buoyancy effects (Budd and others 1979) modifies the evolution of the ice sheet. An attempt will then be made to simulate the Holocene retreat of the Antarctic ice sheet.

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SOUTHERN OCEAN SEA-ICE RESPONSE TO ATMOSPHERIC WARMING

(Abstract)

by

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The response of Antarctic sea ice to hypothetical atmospheric temperature increases has been simulated with a thermodynamic/dynamic sea-ice model having horizontal resolution of approximately 200 km. The model was run, as a standard case, with mean-monthly climatological air temperatures and dew points, followed by four subsequent simulations with all temperatures and dew points uniformly increased by -1, +1, +3, and +5 K. A temperature increase of 3 K suffices to eliminate the mid-summer ice around all of East Antarctica, with ice remaining only in the Amundsen and western Weddell seas. A temperature increase of 5 K suffices to eliminate the summer ice cover almost entirely, a small amount of ice remaining only off the Thwaites Glacier region in the Amundsen Sea. In winter, the hemispheric average of the calculated ice-edge retreat rates is 1.4° latitude for each 1 K increase in atmospheric temperature. These retreat rates are nonlinear with respect to temperature change, the sensitivity of the position of the ice edge decreasing as temperatures are further increased. This nonlinearity in the response of the ice edge occurs in the response of other ice variables as well, including the total ice area and total ice volume at maximum ice extent. These maximum areas and volumes decrease by roughly half with an atmospheric temperature increase of 5 K. Among the other simulation results of increasing the atmospheric temperatures is an increase in the temporal asymmetry in the annual cycle of ice cover, showing longer, slower periods of ice growth and shorter, faster periods of ice decay.

The results of this study are described in full in a paper to appear in: Hansen J, Takahashi T (*eds*) *Climate processes: sensitivity to solar irradiance and CO_2*. Washington, DC, American Geophysical Union (M Ewing Series 4).

PAST ACCUMULATION RATES AT CAMP CENTURY AND DEVON ISLAND, DEDUCED FROM ICE-CORE MEASUREMENTS

(Abstract)

by

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Measurements of oxygen-isotope ratio in cores from polar ice sheets have provided detailed long-term records of past fluctuations in temperature. Cores in which annual layers can be identified also contain a record of past precipitation rates provided that one can calculate the total vertical strain to which each layer has been subjected since it was deposited at the surface. Because this is difficult, few such records have been published so far.

Nye (1963) proposed a method based on the assumption that the vertical strain-rate along any vertical line in the ice was uniform at any instant and that there was no basal melting. The first assumption is invalid and the method gives implausible results in the cases in which we have used it. Reeh and others (1978) obtained continuous records of precipitation, extending back to 600 AD in one case, from three cores in Greenland. They also assumed that the vertical strain-rate did not vary with depth, but only

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