

Approved: Carl Dean Holmes
Date 3/14/96

MINUTES OF THE HOUSE COMMITTEE ON ENERGY AND NATURAL RESOURCES.

The meeting was called to order by Chairperson Carl Holmes at 3:40 p.m. on February 14, 1996, in Room 313-S of the Capitol.

All members were present except:

Committee staff present: Raney Gilliland, Legislative Research Department
Dennis Hodgins, Legislative Research Department
Mary Torrence, Revisor of Statutes
Marcia Ayres, Committee Secretary

Conferees appearing before the committee: Hugh W. Ellsaesser, Ph.D.
John C. Irwin, Kansas Department of Health & Environment
John Carter, Kansas Natural Resource Council & Ks Sierra Club
Terry Leatherman, Kansas Chamber of Commerce & Industry

Others attending: See attached list

Chairperson Holmes opened the meeting by announcing he intends to work four bills tomorrow in Committee. He will be gone next Monday and Tuesday, but Vice Chairperson Freeborn will chair the Committee to hear the rest of the bills. Wednesday and Thursday of next week will be spent working some of the bills for which hearings have been held.

Hearing on HB 2710: Chlorofluorocarbon use permitted

John Irwin. Mr. Irwin, Director of the Bureau of Air and Radiation for KDHE, spoke in opposition to **HB 2710**. (Attachment #1)

John Carter. Mr. Carter, representing the Kansas Resource Council and Kansas Sierra Club, testified in opposition to **HB 2710**. (Attachment #2)

Terry Leatherman. Mr. Leatherman, representing the Kansas Chamber of Commerce, appeared on behalf of the Dupont Company and distributed a handout regarding CFC phaseout issues. (Attachment #3)

Questions of the conferees in opposition to **HB 2710** followed their testimony.

Hugh Ellsaesser. Dr. Ellsaesser, Member of the Science Advisory Board of the George C. Marshall Institute, testified in support of **HB 2710**. (Attachment #4)

After questions of Dr. Ellsaesser, the hearing was closed.

Chairperson Holmes announced that the committee report on the Substitute to **HB 2617** was not received by him today and would be reported adversely tomorrow unless there is a motion to reconsider the action of yesterday.

Representative Bob Krehbiel moved to reconsider the action on the Substitute to **HB 2617**. Representative Laura McClure seconded the motion. Discussion followed. The motion carried.

Action on Substitute to **HB 2617: Counties authorized to impose fees on disposal of solid waste**

Chairperson Holmes called a five-minute recess to give the Revisor time to be present.

A fax received today from David Burnett of the Southeast Kansas Solid Waste Authority was distributed to members of the Committee. (Attachment #5) Two proposed Substitutes to **HB 2617** were distributed, and the Revisor explained the language of the proposals.

CONTINUATION SHEET

MINUTES OF THE HOUSE COMMITTEE ON ENERGY AND NATURAL RESOURCES, Room 526-S Statehouse, at 3:30 p.m.. on February 14, 1996.

Representative Tom Sloan moved to adopt the Substitute to **HB 2617** which limits the revenue collected from fees to be used only for the following waste management purposes: (1) public education and training; (2) worker training relating to recycling and composting; (3) solid waste reduction, reuse, recycling and composting projects; and (4) household hazardous waste collection projects. Representative Vaughn Flora seconded the motion. Discussion followed. The motion carried.

Representative Doug Lawrence moved to amend the Substitute to **HB 2617** on page 1, line 8, by inserting the words "not exceeding \$.50" after the word "fee . . ." Representative Tom Sloan seconded the motion. Discussion followed. The motion carried.

Representative Sloan distributed copies of a Proposed Amendment to Substitute for **HB 2617** (Attachment #6).

Representative Tom Sloan moved to adopt the amendment to the Substitute for **HB 2617**. Representative Joann Freeborn seconded the motion. Discussion followed. Representative Sloan withdrew the motion. Representative Freeborn withdrew the second.

Representative Joann Freeborn moved to adopt the amendment to the Substitute for **HB 2617** by striking the word "project" in the first line and adding the words "capital investment over \$10,000 . . ." Representative Tom Sloan seconded the motion. Discussion followed. Representative Freeborn withdrew the motion. Representative Sloan withdrew the second.

Representative Terry Presta moved to amend the Substitute for **HB 2617** on page 1, line 11, by adding the words "trash delivered from outside the county" before the colon. Representative Clay Aurand seconded the motion. Discussion followed. Representative Presta withdrew the motion. Representative Aurand withdrew the second.

Representative Joann Freeborn moved to adopt a conceptual motion to amend the Substitute for **HB 2617** on page 2, line 10, following the word "projects" by insert the words "and these services above shall be provided equally to all upon whom the tipping fee is levied." Representative Terry Presta seconded the motion. Discussion followed. Representative Freeborn withdrew the motion. Representative Presta withdrew the second.

Representative Dennis McKinney moved that the Substitute for **HB 2617** be passed out favorably as amended. Representative Doug Lawrence seconded the motion. Discussion followed. The motion carried.

The meeting adjourned at 5:45 p.m.

The next meeting is scheduled for February 15, 1996.

ENERGY AND NATURAL RESOURCES COMMITTEE
COMMITTEE GUEST LIST

DATE: February 14, 1996

NAME	REPRESENTING
Cynthia Abbott	Ks. Audubon Council
JOHN C. BOTTENBERG	DEFENBACH
Susan C. Hascall	Tom Sawyer
Harrie Ann Brown	KHH
JOHN CARER	KANSAS SIERRA CLUB
Bill Gaven	Senat KWR
Ken Peterson	KS Petroleum Council
JOHN TRWIN	KDHE
Randy Chen	KTLA
Terry Leatherman	KCCI
PHIL WITTEK	JOHNSON COUNTY ENV. DEPT.
Dave HOLTHANS	Western Resources
Bill Fuller	Kansas Farm Bureau
Andrew Houser	STATE REP. Dist. #4
Julie Hein	Hein, Ebert & Weir

State of Kansas

Bill Graves



Governor

Department of Health and Environment

James J. O'Connell, Secretary

Testimony presented to

House Energy and Natural Resources Committee

by

The Kansas Department of Health and Environment

House Bill 2710

On behalf of the Kansas Department of Health and Environment (KDHE), I would like to comment briefly in opposition to the enactment of HB 2710 into law.

Under the authority of Title VI of the federal Clean Air Act Amendments of 1990 (CAA), the U.S. Environmental Protection Agency has created a complex regulatory program to protect the ozone layer. The program includes product labeling, a phase-out of production of certain chemicals, mandatory recycling and recovery while repairing equipment, bans on non-essential products, and a program to review the health and environmental acceptability of alternatives.

The United States was one of the first countries to ban CFCs in aerosols in the 1970s. The Title VI initiative extends the regulation of CFCs as a part of a larger global effort. The Montreal Protocol on "Substances that Deplete the Ozone Layer" is the international treaty designed to protect the ozone layer. The original Montreal Protocol was signed by 27 countries, including the United States, in September 1987. To date, 150 nations have signed the Protocol. HB 2710 authorizes actions related to CFC possession, use, manufacture, purchase, installation, transportation, and sale that are in direct conflict with the federal CFC program.

The benefits of these national and international efforts to reduce CFC emissions are beginning to become apparent. Recent data confirm that the rate of growth of atmospheric concentrations of CFCs has begun to decline substantially with peak levels expected before the turn of the century. This global effort has slowed the build-up of ozone-depleting chemicals in the atmosphere.

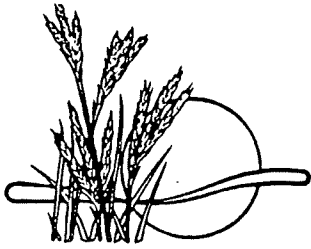
In Kansas, the direct implementation of Title VI of the federal CAA is the responsibility of the U.S. Environmental Protection Agency. Kansas is, however, indirectly involved in Title VI as a result of the responsibilities assigned to the states under Title V of the CAA related to the implementation of a new operating permit program. The new Title V permit program in Kansas requires that operating permits issued to major sources of air emissions contain provisions for assuring that any provisions of the federal Title VI program are made a state-enforceable element of the Title V permits issued by KDHE. Notice of final approval of the Kansas program was published in the *Federal Register* January 30, 1996. HB 2710 is read to prevent any such provisions from being enforced by KDHE in Kansas.

This problem renders the Title V program in Kansas vulnerable to disapproval by the federal EPA. After four years of intense effort by numerous parties across Kansas developing the program required to obtain federal approval, the threat of federal sanctions could create numerous implementation problems for both KDHE and the hundreds of affected emission sources statewide. For this reason, KDHE strongly recommends against the enactment of HB 2710 into law.

Thank you for the opportunity to appear today.

Testimony presented by: John C. Irwin
Director, Bureau of Air and Radiation

House E + NR
2-14-96
Attachment 1



Kansas Natural Resource Council

P.O. Box 2635
Topeka, KS 66601-2635

Officers

President

Bill Ward, Lawrence

Vice President

Joan Vibert, Ottawa

Secretary

Ann Fell, Winfield

Treasurer

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William J. Craven,
Legislative Coordinator
935 S. Kansas Ave.

Suite 200
Topeka, KS 66612
913-232-1555

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Testimony of John Carter
Kansas Natural Resource Council
and Kansas Sierra Club
H.B. 2710 and S.B. 518
House and Senate Natural Resources Committees
February 14, 1996

I appreciate the opportunity to testify on this bill which is opposed by the group I represent. This bill seeks to lift the ban on chloroflourocarbons in the state of Kansas. It is based on bad science and violates both federal and international law.

The majority of scientists not loyal to special interest groups acknowledge that there is a problem with ozone depletion, and that CFC's play a major but reversible role in it. A lot of people, and even some scientists disagree with this conclusion, and that's human nature. I'm sure that ten years after Galileo there were many "scientists" who could prove the earth was flat.

Bad science says the ban is unnecessary because there is no conclusive proof that CFC's contribute to ozone depletion, or alternatively, there is no conclusive proof that ozone depletion is harmful. They say the hole in the ozone and the part CFC's play in it are just theories. By that same token, gravity is just a theory. But we all know it's real. We also know some things about the stratopheric ozone layer which protects the earth from certain harmful ultraviolet rays.

We know, for instance, that the chemical reaction that causes the break-down of ozone utilizes chlorine molecules that reach the stratosphere. We know that both nature and humans contribute to the amount of chlorine existing in the environment. We know that CFC's are a more stable carrier of chlorine than most natural carriers so the chlorine contained in CFC's is more likely to reach the stratosphere than natural chlorine. We know that it takes between fourty and sixty years for the chlorine released today to reach the stratosphere and expend its reactive potential. We know there is a hole in the ozone layer, and that it is growing, every year exposing more of the earth to harmful ultraviolet radiation. Finally, studies show that one of the very real effects of the increase in solar radiation is interference with the photosynthesis process plants rely on to utilize sunlight. No one knows what the effects might be on Kansas wheat and other crops, but this bill would commit us to find out.

I am a proponent of the right of Kansas to be free from federal interference. This bill, however may have the opposite effect.

This bill is a violation of federal law, and will knock Kansas out of compliance with the Clean Air Act. One of the provisions of the Act is that a state's noncompliance gives the EPA, a federal agency, the ability to take over administration of the Act. Enacting this bill is an invitation to the EPA to take over. Now if you want to deal with the EPA instead of the Kansas Department of Health and Environment, this is a good bill.



House E+NR
2-14-96
Attachment 2

This bill is a violation of international law. It violates provisions of the Montreal Protocol, a treaty entered into by the United States, and binding on all the states. As such, this bill, if enacted, would be rendered void under Article VI of the Constitution of the United States.

If you are determined ignore good science, you might consider doing it in the form of a referendum which would not violate federal or international law. Enacting this bill amounts to nothing more than an unconstitutional invitation for federal interference.

Ex. 1

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FOR YOUR INFORMATION
from the
SIERRA CLUB
ENVIRONMENTAL QUALITY STRATEGY TEAM

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Pollution News #163

[From Chemical & Engineering News, 1/2/95, p.9]

SATELLITE DATA CONFIRM CFC LINK TO OZONE HOLE

Newly released satellite data confirm that chlorofluorocarbons (CFCs) are the source of the chlorine that is eroding - Earth's protective ozone layer.

Three years' worth of data from the National Aeronautics & Space Administration's Upper Atmosphere Research Satellite (UARS) have enabled NASA scientists to prepare the first global maps of CFCs and their breakdown products in the stratosphere -- hydrogen chloride (HCl) and hydrogen fluoride (HF). The maps refute the claims of skeptics that natural sources, not human activities, cause ozone depletion.

"We believe these data eliminate the possibility [that] there are major natural sources of chlorine in the stratosphere," says UARS project scientist Mark Schoeberl. "They confirm CFCs are responsible for the ozone loss we are observing."

Critics of the theory that chlorine from CFCs catalyzes ozone depletion argue CFC molecules are too heavy to rise into the stratosphere. And even if they did, the skeptics say, the amount of chlorine CFCs carry into the stratosphere is dwarfed by natural sources such as seawater and volcanic eruptions. These arguments are laid out by Rogelio A. Maduro in his 1992 book, "The Holes in the Ozone Scare," and they have been popularized on radio talk shows.

The UARS data solidly refute these claims. UARS was launched in September 1991 to provide a comprehensive picture of stratospheric chemistry. Its 10 instruments gather data on the chemical composition of the upper atmosphere, as well as wind patterns and solar energy input.

Measurements of CFC-12 (CCl₂F₂) by UARS's Cryogenic Limb Array Etalon Spectrometer indicate high levels of this refrigerant reach the stratosphere. The amounts begin to decrease above about 20 km as the molecules are broken apart by ultraviolet light. Simultaneous measurements of HCl and HF by UARS's Halogen Occultation Experiment show levels of these CFC decomposition products rise at heights where CFCs are photolyzed.

"We now have the global distribution of man-made CFCs in the stratosphere," Schoeberl says. "They are not just lying around on the ground as some people will have you believe."

In addition, by comparing concentrations of HCl and HF, the scientists calculated that virtually all the HCl comes from breakdown of CFCs. "HF has no natural sources, it is not produced by volcanic eruptions or salt spray. It comes only from CFCs. We only see high amounts of HCl in the same places where we see high HF," stresses deputy project scientist Anne Douglass.

DuPont Talking Points on CFC Phaseout Issue

TALKING POINTS
SCIENCE, REGULATIONS, ECONOMIC ISSUES AROUND THE CFC PHASEOUT

1. Science

- * The best scientific information available, from nearly 300 from scientists from over 30 countries, tells us that ozone depletion in the upper atmosphere is caused mostly by man-made compounds (like CFCs) that are very persistent in the atmosphere.
- * This represents scientific consensus from every research facility in the world participating in the field of atmospheric chemistry
- * Ozone in the upper atmosphere filters harmful UV rays from the sun. Ozone loss in the upper atmosphere is believed to be linked to increases in non-melanoma skin cancer and cataracts in humans, potential for crop damage, and danger to animal and aquatic life.
- * Scientists and policy makers made the decision that the economic pain associated with the CFC phaseout is justified by the grave potential concerns from continued CFC production.
- * If the world adheres to the commitments made in the Montreal Protocol treaty, the ozone layer will recover by about 2060.

2. Regulatory/Legal

- * Because this is a global issue, decision and controls measures have been pursued on a global basis rather than on a local basis.
- * Laws and restrictions cover only the new manufacture of CFCs, not use. Continued use in air conditioners and refrigerators is not banned.
- * The U.S. signed the Montreal Protocol, an international treaty, in 1988, and participated in the treaty's amendments in 1990 and in 1992, which agreed to end manufacture of CFCs globally.
- * In 1990, the U.S. Congress passed the Clean Air Act Amendments, which was signed by President Bush, legislating the U.S. to adhere to the Montreal Protocol. The Clean Air Act gives the federal government authority over the states with respect to CFC phaseout regulations.

3. Economic

- * Industries that produce and use CFCs have been working globally with international, national, state, and local regulatory agencies to develop responsible regulations dealing with CFCs.
- * Industry has worked for years to phase out CFCs and develop CFC alternatives, which are available and are being used today.
- * Industry believes that the situation regarding service of existing air conditioning and refrigeration equipment, particularly motor vehicle air conditioning equipment, can be managed effectively through CFC recovery, recycling, stockpiling, and retrofit of equipment.

House E+NR
2-14-96
Attachment 3

Written Testimony to the Energy and Natural Resources Committees
of the Senate and House of Representatives of the State of Kansas

Topeka, Kansas

14 February 1996

by

Hugh W. Ellsaesser, Ph. D., Meteorology*

Member Science Advisory Board, George C. Marshall Institute

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This paper was originally presented as
"A Rational View of Stratospheric Ozone"***
at, and appeared in the Proceedings of,
the Symposium and Round Table Discussion
STRATOSPHERIC OZONE;

Effects of Increased UV-Radiation on Humans and on the Environment

Rudolf Sallinger Saal, Austrian Chamber of Commerce

Wiedner Hauptstrasse 63, A-1040 Vienna, Austria

10 May 1994

*Dr. Ellsaesser retired from the US Air Force after 20 years as an Air Weather Officer and from the Lawrence Livermore National Laboratory after 23 years of atmospheric and climate research.

***This paper was also published in *Technology: Journal of the Franklin Institute* 332A, 67-76, 1995.

A Rational View on Stratospheric Ozone

by

Hugh W. Ellsaesser

A. Introduction; The Ozone Layer.

Over the past quarter century, the so-called ozone layer has frequently been in the headlines where it is sometimes described as a "thin fragile layer." To put this in perspective I constructed Fig. 1 showing global mean ozone mixing ratio as a function of altitude. Mixing ratio is the number of molecules of ozone to the total number of molecules of air. If an air parcel is moved up or down without mixing or chemical action the mixing ratio doesn't change even though the total number of air molecules per unit volume drops by about half for each 18,000 ft (6 km) increase in altitude.

Starting at the mean surface value of 0.03 ppm, the mixing ratio increases rather steadily with altitude to the tropopause (about 10 km at the poles and 16 km in the tropics). Just above the tropopause it reaches 1 ppm and increases quite rapidly to a peak of 10-15 ppm around 35 km. Above the peak it decreases even more rapidly than it increased below, reaching 1-2 ppm around 50 km and then decreasing slowly to about 0.1 ppm around 90 km and increasing again above 90 km.

While the bulk of the ozone is in the lower stratosphere and the layer of high mixing ratio in the stratosphere may be thought of as a layer, ozone extends throughout most of the atmosphere. Ozone is measured by the equivalent depth of the ozone layer formed if all the ozone molecules were compressed into a layer of pure ozone at standard surface conditions of pressure and temperature. The average depth of the ozone layer in these units is about 300 DU (Dobson Units or milli-atmospheric centimeters) i.e. 0.3 cm or less than one eighth of an inch -- or about half a millionth of the depth of the total atmosphere if similarly compressed to surface conditions. It is from this method of quantifying the ozone in the atmosphere that the concept of an ozone layer that is thin and fragile arises.

Above the level of maximum mixing ratio ozone is in chemical equilibrium and is being destroyed just as quickly as it forms. If disturbed the half time for reestablishment of photochemical equilibrium, which decreases rapidly with altitude, is about 5 days at 35 km. Below this level the ozone concentration is generally above the equilibrium level but the life time for reestablishment of equilibrium is so long (6 months to a year at 25 km) that the ozone is essentially in storage under normal conditions.

As shown in Fig. 2, latitudinally ozone is lowest (250-270 DU) near the equator and increases to nearly twice this value near 90°N in spring and to somewhat lower

THE EARTH'S ATMOSPHERE

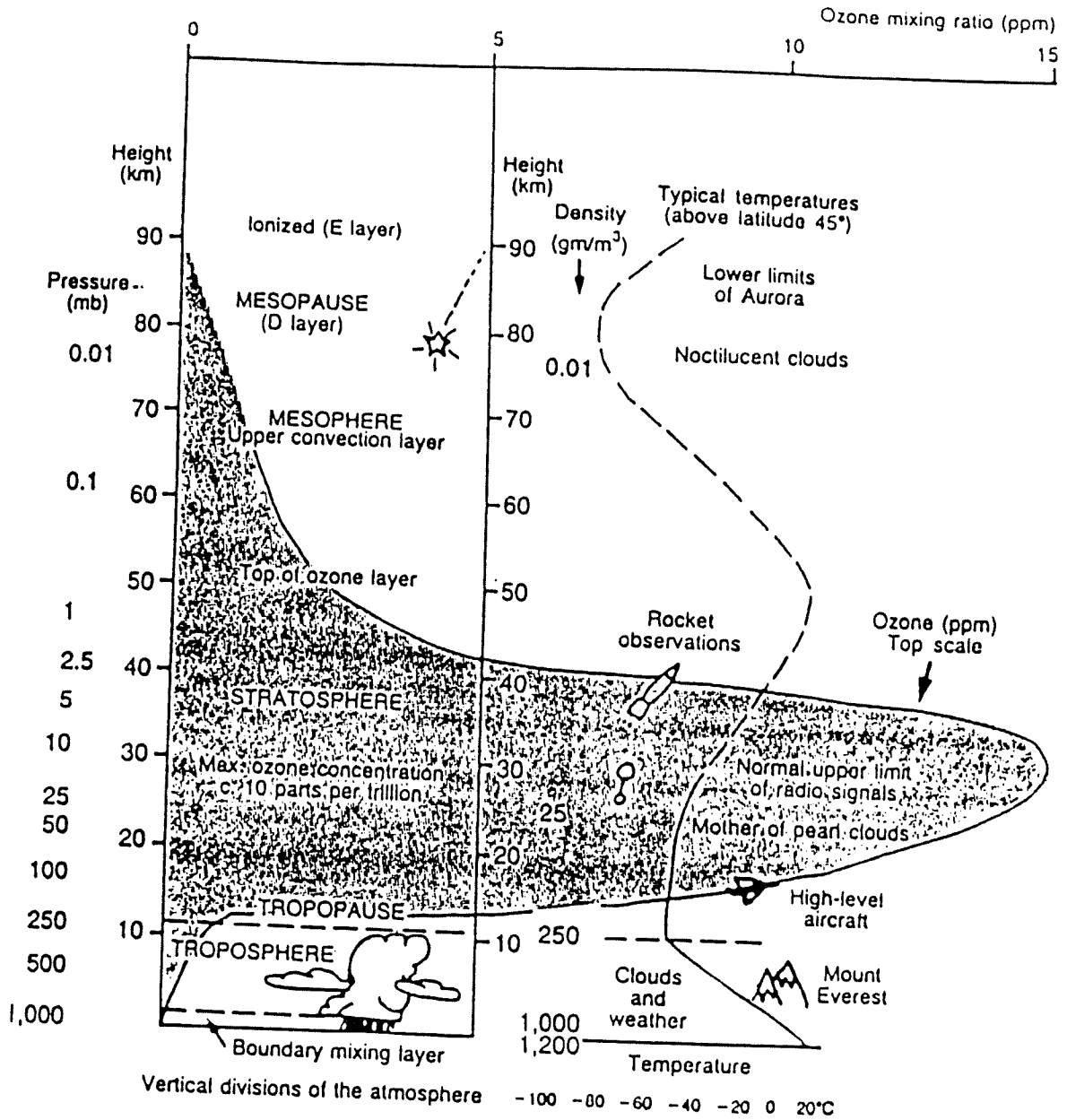


Figure 1. The shaded area is a schematic diagram of the mean distribution of ozone mixing ratio in the atmosphere. The background schematic of the atmospheric structure is from *Lamb (1972, p. 9)*.

values at 60°S. Polar values are generally less than these high latitude peaks except in the NH in winter. Seasonally the ozone layer in mid and high latitudes is thinnest in summer and fall and thickest in winter and spring. Thus, both seasonally and latitudinally the depth of the ozone layer is least where the solar UV (ultraviolet) is most intense. Only above 35 km and within the Antarctic ozone hole (see Fig. 3) is ozone concentration controlled by photochemistry; elsewhere it is controlled primarily by transport. In the stratosphere the flow, an extension of the Hadley circulation, is primarily upward at the equator and over the summer tropics and poleward and downward toward the winter pole. It is the poleward and downward transport that accounts for the buildup of the deepest ozone columns just outside the winter vortex of the winter pole. Cyclones and anticyclones set up additional transport patterns in the lower stratosphere which exert a strong day to day effect on the depth of the ozone column. Cyclones are accompanied by downward motion in the lower stratosphere which brings downward air with a high mixing ratio of ozone and since the subsiding air is replaced by high mixing ratio air moving in horizontally, high ozone columns are associated with cyclones. The reverse pattern accompanies anticyclones resulting in low values of the ozone column associated with anticyclones.

B. Threats to the Ozone Layer.

From their beginning in 1971 there have been predictions that man emitted chemicals would destroy ozone leading to increased surface UV and skin cancers. The initial concern was for water vapor from the exhausts of SSTs (supersonic transports). Amazingly, no one pointed out that available observations then indicated that both stratospheric ozone and water vapor had been increasing for several years (*Ellsaesser, 1982*). The argument soon switched to oxides of nitrogen from the SSTs. Because of the space shuttle, it was soon learned that chlorine and bromine could also destroy ozone catalytically but the sources of these chemicals were too small to cause much concern. Only after *Molina and Rowland (1974)* deduced that photolytic decomposition in the stratosphere was the only significant sinks for CFCs and halons and that this would provide a significant source of chlorine to the stratosphere did chlorine become of prime concern as a destroyer of ozone.

The primary attack by chlorine was predicted to occur around 40 km. With continued release of CFCs at the standard rate, the system was predicted to reach equilibrium in 75-100 years at which time the chlorine released from the CFCs would have caused a thinning of the ozone layer of "perhaps 5 percent sometime near the middle of the 21st century" (*Solomon, 1990 p. 347*).

Per *Stolarski et al. (1992)*, "[t]he search for evidence of downward trends in the thickness of the ozone layer was inconclusive until the discovery of the Antarctic ozone

The average TOTAL OZONE (LONDON) for 1957-1975

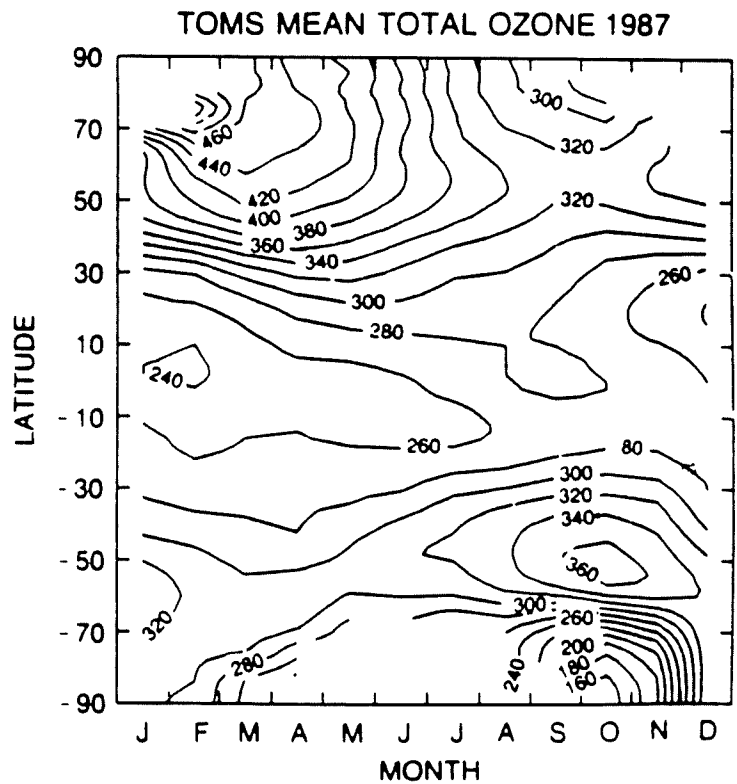
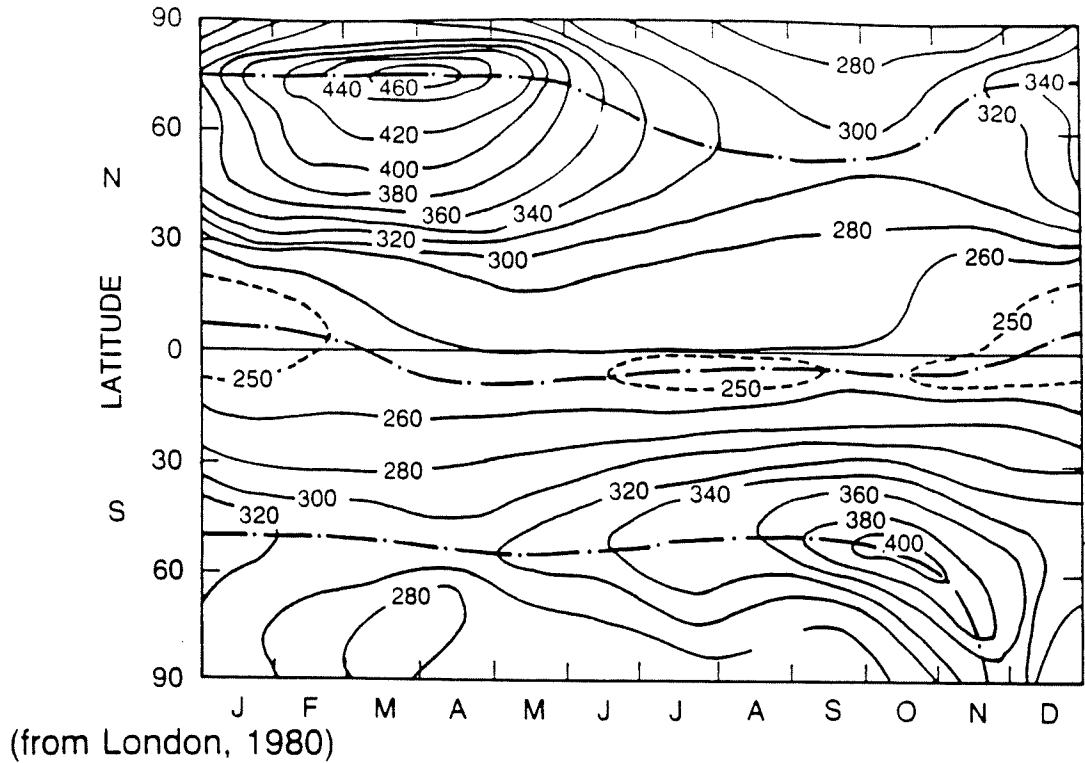


Figure 2. Latitudinal and seasonal variation of total ozone in Dobson Units. The upper graph is an average of the observations from 1957-1975 compiled by London (1980) and the lower graph is derived from TOMS for the year 1987. Note the ozone decrease is obvious only in the vicinity of the ozone hole in the Southern Hemisphere. (Adapted from *WMO*, 1988, v. I, Figs. 4.33 and 4.65.)

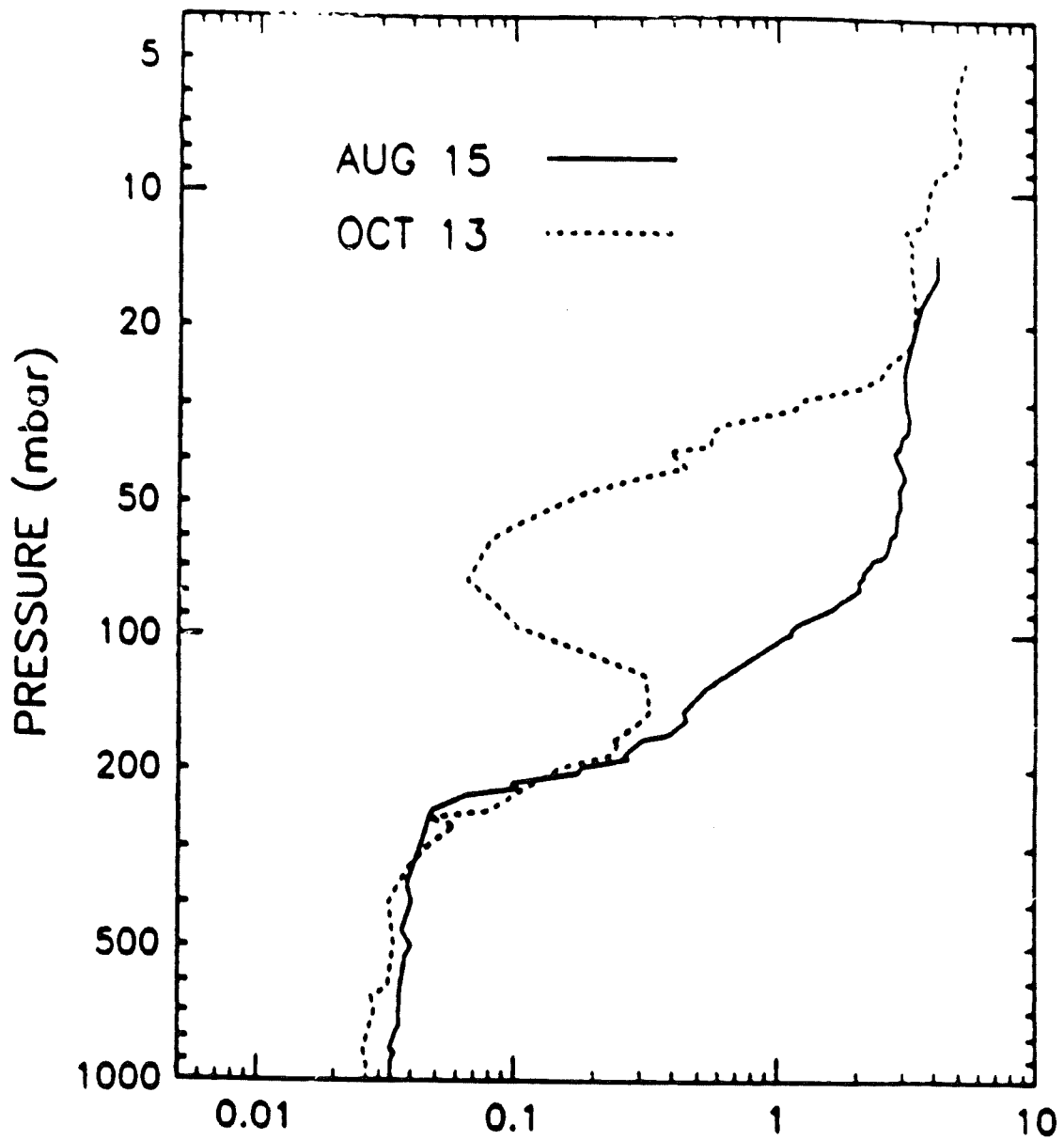


Figure 3. Profiles of ozone mixing ratio over Halley Bay, Antarctica before (solid) and after (dashed) formation of the ozone hole of 1987. Due to the decrease of pressure and density with altitude and the logarithmic scale, the fraction of the total column of ozone destroyed is significantly larger than would be estimated from this plot. (Adapted from *Gardiner*, 1988.)

hole in 1985 [*Farman et al.*, 1985]."

In 1988 EPA (1988 p. 30604) stated; "based on the major assessment issued by the World Meteorological Organization in 1986 (*WMO*, 1986) and EPA's own risk assessment document (*EPA*, 1987), no statistically significant change had occurred in global estimates of total column ozone (i.e. the amount of ozone from the earth's surface through the stratosphere in any given place)." It added (*EPA*, 1988 p, 30605) that "the existence of the ozone hole had been well documented by researchers" and that "[f]ollowing an 18-month review, involving over 100 of the world's leading atmospheric scientists, the executive summary of the Ozone Trends Panel report was released [by press release] on March 15, 1988. ... Its review of global ozone trends showed a depletion of 1.7 to 3.0 percent ozone loss between 1969 and 1986 at latitudes between 30 and 64 degrees in the northern hemisphere (where measurements are the most numerous)." However, it noted "that current atmospheric models ... do not account for these occurrences" and concluded that "because of insufficient information, and time, it was premature to consider these issues in its assessment of risks or as part of the rulemaking." In mitigation, it noted that "[d]ata suggesting that ozone had depleted globally had not yet been published in the scientific literature and therefore had not yet been thoroughly reviewed" and that EPA "intends to notify the public of the availability of the full body of the Ozone Trends Panel Report (*NASA*, 1988b; *WMO*, 1988) when it becomes available and will at that time request comments on its implications for future action."

Several interesting deductions can be drawn from the above.

a. After 14 years of predictions of ozone loss from man-released chemicals, the first observational evidence that any such loss was occurring was the detection of the *unpredicted* September-October decline in ozone over Antarctica in 1985, a loss which occurred in the 12 to 22 km layer as opposed to the 40 km level where ozone destruction by chlorine was predicted to be most important.

b. The ozone hole was enough for certain interests, working primarily through the United Nations Environment Program (UNEP), to hold a series of international conferences culminating in the signing of the Montreal Protocol on Substances that Deplete the Ozone Layer on 14 September 1987. In the words of the chief negotiator for the U.S. in forging this treaty, "the most extraordinary aspect of the treaty was its imposition of short-term economic costs to protect human health and the environment against *unproved future dangers* ... dangers that rested on scientific theories, rather than on firm data. At the time of the negotiations and signing, *no measurable evidence of damage existed* [emphasis added]" (*Richard Benedick*, 1991, preface)

c. The report of the Ozone Trends Panel (*NASA*, 1988b; *WMO*, 1988) was not available to EPA by August 12, 1988 and thus was certainly not generally available to the scientific community for study and comment at that time. Even a *gung-ho* regulato-

ry agency, the U.S. EPA, invoked this as an argument for delay in assessing risks and in rulemaking.

The NASA (1988b) report of the Ozone Trends Panel is dated August 1988 but, as noted above, was both unknown and unexpected by EPA on 12 August 1988. The 2-volume *WMO Report No. 18* (1988) is titled *Report of the International Ozone Trends Panel 1988* but gives no other indication of the publication date. I have not been able to determine precisely when this report became available. In other words, for at least 5 months after NASA's news release of the executive summary of the Ozone Trends Panel report, it reverberated through the news media with no opportunity for study, comment or criticism by scientists including those who served on the panel itself.

The U.S. Congress had originally requested establishment of the Ozone Trends Panel as a result of the 1986 testimony of NASA's Don Heath that satellite data showed a large scale decrease in ozone 2-3 times larger than predicted and most pronounced at 50 km, as opposed to 40 km as predicted. After a critical review and reanalysis of ozone observational data from Dobson instruments, rockets and at least 7 satellite systems, the Ozone Trends Panel concluded:

a The most credible data on ozone as a function of altitude and time was that provided by the SAGE systems. For the period 1979-1985 these data:

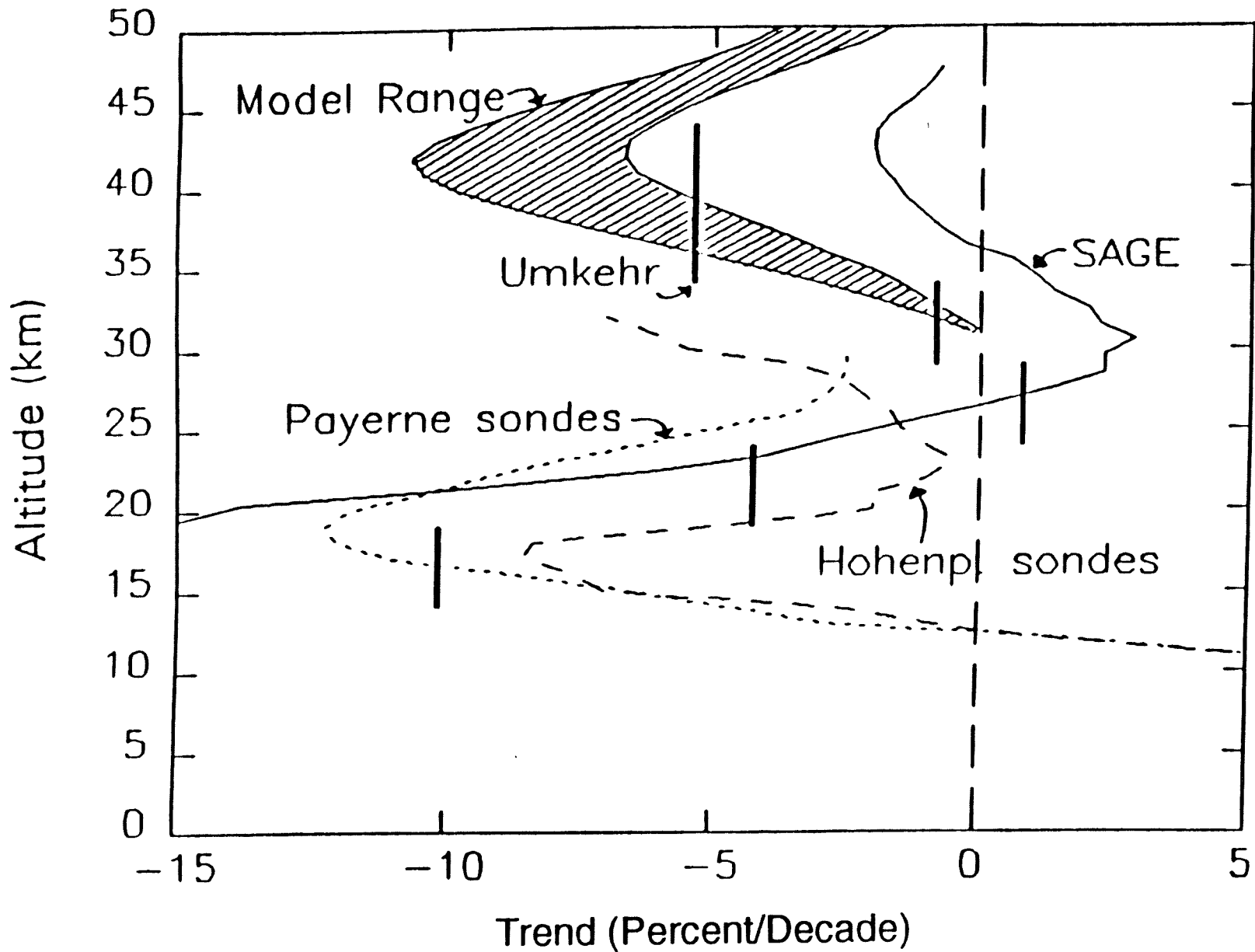
1). failed to confirm the SBUV and TOMS decrease in total ozone of about 1% per year and faster decline of about 3% per year near 50 km.

2). showed a decline in ozone at 40 km of 3 to 9% compared to the model predictions of 5 to 12% for this period. (See Fig. 4.)

3). indicated an unexpected 3% decline in ozone at and below 25 km -- this was found to account for the bulk of the decrease found in the total ozone column. (See Fig. 5.)

b. The SBUV and TOMS instruments indicated excessively rapid declines in ozone due to degradation of a diffuser plate. After normalization against ground-based Dobson measurements, they indicated a 2 to 3% decline in total ozone between 53°N and 53°S from October 1978 to October 1985. This period coincided with the declining phase of the sunspot cycle, itself estimated to have caused an ozone decline of 0.7 to 2% depending on the estimate of UV decline over this period. The actual decline in total ozone was therefore 0 to 2%. According to *WMO* (1988 Vol. 1, p.440) "it probably would require at least a 4 percent change to be reliably detected as a change [by the examined satellite instruments]."

c. The corrected and reanalyzed Dobson data indicated a NH annual mean decline in total ozone 1969 to 1986 of 1.7% at 30°N to 3.0% at 64°N; for winter the numbers were 2.3 and 6.3%.



4-9

Figure 4. Comparison of ozone profile trend estimates from SAGE I & II (averaged 20-50°N and 20-50°S), Umkehr (5 northern mid-latitude stations) and two ozonesonde stations. The shaded area shows the range of two model calculations at 50°N and 50°S. (Adapted from WMO, 1991, Fig. 2-18.)

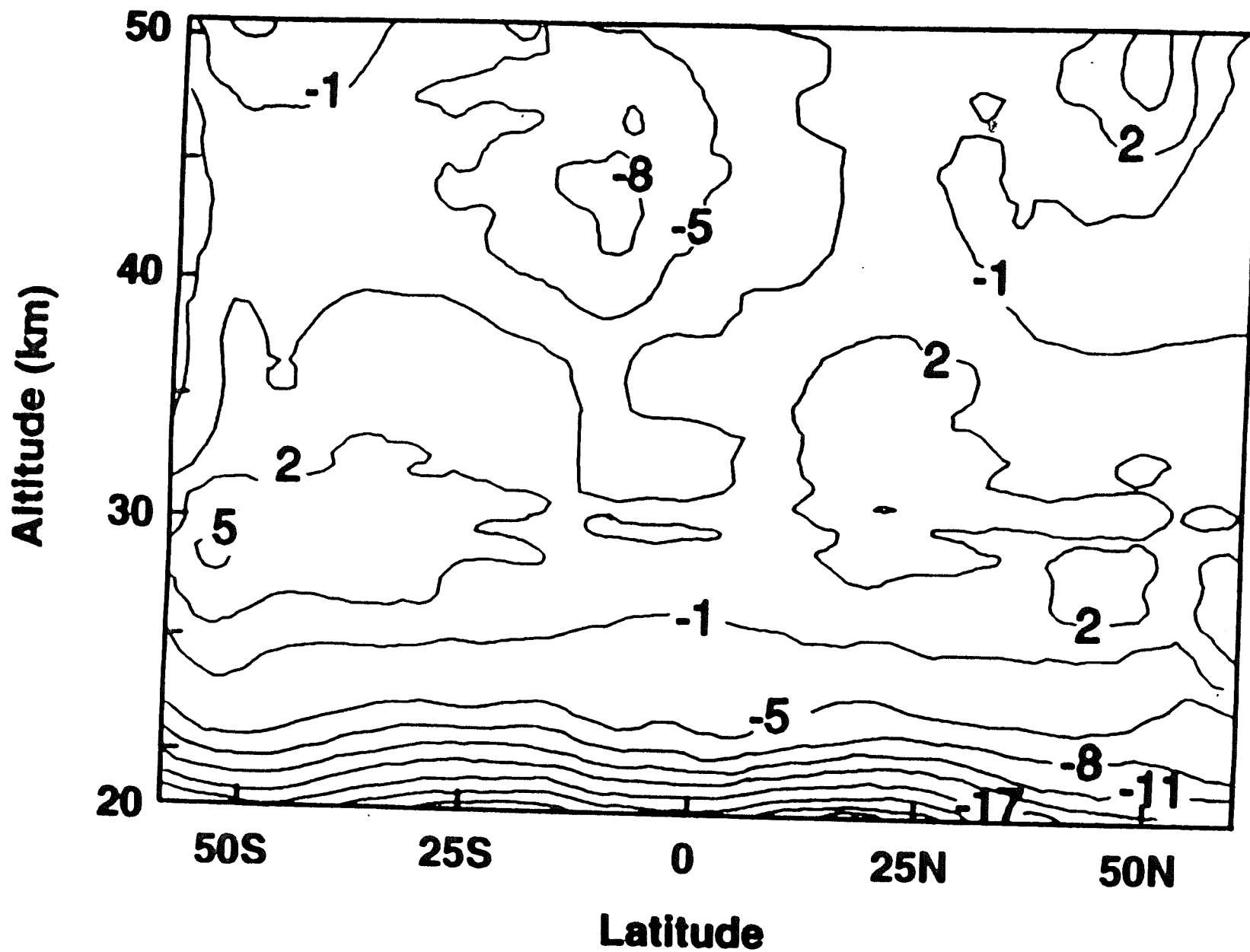


Figure 5. Trends in the ozone profile in percent per decade as a function of latitude and altitude from the SAGE I and SAGE II measurements. (Adapted from WMO, 1991, Fig. 2-17.)

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Basically, the Ozone Trends Panel reports found:

- a. a decrease in ozone at 40 km but only about half of that predicted by models,
- b. a decrease in total ozone in northern mid latitudes, significant only in winter, but about twice that predicted by models,
- c. and the completely unanticipated finding that the bulk of the decrease in the total ozone column resulted from ozone decreases at 25 km and below rather than at 40 km as predicted.

How were these findings presented to the public? In the words of the chairman of the panel, NASA's Dr. Robert Watson; "[our ozone] models do not predict that ozone decreased the way it did over the Northern Hemisphere during the past 17 years. Our models are not doing a good job, so we would have to say that they are underestimating decreases in the future" (*Kerr*, 1988). If you have been trained as a scientist, I urge you to analyze the logic behind this statement.

An even more flagrant example of scientists influencing public policy by press release as opposed to publication of new developments in the peer reviewed literature occurred in 1992. Dr. James Anderson of Harvard, the Chief Scientist for NASA's Airborne Arctic Stratospheric Expedition announced at a press release on 3 February 1992 that their ER-2 plane had detected in the part of the Arctic vortex over eastern Canada and northern New England the highest concentrations of chlorine monoxide it had ever encountered, even in flights into the Antarctic ozone hole. "The ability of the atmosphere to fend off [ozone destroying] chlorine is weaker than we thought before. The system is breaking down in local regions, we don't know if it's going to be shredded on a larger scale. ... If the vortex persists, we can expect large ozone losses," on the order of 30 to 40% (*Kerr*, 1992).

This promptly got the attention of William Reilly of our Environmental Protection Agency and of Al Gore of our Senate. Within 2 days the U.S. Senate voted 96-0 to advance the ban on CFCs from the year 2000 to 1995. President Bush took this action for the US on 11 February 1992. On 30 April 1992 NASA held another press conference to announce that the observed high levels of chlorine oxide apparently were prevented from doing their worst by unusually warm winter air (*Leary*, 1992). This did not prevent the Montreal Protocol Meeting in Copenhagen from adopting the 5-year acceleration of the phaseout of CFCs etc. as an official part of the treaty in November 1992.

C. A Brief History of the Ozone Layer.

First measurements of the depth of the ozone layer were made around 1913. Routine measurements were begun at Oxford, England and Arosa, Switzerland in the

late 1920s and at Tromso, Norway; Lerwick, Scotland and a few other stations in the 1930s. Global coverage cannot be claimed before the IGY of 1957/58.

Fig. 6 shows (above) a smoothed curve of total ozone prepared by *Jim Angell* (1989). Note:

- a. the resemblance to the curve for sunspot number (below);
- b. the minimum of -2.3% below normal in 1961 -- only slightly exceeded by the minimum of 1986 of -2.9%;
- c. the long-term upward trend from 1961 to the 1970 peak of 1.7% above normal -- the highest ozone level up to that time ever observed and since equalled only in 1979; and
- d. the upward trend at the end of the curve. I doubt that many of you were aware that mean global ozone was not only observed to increase from 1985 to 1991 (*Herman and Larko*, 1994) but was actually predicted to do so by the Ozone Trends Panel (NASA, 1988b; WMO, 1988).

We have no explanation for the long-term upward trend of ozone in the 1960s. While most stratospheric ozone modelers have chosen to attribute the 1961 minimum to the effect of oxides of nitrogen from the hydrogen bomb tests of the USSR at Novaya Zemlya in 1961/62, most other atmospheric scientists who have examined the data have rejected this explanation for the following reasons;

- a. Nearly all the drops in ozone occurred before the bombs were exploded. *Angell's* (1989) data show the northern hemisphere minimum to have been in the winter of 1960/61-- at least three seasons before the first and largest explosion in the fall of 1961. Models predict the minimum from the bombs should have occurred in early 1963.
- b. The recovery time is much longer than would be expected if this had been the cause of the ozone decline, i.e. longer than it would have taken to have swept the excess NO_x out of the stratosphere.
- c. Since the mean global level of ozone in 1970 was higher than ever before recorded it can hardly be a return to normal.

It is therefore difficult not to agree with the world-renowned Belgium modeler of stratospheric ozone, *Guy Brasseur* (1978), who concluded: "Actually no feature appears in the data that can be attributed to the thermonuclear explosions of 1961-1962."

Since we have no explanation for the upward trend in ozone in the 1960s we also have no reason not to expect that an occasional return to the levels of 1961 should occur due to natural causes.

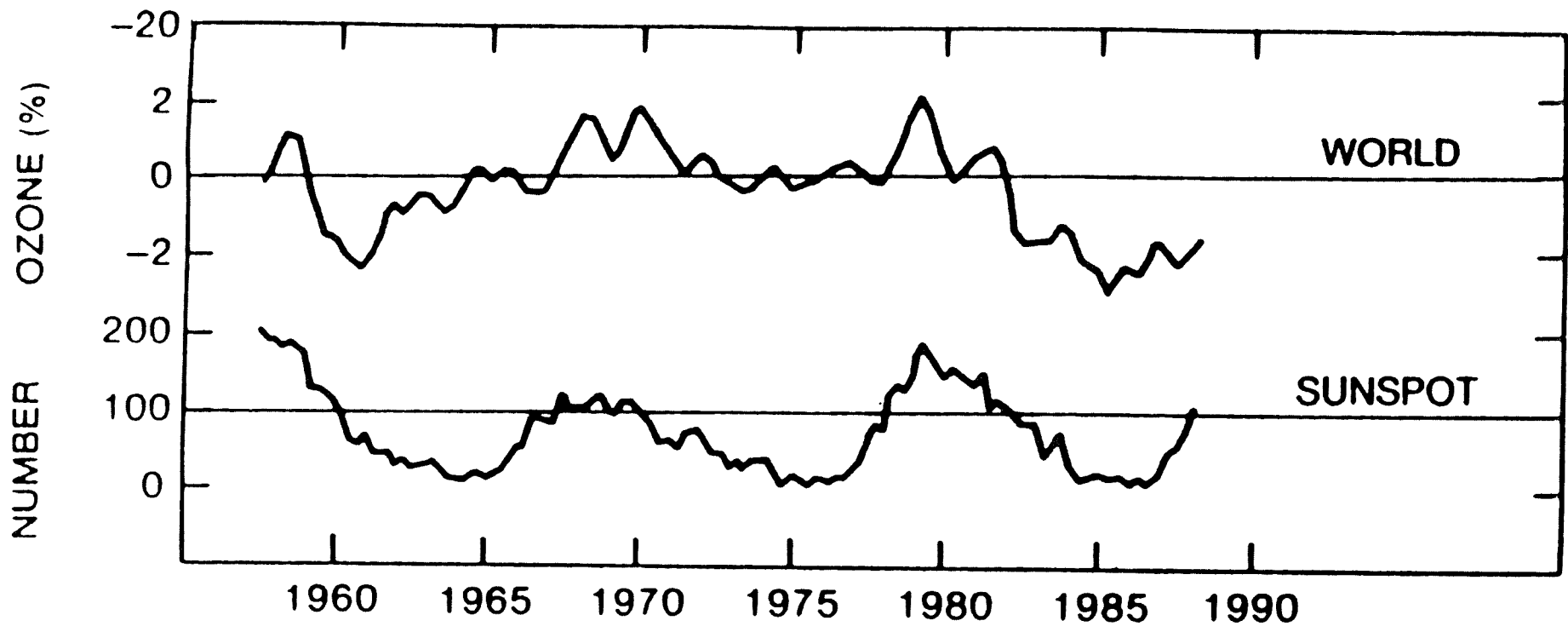


Figure 6. Comparison of seasonal values of sunspot number (lower curve) with the smooth variations in global total ozone, 1958 through August 1988. The seasonal values have been smoothed by a 1-2-1 weighting applied twice to seasonal deviations from the long-term mean. The time ticks mark the northern summer. (Adapted from *Angell*, 1989.)

D. The Unheard Arguments.

1. Strong Natural Latitudinal Variation in UV Flux.

On an annual mean basis, surface UV flux increases about 50-fold from the poles to the equator (*Mo and Green, 1974*); the summer monthly mean maximum increases approximately 10-fold (*WMO, 1991, Fig. 11-10*). For the annual mean this can be thought of as approximately one doubling for each one thousand miles displacement from the poles to the equator or roughly a 1% increase for each 10 miles (16 km) displacement toward the equator. For skin cancer incidence over the United States the *US NAS (1975)* gave the doubling distance as 8-11 degrees of latitude or roughly 1% for every 6 miles (10 km) displacement toward the equator. *WMO (1991)* estimates that a 1% decrease in the depth of the ozone layer will lead to a 2.3% increase in ordinary skin cancer. By the above numbers we would get the same increase in skin cancer by moving about 15 miles (25 km) closer to the equator.

This gives you a number by which you can evaluate the seriousness of the ozone issue. The 5% decrease in ozone predicted by models for continued use of CFCs until equilibrium is equivalent to an 11.5% increase in skin cancers or to a displacement of about 70 miles (112 km) closer to the equator. Do you consider this of sufficient hazard to undertake the expense, discomfort and actual harm that you are likely to experience from living up to the current -- much less the evolving -- provisions of the Montreal Protocol?

2. Beneficial Effects of UV.

One subject you never hear in discussions of stratospheric ozone is the beneficial effects of UV radiation. For most land animals with skeletons (including man), the only natural source of the vitamin D required to metabolize calcium into bone is from the action of solar UV on the oils in the skin. Shortage of vitamin D during the growing years can lead to rickets, and even if this serious disease is escaped, it can lead to osteomalacia (bone loss to dangerous levels) in later life.

In the US it is estimated that 20-25 million people now suffer from osteomalacia, including 25% of the women beyond menopause. Among these there are over twice as many bone fractures per year (typically of the femur) as there are new cases of skin cancer per year. Theoretically, an increase in UV exposure would alleviate this condition in future generations just as, theoretically, it would lead to additional cases of skin cancer. Considering the numbers involved and the relative seriousness of the health effects involved, a decrease in the depth of the ozone layer could prove to be a

net health benefit, particularly since our bodies are far better at letting us know when we are getting too much UV than they are at letting us know when we are getting too little. This beneficial aspect of additional UV exposure, due to current suboptimal levels, has been made more important by the widespread migration of darker skinned peoples into higher latitudes.

While I have been able to find very little work in this area, there may well be other human diseases that would be alleviated by an increase in UV exposure. Drs. Cedric F. and Frank C. Garland and Edward D. Gorham have been studying the incidence of colon and breast cancer for 10-20 years. They have found significant negative correlations between the mortality rates for these cancers and both vitamin D availability and the amount of total sunlight, a fair surrogate for UV (see for example *Garland and Garland, 1980, Garland et al., 1986; Gorham et al., 1989*). Should we not investigate this possibility further before we take hasty action to forsake the very special properties of such chemicals as CFCs, halons and methyl bromide which may in fact be providing unexpected benefits as well?

3. An Alternative Explanation for Ozone Decline in the Lower Stratosphere.

As indicated earlier, air circulation in the stratosphere is an upward extension of the Hadley circulation. It consists mainly of upward motion through the tropopause at the equator and in the summer tropics and poleward and downward motion above, primarily toward the winter pole. In this hemispherically antisymmetric cyclic circulation, driven by the seasonal movement of the subsolar point into the summer hemisphere, ozone gets transported from the region around 35 km in the tropics where it is generated, downward into the lower stratosphere of the winter hemisphere. It is the adiabatic cooling of the upward branch of this circulation that accounts for the continued temperature minimum at the tropical tropopause despite radiative heating in that region.

Since rising air cools and air temperature increases with altitude in the stratosphere, above the tropopause this ascending air has to match its rate of ascent with the rate at which it is radiatively warmed. This means that the actual trajectory in the stratosphere will depend on both the rate of upflow through the tropopause and on the rate of radiative warming in the stratosphere. If the air enters too rapidly so that its adiabatic cooling makes it denser than the surrounding air it will be forced to move more horizontally and less vertically. In this case, this exchange would tend to sweep ozone from the lower stratosphere back into the troposphere. Alternatively, if ascending stratospheric air contains absorbers, such as aerosols, it will be additionally warmed by the aerosol absorption of both solar and infrared radiation and will tend to ascend more easily and rapidly than otherwise. This will tend to push the higher mixing ratio air of

the mid-stratosphere poleward and downward. Since air reaching near 35 km will soon come into photochemical equilibrium, this type of circulation could increase the ozone in the stratosphere as occurs after the deep overturnings of the stratosphere called sudden stratospheric warmings (*Elisaesser, 1978*). Thus, the specifics of the circulation in the stratosphere not only accounts for the seasonal cycle of the depth of the ozone column but can also have a significant impact on the year to year variations in this parameter.

Since the eruption of the volcano Agung in 1963, we have learned that volcanic plumes in the stratosphere cause additional heating and therefore lofting of the air near them. The initial effect is to loft the ozone profile of Fig. 1 filling the lower stratosphere with air of low ozone mixing ratio and to loft the upper part of the ozone layer to a level where its ozone mixing ratio is above chemical equilibrium and the ozone therefore decreases back to equilibrium in a matter of days. The net result is a decrease in total ozone in the columns occupied by the plume. There may also be chemical destruction of ozone on the particles themselves.

The effects due to warming and lofting would be expected to be strongest as soon as the bulk of the volcanic injected sulfur dioxide was oxidized to sulfate particles (about two months), but could have some effect as long the particles remained in the stratosphere (half-life of about 18 months). The rate of chemical destruction on the other hand depends on the surface area of the aerosols per unit volume, the number of ozone molecules per unit volume and inversely on the temperature so would probably be most important as the volcanic aerosol approaches higher (colder) latitudes of the winter hemisphere where ozone density is also high.

We have seen dips in global total ozone following Agung in 1963 and El Chichon in 1982 lasting about a year and strongest in the winter following the eruptions. The Agung dip also appears to have been largest in the southern hemisphere where the denser aerosol was observed. However, a similar dip was observed in 1985 with no known eruption. Following Pinatubo (June 1991) total ozone began a dip which has lasted into this past winter but now seems to be recovering. This is an unprecedented behavior following a volcanic eruption unless the 1985 dip can also be attributed to El Chichon.

Estimating a long term trend in global total ozone from all of this is not at all straight forward. In 1986 we had a solar cycle minimum which may have had an unusually large impact on ozone We have just passed through an unprecedented large and extended dip in total ozone following an unusually large volcanic injection. The present tendency is to assume that the unusual declines in ozone since the peak of 1979 are due to destruction by the increasing level of chlorine in the stratosphere even though the mechanisms are unknown -- they are certainly not those predicted by the *Molina and Rowland (1974)* theory. If you have been following the headlines you know that the

ozone has been decreasing "2 to 3 times faster than predicted." Is this a reason to panic or is it a reason to recognize that we currently do not know what is going on with stratospheric ozone and should therefore wait awhile until we do understand what is going on?

I recommend we recognize that global total ozone was at an all time peak in 1979, equalled in 1970 but never exceeded. As long as we cannot explain the long-term increase in ozone during the 1960s we have no reason not to expect a similar extended downward trend due to natural causes and when better to expect it than after an all time peak, as occurred in 1979? Are there other developments within the climate system that might lead us to expect such a downward trend? I believe there are.

Beginning in the late 1970s, global surface temperatures rose rather abruptly to a new peak in 1981. Since then temperatures have remained near this higher level. Most climate models indicate that this will accelerate the Hadley circulation which drives the upward motion through the tropical tropopause. This accelerated motion, without additional heating in the stratosphere to speed the warming of the air, will cause more of this upward flow to move horizontally directly toward the poles for return to the troposphere. Such flow will sweep ozone out of the lower stratosphere where we have noted the largest declines in ozone concentration.

Over this same period we have noted an unexplained increase in the concentration of ozone in the troposphere of the northern hemisphere. This would also be expected if the change in circulation I have proposed has occurred. A similar increase in ozone in the southern hemisphere has not been observed and would not be expected as long as the Antarctic ozone hole appears each spring. It may be stretching my proposal too far, but the increase in total ozone in the 1960s also occurred just after the rather abrupt cooling of northern hemisphere surface temperatures between 1958 and 1963 which may have led to a slowdown in the flushing of the ozone out of the lower stratosphere and to more deep overturning of the stratosphere. As noted above in the case of sudden stratospheric warmings, such deep overturning tends to build up the thickness of the ozone column in the stratosphere.

E. Incongruities in the Ozone Story

There are a number of incongruities which make it clear that this is not a strictly scientific issue to be settled on a scientific basis alone. I would like to cite for you briefly those that have troubled me most.

1. The benefits of UV, that is, the illnesses resulting from too little UV exposure have been studiously ignored. If this is a purely objective scientific argument why have

we heard almost nothing about rickets, osteomalacia and the germicidal properties of UV?

2. The large natural latitudinal and secular variations in ozone have also been ignored. The 1985/86 minimum was comparable to the earlier 1961 minimum. Where solar UV is strongest and we presumably need the most protection, the ozone layer is thinnest. Only since the mid 1980s and only poleward of 60°S have we seen ozone columns as thin as or thinner than those of the tropics. At higher latitudes, even such thin ozone layers provide more protection than they do in the tropics due to the greater sun angle and longer path length through the ozone layer. A much larger thinning of the ozone layer than has so far been observed or predicted would be necessary before any area receives UV as strong as that which has been survived comfortably, presumably, at the equator for millions of years. Remember, in terms of skin cancer incidence, a 1% thinning of the ozone layer is equivalent to a 15-mile (25-km) displacement toward the equator. Why has this simple equivalence by which the general public might evaluate the seriousness of the ozone problem for themselves been spiked from almost every news story and scientific article about stratospheric ozone for nearly 20 years? (see *Dotto and Schiff, 1977, p. 283 footnote*)

3. It is over the equator that the depth of the ozone column is most nearly controlled by chemistry alone, i.e. is least influenced by air transport. Every study to date has noted the absence of a long term trend in the depth of the ozone column near the equator. Yet, according to Figs. 5 and 6, there have presumably been decreases in ozone concentration over the equator at both 40 km and at 25 km and below. Can anyone tell me what is going on here?

4. Remember the original prediction of dire consequences if we continued to use CFCs etc. until the situation came into equilibrium in 75-100 years? This was supposed to result in a 5% decrease in the global mean depth of the ozone layer. Guess what. In 1993 the global mean depth of the ozone layer was measured to be "5% below the historical mean" (*Herman and Larkö, 1994*). Have you noticed any of the dire consequences this was predicted to cause?

5. In experiments growing plants under different levels of UV exposure it is difficult to maintain a fixed or natural ratio of UV flux to total light flux. To solve this problem, there has been developed a system of suspending cuvettes over the plants, one filled with ozone which absorbs part of the solar UV and one filled with air which does not. In this case the plot receiving reduced UV becomes the control and the one receiving almost normal UV becomes the perturbed or enhanced UV plot. "In such a study [simulating a 10% reduction in ozone], plant height, leaf area, and the dry weight of sunflower, corn, and rye seedlings were significantly reduced" (*UNEP, 1991, p. 28*). This of course means that all these measures of plant growth were greater when the natural UV was reduced -- i.e., the detected damage was due to current normal levels of

UV but reported as due to enhanced levels of UV. This may be a perfectly valid method of carrying out such experiments but it gives a distorted picture to the public as currently reported. The public is left believing that no damage occurs at current levels of UV.

6. If you think I am the only one confused, let me read to you some of *Shell's* (1994) quotes from Jim Anderson, the Harvard University scientist who is in the middle of the ozone problem and should know what is going on: "The thinning of the ozone layer over other parts of the earth is accelerating, and we don't understand why, and we don't know how fast. We don't know what factors control the movement of ozone in the stratosphere. We don't know what part of the thinning is due to the natural dynamics of the atmosphere and what part is due to the destruction of ozone by man-made chemicals. We don't know much of anything. ... We've confused computer models of the atmosphere with the real thing. We're making huge extrapolations based on nothing but models, and models are often wrong." To this I would like to add a repetition of an earlier quote from NASA's Dr. Robert Watson, organizer and director of the Ozone Trends Panel: "[our ozone] models do not predict that ozone decreased the way it did over the Northern Hemisphere during the past 17 years. Our models are not doing a good job, so we would have to say that they are underestimating decreases in the future" (*Kerr*, 1988).

It is clear that these scientists do not understand what has been happening. But in very unscientific fashion, they are assuming that it has all been due to the influence of man and that we must change our ways. If this doesn't remind you of Chicken Little, it should.

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Why the U. S. Should Withdraw from the Montreal Protocol

by

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January 1996

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I have been recommending for some time that the U.S. should delay implementation of the provisions of the Montreal Protocol and should initiate action to withdraw from the treaty. There are two primary reasons for this recommendation:

1) We are still lacking in our understanding of the factors controlling stratospheric ozone and

2) There has been a profound misrepresentation of the health and biological effects of UV (ultraviolet light) from the sun.

It had been known since the SST CIAP Program (Climatic Impact Assessment Program of the Super Sonic Transport, 1972-75) that chlorine in the stratosphere could catalytically destroy ozone. However, at that time there was no known significant source of chlorine to the stratosphere other than the small amount expected from space shuttle launches. This was changed dramatically when F. Sherwood Rowland and Mario Molina discovered in 1974 that the ultimate fate of CFCs (Chlorofluorocarbons such as freons) was photo-decomposition by the more energetic solar ultraviolet which penetrates the atmosphere only down to about 20 km altitude. This decomposition releases the chlorine from these compounds and allows it to move about in the stratosphere and to chemically destroy stratospheric ozone catalytically, i.e. without being consumed itself.

Model calculations through 1990 concluded that continuing release of these compounds at then current rates would lead at equilibrium--the middle of the 21st century--to a column-integrated ozone decline of perhaps 5% with most of the ozone destruction occurring near 40 km.

Meanwhile, the Antarctic Ozone Hole was discovered in 1985 and the Montreal Protocol was adopted in 1987. Our chief negotiator of this treaty, Richard Benedict, later wrote about it as follows: "Perhaps the most extraordinary aspect of the treaty was its imposition ... against unproved future dangers ... dangers that rested on scientific theories, rather than on firm data. At the time of the negotiations and signing, no measurable evidence of [ozone] damage existed."

The ozone hole was found to be due to a very rapid and nearly complete springtime destruction of ozone in the 12- to 22-km layer within the Antarctic winter polar vortex. The hole, of course, was not predicted and could not be explained without adding to the theory 1) particles of ice and/or nitric acid, 2) temperatures low enough to freeze these out of their normal vapor states and 3) new reactions converting nitrogen to inactive or reservoir species and converting reservoir species of chlorine to active species.

An Ozone Trends Panel was formed and following an 18-month review it's leader, Dr. Robert Watson of NASA, issued an executive summary by press release of 15

March 1988 claiming a 1969-86 ozone loss of 1.7 to 3.0 per cent from 30 to 64 degrees north. He added; "[our ozone] models do not predict that ozone decreased the way it did over the Northern Hemisphere during the past 17 years. Our models are not doing a good job, so we would have to say that they are underestimating decreases in the future." The Ozone Trends Panel also made the completely unanticipated finding that the bulk of this ozone column decrease had occurred below 25 km; it did confirm a loss in ozone near 40 km but only about half that predicted by the models.

A flagrant case of influencing public policy by press release occurred when Dr. James Anderson, Chief Scientist of the NASA expedition, announced by press release of 3 February 1992 that the NASA ER-2 plane had detected over eastern Canada and northern New England the highest concentrations of chlorine monoxide it had ever encountered, even in flights into the Antarctic ozone hole, and suggested that an Arctic Ozone Hole could be imminent. This promptly got the attention of William Reilly of the Environmental Protection Agency and of Al Gore in the Senate. Within 2 days the U. S. Senate voted 96-0 to advance the ban on CFCs from the year 2000 to 1995. President Bush took this action for the U.S. on 11 February, only eight days after James Anderson's press release. On 30 April 1992 NASA held another press conference to announce that the observed high levels of chlorine oxide apparently were prevented from doing their worst by unusually warm winter air. This did not prevent the Montreal Protocol Meeting in Copenhagen from adopting the 5-year acceleration of the phaseout of CFCs etc. as an official part of the treaty in November 1992

The modelers still cannot explain the loss of ozone in the lower stratosphere below 25 km without large increases in sulfate particles as occurred in 1992 and 93 following the eruption of volcano Pinatubo. As Dr. James Anderson told the New York Times Magazine, 13 March 1994; "The thinning of the ozone layer over other parts of the earth is accelerating, and we don't understand why, and we don't know how fast. We don't know what factors control the movement of ozone in the stratosphere. We don't know what part of the thinning is due to the natural dynamics of the atmosphere and what part is due to the destruction of ozone by man-made chemicals. We don't know much of anything. ... We've confused computer models of the atmosphere with the real thing. We're making huge extrapolations based on nothing but models, and models are often wrong."

With the losses of ozone near 40 km and below 25 km noted above there have been no losses of ozone in the middle stratosphere and essentially no losses in the ozone column over the equator when the depth of the column is controlled most completely by chemistry alone. This leads me to the conclusion that the disappearance of ozone from the lower stratosphere, with no loss in the more chemically active middle stratosphere, is due to changes in the circulation of air from the troposphere to the stratosphere. The most recent atmospheric warming, beginning circa

1976, has been somewhat greater in the tropics than at other latitudes. This would be expected to lead to an acceleration of the so-called Hadley circulation which drives tropical tropospheric air through the tropical tropopause into the lower stratosphere.

Because of the stability of the stratosphere, that is, increase of temperature with altitude, air in the stratosphere can rise no faster than radiative heating allows its temperature to adjust to that of the levels through which it is rising. If the upward motion is accelerated beyond this rate, the air will move horizontally rather than vertically because of its greater density. Thus, any speedup in the Hadley circulation will lead to a greater proportion of the entering tropospheric air moving horizontally toward the poles rather than rising high into the stratosphere forcing air at other latitudes to descend, i.e. cause stratospheric overturning. This enhanced horizontal motion from the tropics to the poles will sweep ozone out of the lower stratosphere and into the troposphere. Such an acceleration of the Hadley circulation would thus explain the observed, but so far unexplained, increase in tropospheric ozone as well as the decrease in ozone in the lower stratosphere accompanied by no change in ozone in the more chemically active middle stratosphere or in the total column over the equator.

As for health effects, by current WMO (World Meteorological Organization) estimates a 1% decrease in the depth of the ozone column is equivalent to a 2.3% increase in normal skin cancer incidence which in turn, from U.S. cancer incidence statistics, is equivalent to moving 14 miles closer to the equator. In addition, at the present time there are 20-25 million sufferers from osteomalacia in the U.S. including 25-50% of the women beyond menopause. Among these there are over twice as many bone fractures per year (typically of the femur or spine) as there are new cases of skin cancer per year.

Theoretically, additional ultraviolet would alleviate this condition in the growing and future generations just as, theoretically, it would lead to additional cases of skin cancer. Considering the number of people affected and the relative severity of the health effects, increased ultraviolet appears to offer a net health benefit, particularly, since our bodies are much better able to warn us of too much ultraviolet than they are to warn us of too little ultraviolet. At least one study by the Dutch has shown that susceptible women living in their tropical island of Curaçao suffer less from osteomalacia than does a comparable group living in the Netherlands.

It should also be noted that the "intolerable" 5 per cent decrease in ozone predicted to result from continued release of CFCs actually occurred in 1993 and is still with us; have you noticed any of the intolerable effects this was supposed to produce?

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February 14, 1996

House Committee on Energy & Natural Resources
Rep. Carl Dean Holmes, Chair
Statehouse, Room 115-S
Topeka, Kansas 66612-1504

RE: Revised/Substitute Version of HB 2617

Chairman Holmes & Committee:

We are not completely sure which version of HB 2617 was voted down by the Committee yesterday. In an effort to simplify things, I want to state the three provisions that we believe are necessary for counties to carry out the legislative mandates in the area of solid waste management:

1. The bill should allow the county to assess the tonnage fee on every municipal solid waste disposal area within the county. This includes those operated by cities and private entities. If an amendment to 65-3415f. is proposed, we ask that the application to all municipal solid waste landfills be clarified.
2. The bill should be optional and not mandatory upon any county. No county should have the ability to arbitrarily and unilaterally impose the tonnage fee at a facility in another county.
3. The bill should not be punitive to regional entities. All counties, with or without a landfill, should be able to form an interlocal agreement with another county, or group of counties for the purpose of collecting and distributing tonnage fee receipts.

Before you pass a final judgement on this issue, I ask for you to consider two things:

1. Remember that the Environmental Law Task Force has recommended legislation on this issue.
2. Please read the attached emphasized statutory references. I want you to see the nature of the burden that is placed solely upon the counties. Look at every reference marked COUNTY and note that there is no mention of responsibility to the State, any private entity, or to a city. Would you consider making cities and private entities equally responsible partners with the counties under the law? If not, help the counties live up to the heavy responsibility that only they must bear.

Sincerely yours,

David T. Burnett
David T. Burnett

House E+NR Comm.
2-14-96
Attachment 5

STATUTES ASSIGNING COUNTY ACCOUNTABILITY FOR ALL SOLID WASTE MANAGEMENT WITHIN THE COUNTY'S BOUNDARIES.

65.3405. Solid waste management plan required; solid waste management committee, composition; duties of committee; contents of plans. (a) Each COUNTY of this state, or a designated city, shall submit to the secretary a workable plan for the management of solid waste in such COUNTY. The plan developed by each COUNTY or designated city shall be adopted by the governing body of such COUNTY or designated city if so authorized. Two or more COUNTIES, by interlocal agreement entered into pursuant to K.S.A. 12-2901 et seq., and amendments thereto, may develop and adopt a regional plan in lieu of separate COUNTY plans. The secretary shall not require the submission of COUNTY or regional plans earlier than one year following completion and distribution of the statewide solid waste management plan provided for in subsection (a)(5) of K.S.A. 65-3406. and amendments thereto. COUNTY and regional plans shall be amended from time to time as changing conditions occur by filing revisions with the secretary.

(SECTIONS (b) and (c) not referenced in this paper)

(d) Each COUNTY or group of COUNTIES is required to adopt and implement a solid waste management plan pursuant to this section and IS RESPONSIBLE FOR CONTINUED AND ONGOING PLANNING FOR SYSTEMATIC SOLID WASTE MANAGEMENT WITHIN THE BOUNDARIES OF SUCH COUNTY OR GROUP OF COUNTIES. Each COUNTY or group of COUNTIES shall demonstrate that its planning process includes regular communication with other counties or groups of counties and reflects consideration of planning and solid waste management practices that are ongoing in the state. The solid waste management plan of each COUNTY or group of COUNTIES or designated city or cities shall provide for a solid waste management system plan to serve the residents of all townships and cities within the COUNTY or group of counties.

(e) Every plan shall;

(1) Delineate areas within the jurisdiction of the political subdivision or subdivisions where waste management systems are in existence and areas where the solid waste management systems are planned to be available within a 10-year period.

(2) Reasonably conform to the rules and regulations, standards and procedures adopted by the secretary for implementation of this act.

(3) Provide for the orderly extension of solid waste management systems in a manner consistent with the needs and plans of the whole area, and in a manner which will not contribute to pollution of

the waters or air of the state, nor constitute a public nuisance and shall otherwise provide for the safe and sanitary disposal of solid waste.

(4) Take into consideration existing comprehensive plans, population trend projections, engineering and economies so as to delineate with practicable precision those portions of the area which may reasonably be expected to be served by a solid waste management system within the next 10 years.

(5) Take into consideration existing acts and regulations affecting the development, use and protection of air, water or land resources.

(6) Establish a time schedule and revenue schedule for the development, construction and operation of the planned solid waste management systems, together with the estimated cost thereof.

(7) Describe the elements of the plan which will require public education and include a plan for delivering such education.

(8) Include such other reasonable information as the secretary requires.

(9) Establish a schedule for the reduction of waste volumes taking in consideration the following: (A) Source reduction; (B) reuse, recycling, composting; and (C) land disposal.

(10) Take into consideration the development of specific management programs For certain wastes, including but not limited to lead acid batteries, household hazardous wastes, small quantities of hazardous waste, white goods containing chlorofluorocarbons, pesticides and pesticide containers, motor oil and yard waste.

(f) The plan and any revision of the plan shall be reviewed by appropriate official planning agencies within the area covered by the plan for consistency with programs of comprehensive planning for the area. All such reviews shall be transmitted to the secretary with the proposed plan or revision.

(g) The secretary is hereby authorized to approve or disapprove plans for solid waste management systems, or revisions of such plans, submitted in accordance with this act. if a plan or revision is disapproved, the secretary shall furnish any and all reasons for such disapproval, and the COUNTY or group of counties whose plan or revision is disapproved may request a hearing before the secretary in accordance with K.S.A. 65-3412, and amendments thereto.

(h) The secretary is authorized to provide technical assistance to counties or designated cities in coordinating plans for solid waste management systems required by this act, including revisions of such plans.

(i) The secretary may recommend that two or more counties adopt, submit and implement a regional plan rather than separate COUNTY plans.

(j) The secretary may institute appropriate action to compel submission of plans or plan revisions in accordance with this act and the rules and regulations, standards and procedures of the secretary.

(k) A COUNTY cooperating in a regional solid waste management plan may withdraw from such plan only:

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(1) Upon approval by the secretary of new or revised solid waste management plans for all counties cooperating in the old plan; and

(2) in accordance with the terms of the interlocal agreement adopting the old plan or upon revision or termination of such agreement to permit withdrawal,

History L. 1970, ch. 264, § 5; L. 1974,

ch. 352, § 158; L. 1992, ch. 316, § 3; July 1,

PROPOSED AMENDMENT TO SUBSTITUTE FOR HOUSE BILL NO. 2617

Before commencement of any project funded by a fee authorized by this section, the county or group of counties implementing the project shall publish a request for proposals for the project and allow sufficient time for notice and submission of proposals. The request for proposals shall be published in the Kansas register and: (1) In the official county newspaper, as defined in K.S.A. 64-101 and amendments thereto, if the project is to be implemented by a single county; or (2) in the official newspaper, as defined in K.S.A. 64-101 and amendments thereto, of the most populous county if the project is to be implemented by a group of counties.

ENR
Attach. #6
2-14-96