westerlies, higher temperatures and higher ozone mixing ratios at high latitudes. It is possible that the long term change in the lower stratosphere are also related to the long-term trend in wave activity, although the evidence is not clear. Because the wave activity in 1979 was very vigorous, a simple comparison of atmospheric states between the 1979 and other recent years could lead to misleading conclusions on the rate of ozone decrease over the Antarctic. A long-term chemical effect is not precluded.

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HETEROGENEOUS REACTIONS RELATED TO ANTARCTIC OZONE HOLE (ABSTRACT)

Shiro HATAKEYAMA[1] and Ming-Taun LEU[2]

[1]*National Institute for Environmental Studies, Yatabe-machi, Tsukuba-gun, Ibaraki 305*
[2]*Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109, U.S.A.*

Reactions of chlorine nitrate ($ClONO_2$) with HCl and H_2O have been investigated using a 320-L Pyrex chamber and long-path FT-IR spectroscopy. Both reactions showed highly heterogeneous nature. Obtained upper limit rate constants fot homogeneous reactions were 8.4×10^{-21} and 3.4×10^{-21} $cm^3\,molec^{-1}\,s^{-1}$ for $ClONO_2+HCl$ and $ClONO_2+H_2O$, respectively, at 296 ± 2 K at 730 torr total pressure. The yield of HNO_3 from both the reactions was 1.05 ± 0.09 and 0.86 ± 0.08, respectively. Formation of HOCl was confirmed in the latter reaction. No synergistic effect between HCl and H_2O was observed for the reaction with $ClONO_2$. The kinetic behavior of the reaction $ClONO_2+H_2O$ was well described by simple first-order kinetics while the behavior of the reaction $ClONO_2+HCl$ was found to obey the Langmuir adsorption isotherm.

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ATMOSPHERIC CARBON DIOXIDE CONCENTRATION AT SYOWA STATION (69°00′S, 39°35′E), ANTARCTICA (1985) (ABSTRACT)

Haruta MURAYAMA[1], Masayuki TANAKA[2], Takakiyo NAKAZAWA[2], Sadao KAWAGUCHI[3], Takashi YAMANOUCHI[3], Shuji AOKI[3] and Masataka SHIOBARA[4]

[1]*Department of Chemistry, Faculty of Education, Yokohama National University, 156, Tokiwadai, Hodogaya-ku, Yokohama 240*
[2]*Upper Atmosphere Research Laboratory, Faculty of Science, Tohoku University, Aramaki Aoba, Sendai 980*
[3]*National Institute of Polar Research, 9–10, Kaga 1-chome, Itabashi-ku, Tokyo 173*
[4]*Meteorological Research Institute, 1–1, Nagamine, Yatabe-machi, Tsukuba-gun, Ibaraki 305*

Since 1984, continuous measurements of the atmospheric CO_2 concentration have been carried out at Syowa Station, Antarctica. Preliminary inspection of the data showed that; (1) a regular

diurnal variation is not observable; (2) irregular variations are sometimes observed with an extremely small amplitude of 0.2 ppmv at most; (3) a seasonal variation with the minimum concentration in mid-April and the maximum concentration in mid-October and peak-to-peak amplitude of about 1.2 ppmv is detected; and (4) an annual mean value of CO_2 concentration is 342.6 ppmv.

The results obtained in 1985 are as follows: An annual mean value of CO_2 concentration is 343.8 ppmv. The pattern of seasonal variation is almost the same as that of the previous year. But a secular increase trend of the CO_2 content is larger than 1984.

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BALLOON MEASUREMENTS OF AEROSOLS IN THE ANTARCTIC STRATOSPHERE (III) (ABSTRACT)

Yasuhiro MORITA[1], Yasunobu IWASAKA[2], Masataka SHIOBARA[3] and Hiroshi KANZAWA[4]

[1]*Research Institute of Atmospherics, Nagoya University, 3–13, Honohara, Toyokawa 442*
[2]*Water Research Institute, Nagoya University, Furo-cho, Chikusa-ku, Nagoya 464*
[3]*Meteorological Research Institute, 1–1, Nagamine, Yatabe-machi, Tsukuba-gun, Ibaraki 305*
[4]*National Institute of Polar Research, 9–10, Kaga 1-chome, Itabashi-ku, Tokyo 173*

Balloon measurements of aerosols have been made in the winter and spring of 1985 to investigate the behavior of the antarctic stratospheric aerosols. Number concentration and the size distribution of aerosol particles with diameter greater than 0.3 μm were measured by using a light scattering aerosol particle counter. The vertical distributions of the number concentration were obtained up to about 18 km on July 21 and about 17 km on October 8, 1985. Compared with the result on June 3, 1983, the stratospheric aerosol concentration on July 21, 1985 decreased by a factor of three. This indicates that the higher aerosol concentration on June 3, 1983 reflects both the effect of El Chichón eruption and winter increase of aerosol concentration. On the other hand, the high aerosol concentration on July 21, 1985 reveals a regular seasonal variation having a remarkable winter maximum. The difference in the stratospheric aerosol concentration between the two winter measurements can be attributed to the aftereffect of El Chichón eruption.

An extensive aerosol layer was also observed in the measurement on October 8, 1985. The concentration was about three times higher than that usually appeared during the low volcanic period in the summer season. The high aerosol concentration cannot be attributed to the aftereffect of El Chichón eruption. The stratospheric temperature measured during the flight of October 1985 was about 5–10 degrees colder than that of October 1983. The high aerosol concentration of October 1985 could be attributed to the aerosol formation in the cold spring season.

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