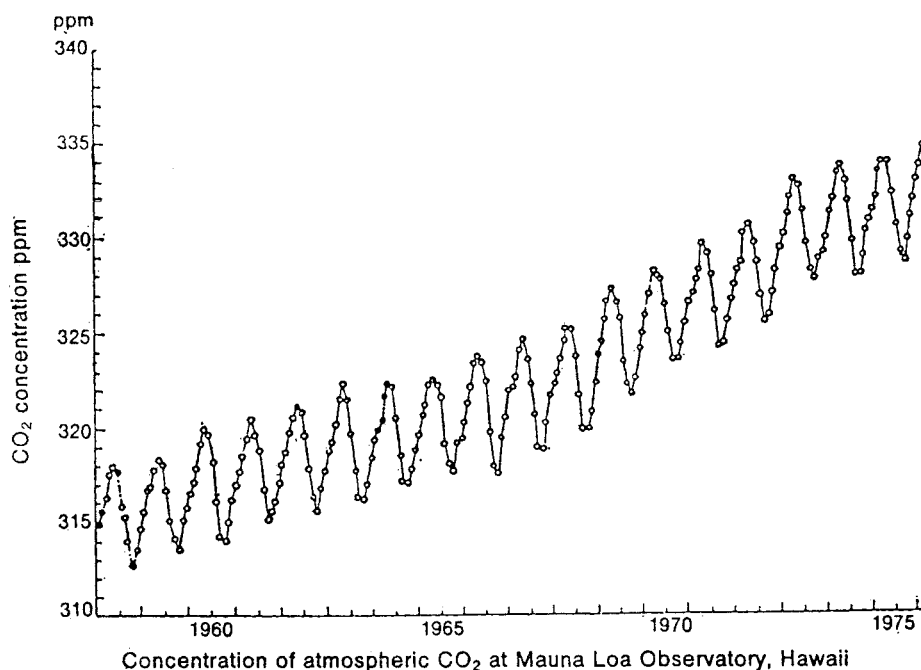


十七、Chemistry and The Environment

Keiichiro Fuwa

*The National Institute for Environmental Studies
Japan Environment Agency*

1. Concentration of atmospheric CO₂



2. The Origins of Life on Earth

- | | |
|-------------------------------------|-------------------------------|
| (a) Formation of the Universe | 15×10 ⁹ years ago |
| (b) Solar System and the Earth | 4.6×10 ⁹ years ago |
| (c) Evolution of Primitive on Earth | 3.5×10 ⁹ years ago |
| (d) Human Race | 2×10 ⁶ years ago |

3. Historic Landmarks Related to Environmental Problems with Special Reference to Japan

Publication of "Silent Spring" by Rachel Carson	1962
Basic Law for Environmental Pollution Control (Japan)	1967
Minamata Disease, Itai-Itai Disease (recognition of the cause, Japan)	1968
SCOPE, Scientific Committee on Problems of the Environment (ICSU)	1969
MAB, Man and the Biosphere Programme (UNESCO)	1971
Environment Agency (Japan)	1971

UN Conference on the Human Environment	1972
United Nations Environment Programme	1972
National Institute for Environmental Studies (Japan)	1974
Vienna Convention for the Protection of the Ozone layer	1985
Montreal Protocol on Substances that Deplete the Ozone layer	1987
Publication of "Our Common Future" by G. H. Brundtland Committee	1987
International Geosphere-Biosphere Programme (ICSU)	1988
Tokyo Conference on Protection of the Global Environment	1989
Environmental Chemistry, (as a Horizontal Union Programme, IUPAC)	1989

4. Basic Law for Environmental Pollution Control (1967)

Seven Typical Problems:

AIR POLLUTION

WATER POLLUTION

SOIL POLLUTION

NOISE

VIBRATION

GROUND SUBSIDENCE

OFFENSIVE ODORS

5. Air Pollution Control Law (1968, 1989)

Sulphur oxides (SO_x)

Nitrogen oxides (NO_x)

Suspended particulates (Soot, Dust)

Photochemical oxidants (O₃, PAN)

Carbon Monoxide (CO)

Asbestos

6. Water Pollution Control Law (1970, 1989) (relating to human health)

Cadmium (Cd)

Cyanides (Mx CN)

Organophosphorus (org-P)

Lead (Pb)

Hexavalent Chromium (Cr^{VI})

Arsenic (As)

Total mercury (Hg)

Alkyl mercury (C_n H_{2n+1}·Hg)

Polychlorinated biphenyls (PCB)

Trichloroethylene (CHCl=CCl₂)

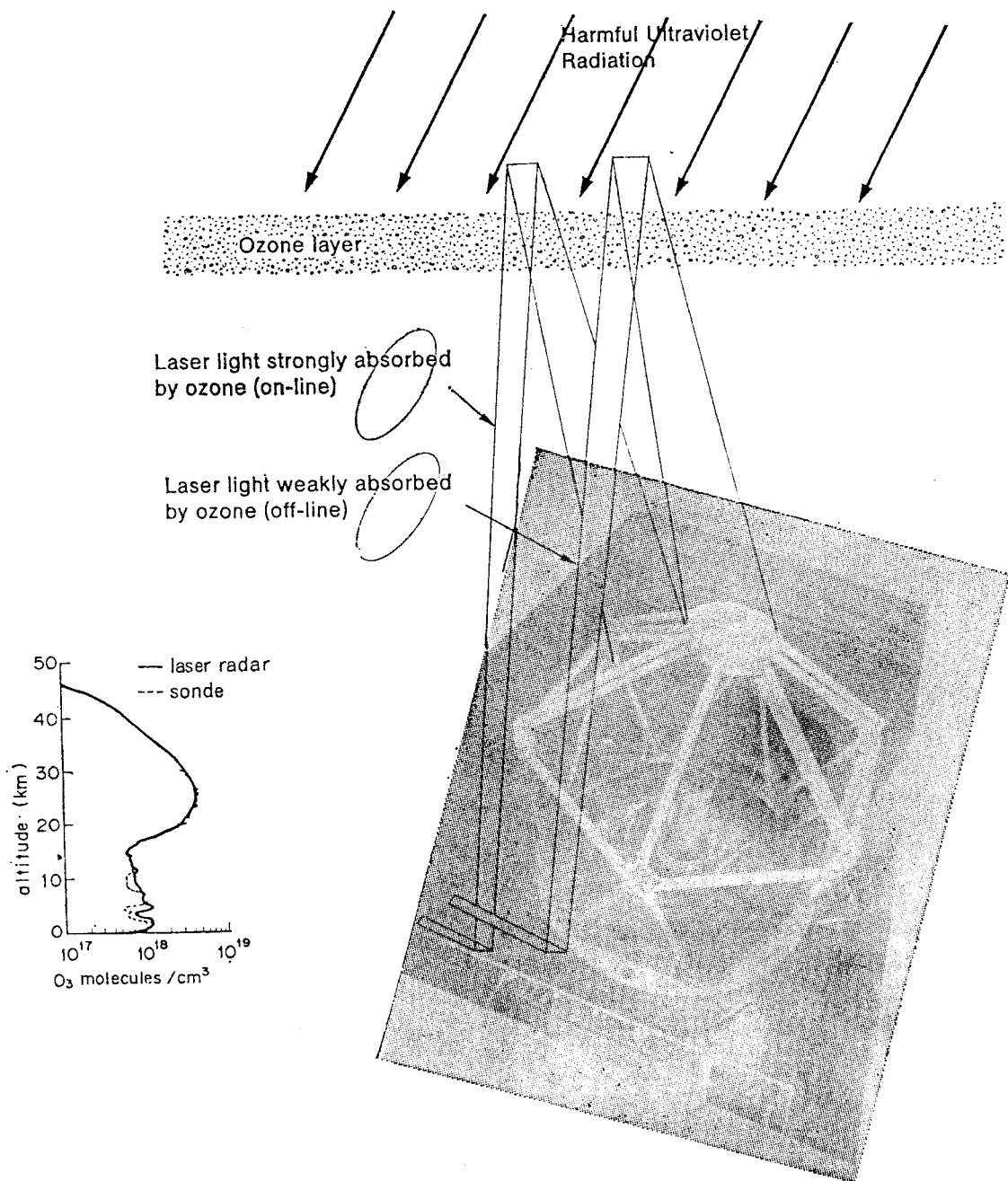
Tetrachloroethylene (CCl₂=CCl₂)

8. The Measurement of Atmospheric Ozone by Laser Radar Techniques

Light scattered by molecules in the air is collected by a telescopes.

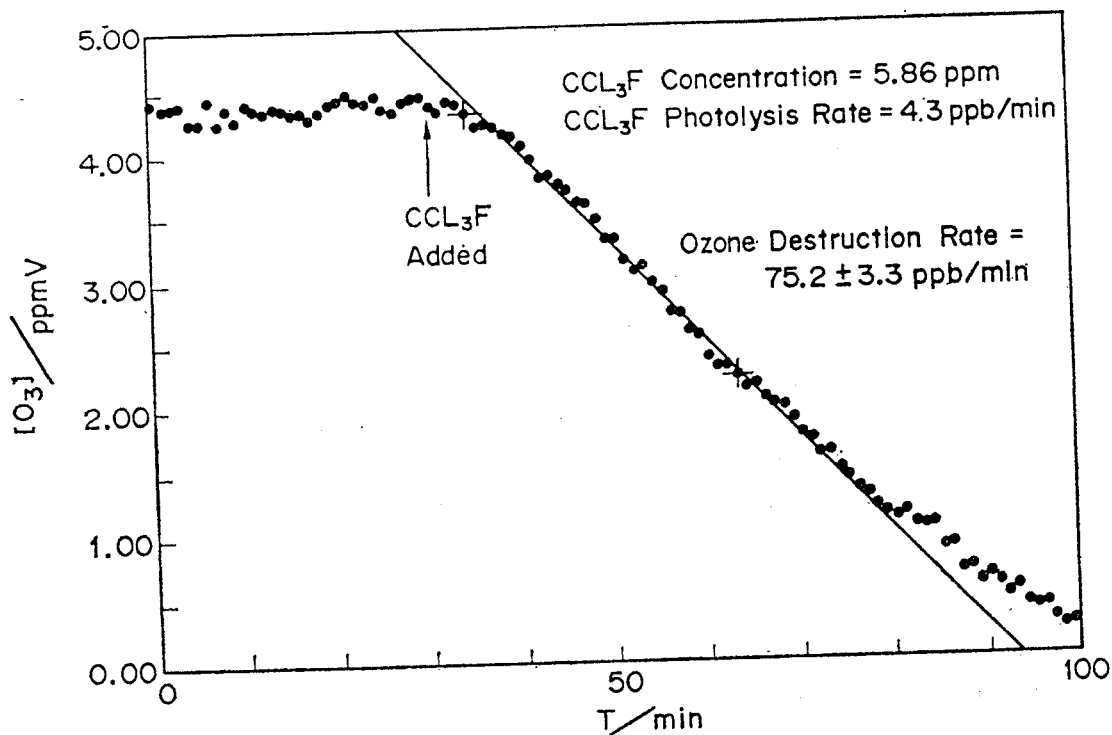
The ozone is measured from the difference between the on-line and off-line values.

All the analysis has been done at the National Institute for Environmental Studies Japan.

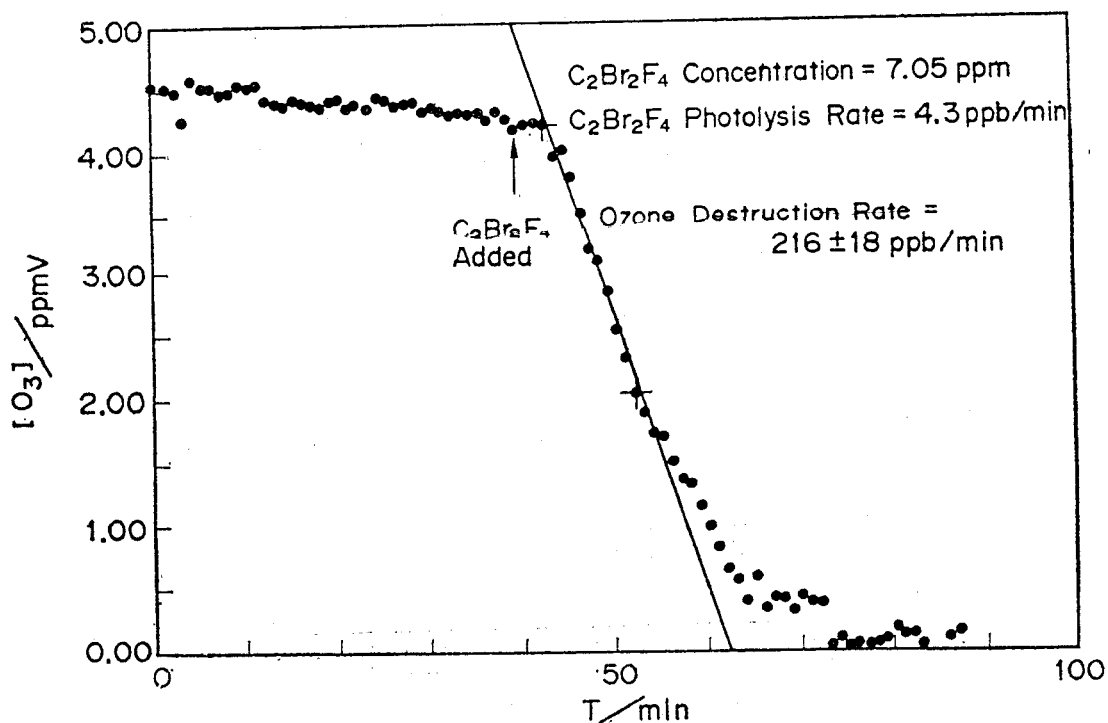


9. Destruction of Ozone by CFC and Halon Studied by a Photochemical Chamber (Nies-Japan 1969)

CFC-11 (CCl_3F)



HALON-2402 ($\text{C}_2\text{Br}_2\text{F}_4$)



10. Tokyo Conference on the Global Environment and Human Response Towards Environmentally Sound and Sustainable Development (Sept. 11-13, 1989, Tokyo)

Recommendations:

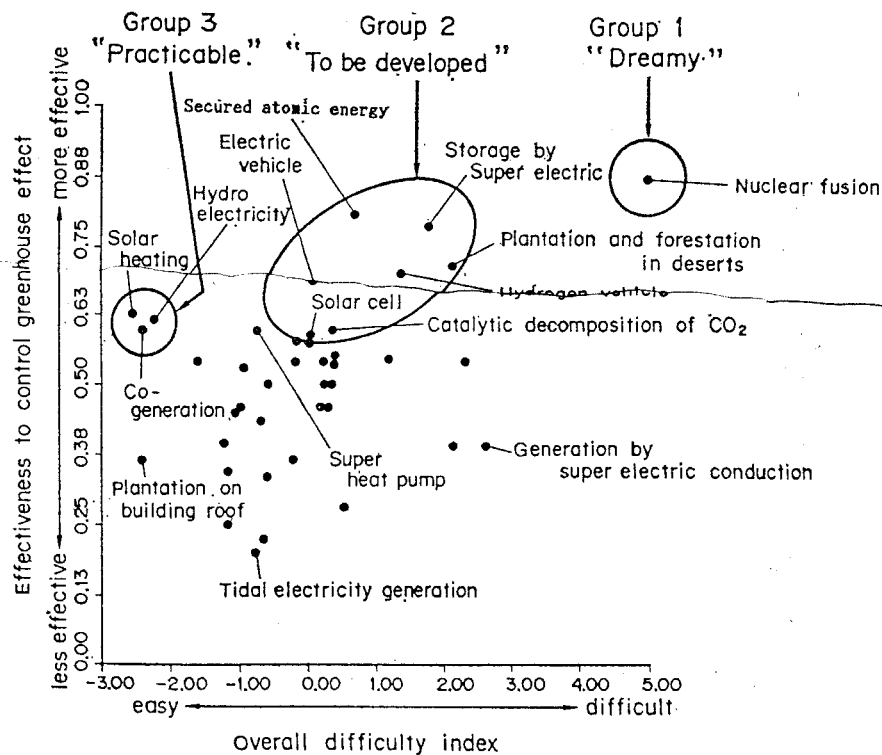
- A. Reducing Uncertainties
 - a) Global monitoring using ground and ocean stations, ships, airplanes and satellites.
 - b) Global environmental research center.
 - c) Training of specialists.
- B. Technological Advances

Fields of energy, bio-technology and agriculture.
- C. Financial Arrangements

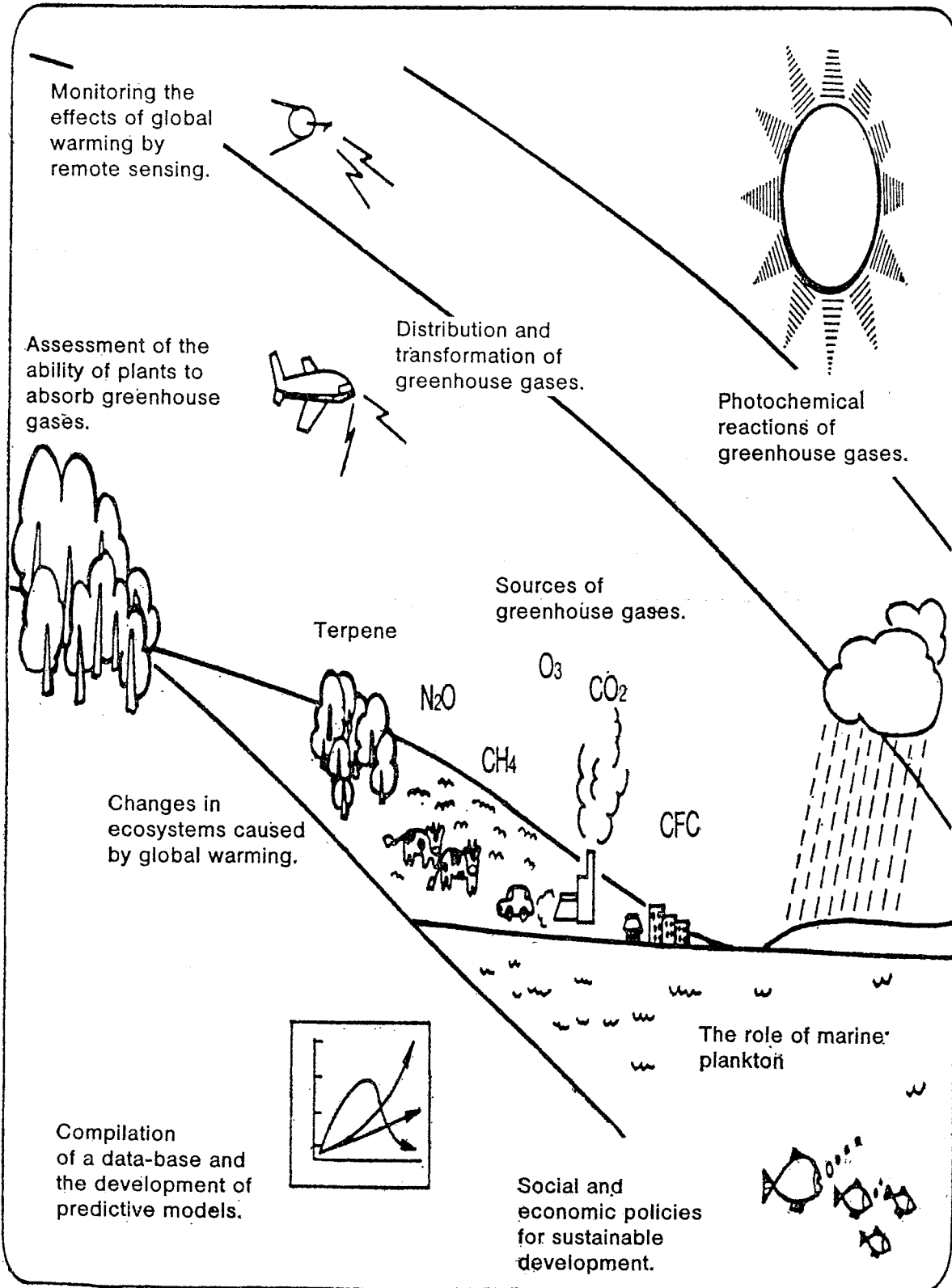
International financing and official assistance and development.
Mechanisms such as "debt-for-nature swaps"
- D. Institutional Responses

Expand the capacity of national, regional and international organizations.
UNEP, WMO, MAB, IGBP etc.

11. An Evaluation of "Environmentally Sound" Technologies for Controlling the Effects of Climatic Change (questionnaire survey, 1989, Nies Japan)



12. An Evaluation of the Causes and Effects of Global Warming



化 學 與 環 境

不 破 敬 一 郎

日本國立公害研究所

摘 要

人類與環境關係密不可分，世界各國對環境問題又漸予重視。本文僅就化學和環境關係提出說明。

1. 地球之生命起源
2. 歷史上環境問題之路標（特別與日本有關者）
3. 環境污染管制之基礎法律
4. 空氣污染管制
5. 水污染管制法律（與人體健康有關者）
6. 工業來源之有毒化學物質
7. 應用雷射雷達技術測定大氣層之臭氧
8. 應用光化學腔體研究鹵化合物對臭氧之破壞
9. 宇宙環境問題預警之原因和影響評估（黃登福譯）