MODELING OF POLAR STRATOSPHERIC CLOUDS (ABSTRACT)

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Formation of polar stratospheric clouds (PSCs) is simulated assuming that they consist of H_2O ice particles. Stratospheric aerosols are assumed to work as the ice-forming nuclei if the supersaturation ratio exceeds the critical values determined from aerosol size. Growth of the PSC particles is computed using the condensation equations.

Two cases of cooling rates of the atmosphere are tested. One is 1.0 K/day, and the other is 0.25 K/day. The number concentration of the PSC particles ranges between 0.1 and 0.4/cm^3, and the particle size ranges between 4 and 6 μm. Further inspection shows that the particles are larger in number concentration but smaller in particle size when the larger cooling rate is used.

A simulation is also carried out for the temperatures measured in the Antarctic winter of 1980 incorporating the fall effect of PSC particles. The result shows that growth of the PSC particles is restricted by the fall effect, particularly in the upper part of the PSC layer.

(*Received November 28, 1989*)

GIANT PARTICLES IN THE LOWER STRATOSPHERE (ABSTRACT)

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Polar stratospheric clouds (PSCs) are well known phenomena in the lower polar stratosphere. Using the data of balloon flights at McMurdo Station, Antarctica, D.J. HOFMANN *et al.*(J. Geophys. Res., **93**, 665, 1988) and D.J. HOFMANN (Nature, **337**, 447, 1989) have recently showed vertical profiles of aerosol above the altitude of 10 km. The upper limit of the particle size of their measurements was less than about 1 μm. We present here the results of balloon observations for measuring relatively large particles (more than 10 μm) in the lower stratosphere. The sounding instrument of particles was similar in design to that described by M. MURAKAMI *et al.* (J. Meteorol. Soc. Jpn., **65**, 803, 1987) called Cloud Particle Video Sonde (CPVS), whose main device was a TV camera. Four balloon flights for sounding stratospheric particles were carried out on May 28, August 5, August 20 and September 2 in 1988 at Syowa Station (69°S, 40°E), Antarctica. Giant particles which look like liquid particles were found on pictures transmitted from the TV camera ascending with the balloon. The size of the largest one was about 150 μm diameter. Particles of more than 100 μm diameter were found every flight in the lower stratosphere.

There is a possibility that the film does not show liquid particles, but non-uniformity of the surface of the film itself, because CPVS uses water-repellent film for collecting particles and the

coating was probably not uniform on the film surface. An attempt to check this point is being carried out.

(*Received February 3, 1990; Revised manuscript received April 2, 1990*)

THE DOUBLE-JET AND SEMI-ANNUAL OSCILLATIONS IN THE SOUTHERN HEMISPHERE SIMULATED BY THE METEOROLOGICAL RESEARCH INSTITUTE GENERAL CIRCULATION MODEL (ABSTRACT)

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The tropospheric circulation in the Southern Hemisphere has some remarkable features such as a deep circumpolar trough throughout the year, a double-jet in winter months and large semi-annual components in the fields of sea-level pressure and zonal wind. A 12-year integration with the Japan Meteorological Research Institute general circulation model is presented and compared with 9-year observations for the period 1979–1987.

The simulated meridional temperature gradient in July has two maxima, one at 30°S in the upper troposphere and the other at 60°S in the lower troposphere. The horizontal distribution of the strong baroclinic zone is not zonally uniform. The simulated zonal wind at 500 mb in July shows double-jet structures in the Pacific sector, one at 30°S and the other at 60°S, and only one jet in the Atlantic and Indian sectors, corresponding to the observation. There is a large wavenumber 1 stationary eddy field at 60°S with a trough in the Indian Ocean and a ridge in the Pacific, in accordance with the double-jet in the latter. Two strong baroclinic zones in the Pacific sector can be seen from May to October, while there is only one in the Pacific sector during the rest of the year. The seasonal change of the zonal wind follows it. Between 50°S and 60°S, baroclinity becomes strong twice a year during spring and fall, leading to the semi-annual oscillation in the fields of the zonal wind and sea-level pressure. A good simulation of the stationary eddies and the seasonal cycle of the Antarctic temperature field such as a rapid cooling in autumn of the Antarctic lower troposphere, a coreless winter and coldest atmosphere in early spring, is crucial to a successful simulation of the winter double-jet structures and the semi-annual oscillations in high southern latitudes.

(*Received November 9, 1989*)

RADIATIVELY DETERMINED TEMPERATURE IN THE MIDDLE ATMOSPHERE IN THE POLAR REGION (ABSTRACT)

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Radiatively determined temperature, *i.e.*, time-marched temperature under the absence of dynamical warming, in the middle atmosphere is investigated for various conditions. The model