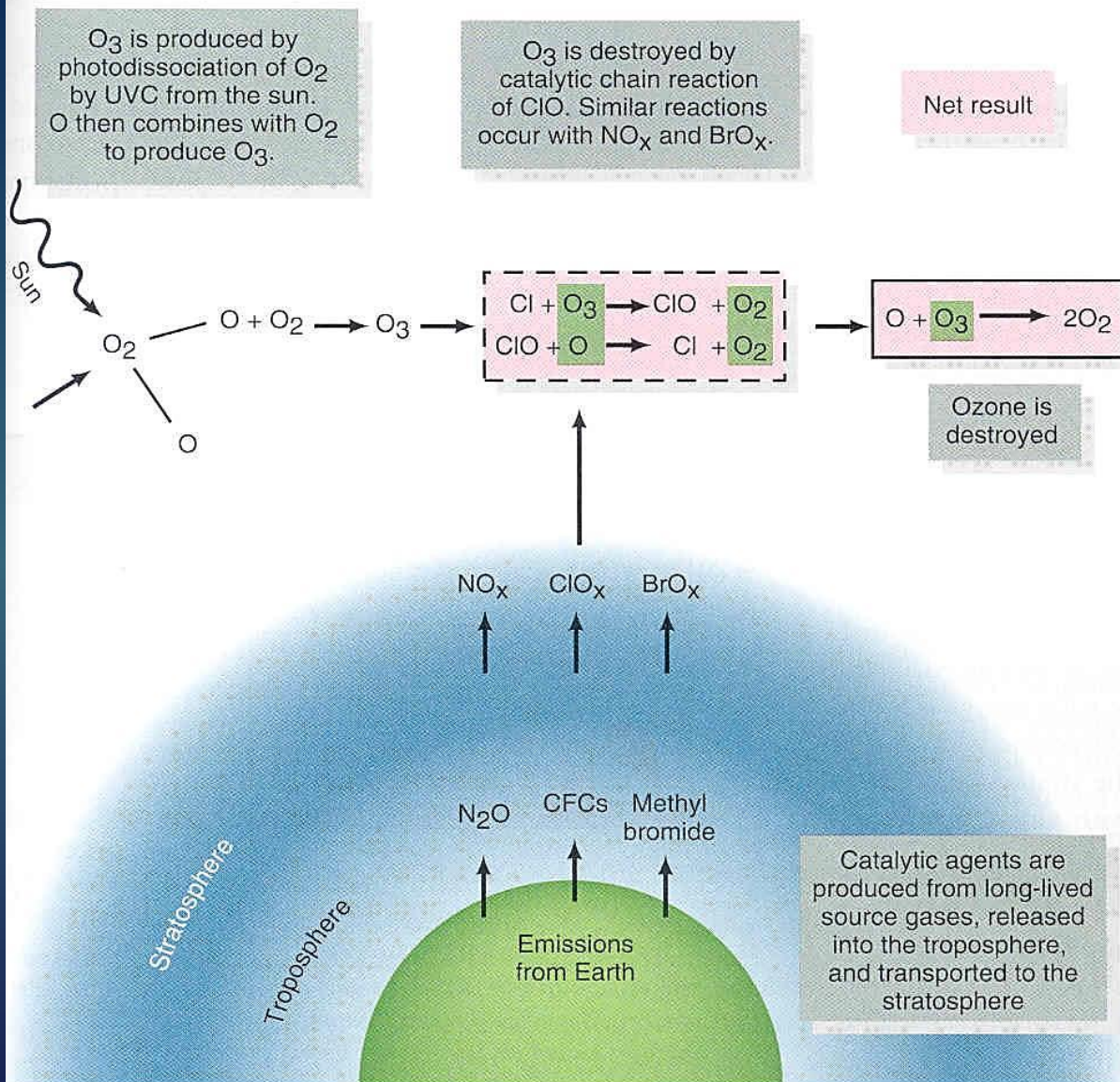
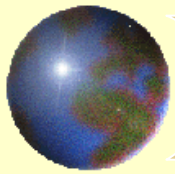
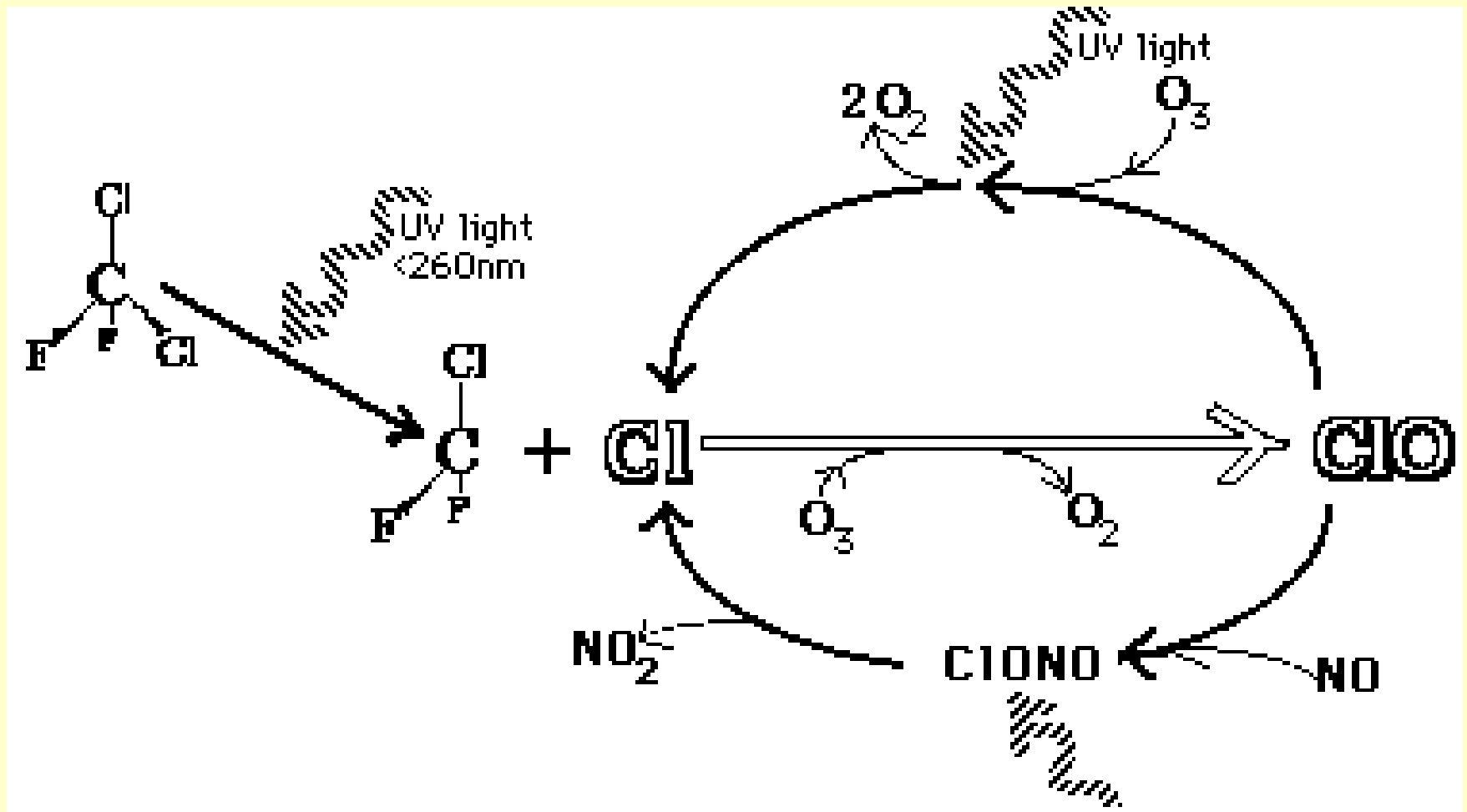
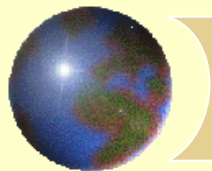


Figure 25.6 • Processes of natural formation of ozone and destruction by CFCs, N_2O , and methylbromide. [Source: Modified from NASA-GSFC, "Stratospheric Ozone," accessed August 22, 2000 at <http://see.gsfc.nasa.gov>.]



Halogen catalysis of ozone destruction





The Nobel Prize in Chemistry 1995



Paul J. Crutzen

The Netherlands

Max-Planck-Institute
for Chemistry Mainz, Germany

1933 -



Mario J. Molina

USA

MIT, USA
Cambridge, MA

1943 -



F. Sherwood Rowland

USA

Department of Chemistry,
University of California
Irvine, CA, USA

1927 -

"for their work in atmospheric chemistry,
particularly concerning the formation and
decomposition of ozone"

Ozone hole

- The ozone "hole" is defined geographically as the area wherein the total ozone amount is less than 220 Dobson Units.
- 1985: Discovery of the Antarctic ozone hole.

1970, 1971, 1972, 1979 average

1992, 1993, 1994, 1995 average

Ozone Hole

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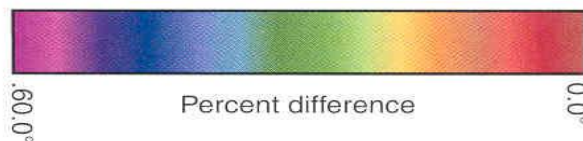
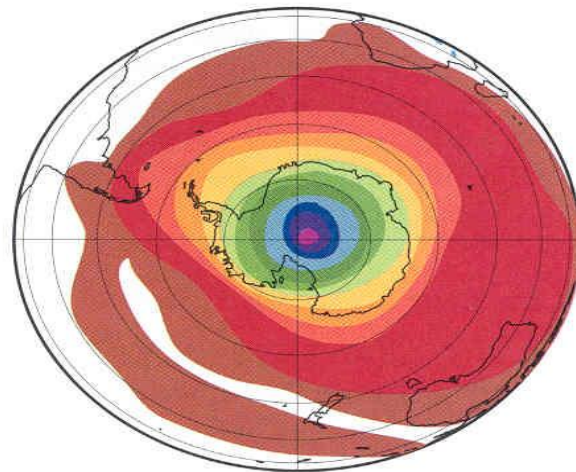
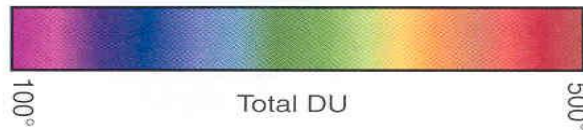
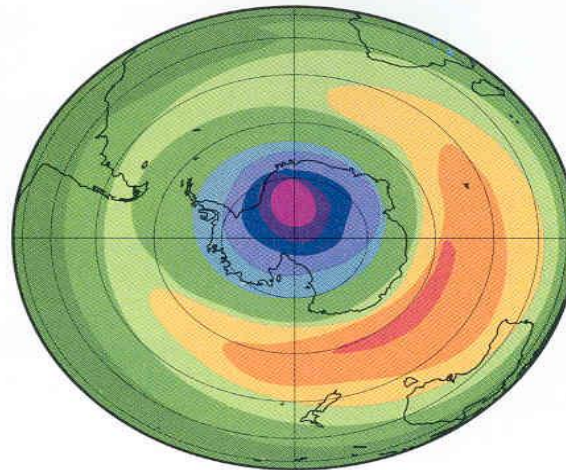
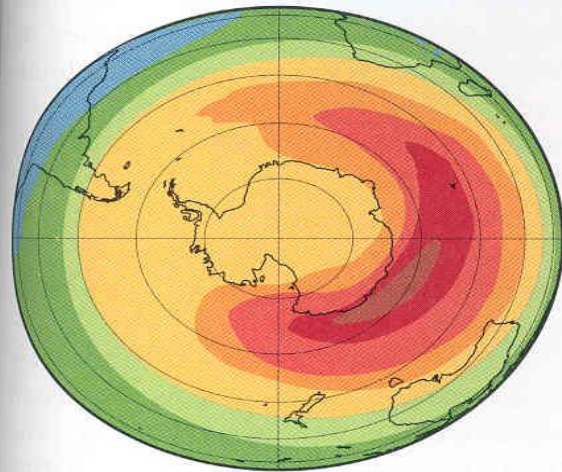



Figure 25.9 • Average development of the ozone hole in the 1970s compared with the early to middle 1990s, with percent differences between those two periods. [Source: Modified from NASA-GSFC, "Stratospheric Ozone," accessed August 22, 2000 at <http://see.gsfc.nasa.gov>.]

Environmental effects of Ozone Depletion

Since the ozone layer absorbs UVB ultraviolet light from the sun, ozone layer depletion increases surface UVB levels (all else equal), which could lead to damage, including

- Skin cancer
 - Eye sight deterioration
 - Suppression of immune system
 - Decreased Photosynthesis rate
 - Global warming (Indirect)
- 

Instead of walking alone tomorrow....
Think today....

THANK YOU

