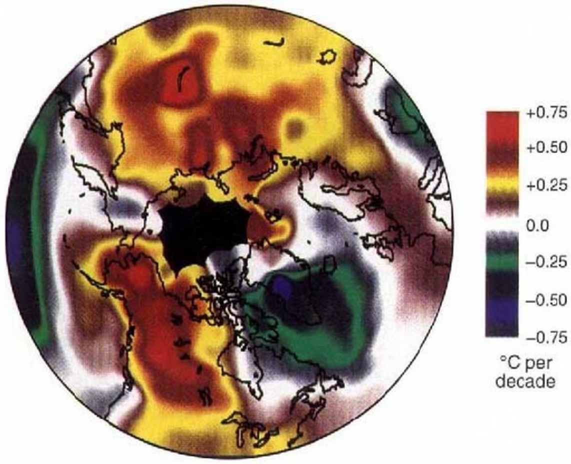
tions are similar in the Arctic and hemisphere time series, and the Arctic variations generally appear as amplifications of the latter. Interestingly, the Arctic temperatures deduced from the tree rings show a century-scale warming interrupted by a cooling from the 1940s to approximately 1970; the instrumental temperatures indicate that the warming over the high-latitude land areas was most pronounced after the late 1960s.

A highly relevant model experiment has recently been performed by Oglesby and Saltzman[8] as a part of MECCA (Model Evaluation Consortium for Climate Assessment). A short-term climate simulation using CO_2 concentrations that increased from 330 to 342 parts per million (corresponding approximately to the increase from 1973 to 1983) showed no significant warming in the Arctic, even in winter. However, when the model was run with CO_2 prescribed to increase from 330 to 450 parts per million (the change projected for 2048), significant warming occurred in the Arctic. The implication is that natural variability will overwhelm the greenhouse signal in the Arctic over a ten-year period, but that the Arctic warming is detectable as a statistically significant signal in a model simulation of 70–100 years.

These studies indicate that climate-model results are not necessarily at odds with recent temperature variations in high latitudes. One may also point to compatibilities between precipitation data of recent decades and model projections of an increase of high-latitude precipitation as greenhouse-gas concentrations increase. Wetter conditions in high latitudes are quite plausible if the greenhouse scenario includes surface warming, higher evaporation rates, and a greater moisture-holding capacity of the warmer atmosphere. Recent data analyses have shown an increase of precipitation in the northern extratropics during the twentieth century[9,10], and the increase over northern Canada and Alaska during the past few decades has been especially large[11].

One may conclude that the greenhouse projections of climate models are consistent, in several respects, with high-latitude data from the past few decades. However, the model projections are not consistent with other observational findings, such as the remarkable strengthening of the wintertime temperature inversions reported by Kahl *et al.* from over the Arctic Ocean. Subtleties in the model formulations of Arctic boundary-layer processes (including cloud/radiative interactions) may well be at the root of this discrepancy. Certainly, the vertical resolution of current models is inadequate. Alternatively, the changing spatial and temporal distributions of the temperature data relative to the climatological spatial pattern may contribute to the apparent discrepancy. As the breakdown of the near-surface temperature inversion contributes substantially to the polar amplification of the greenhouse warming projected by models, the resolution of this discrepancy deserves high priority. One possible approach is to replicate Kahl *et al.*'s sampling strategy, both spatially and temporally, using output from a climate model run with the changing CO_2 concentrations of the period 1950–90. □



Trends of annual temperature (°C per decade) for 1961–90 based on land-station and marine-ship reports. Data from the Arctic Ocean are not included. The analysis was obtained by spatially filtering local trends using a 400-km radius of influence. All points in black area at centre are more than 400 km from locations for which data were consistently available. (From ref. 5.)

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RÉSUMÉ

Fading vision

THE reflected glory of the supernova SN1987A is on the wane, according to A.P.S. Crotts and W.E. Kunkel (*IAU Circ.* No. 5691; 1993). When the precursor star exploded in the Large Magellanic Cloud 180,000 years ago, it launched an expanding shell of intense light into space. The first astronomers knew of it was when that shell reached Earth in February 1987. But within a year, light echoes from material around the supernova appeared — a ring of gas was illuminated first, then a bipolar nebula of dust and gas either side of the star (ejected during its dying phase). The light reflected by dust has now faded from view, so that the part of the shell receding from us must now have reached empty space. The nebula must extend 2.2 light years beyond SN1987A (our nearest star is 4.2 light years away), Crotts and Kunkel say. The gas, heated and ionized by the flash, will continue to glow for some time.

Big blows

THE gales that lashed Britain in 1987 and 1990 have blown some good: they have helped J. R. L. Allen estimate characteristics of winds that felled trees long ago (*Phil. Trans. R. Soc.* B**338**, 335–364; 1992). Until now, estimates of wind direction in the geological past have largely relied on deposits such as dune fields, laid down in arid conditions. The abundant data from trees felled in the recent storms have allowed Allen to relate wind direction and strength to the manner in which trees are felled (bent, snapped or uprooted). Allen applied the findings to ancient trees blown over between 6,000 and 2,500 years ago. It turns out that Britain's weather, at least in the area of southwest England where Allen collected his data, seems to have been as bad then as it is now.

Take five

TESTS for an exotic fifth force, which would look like a composition-dependent correction to gravity, continue to occupy a small band of dedicated physicists. Having ruled out any compositional variation in gravitational acceleration on a terrestrial scale, the group of E. G. Adelberger has turned its attention to cosmological dark matter (G. Smith *et al.* **70**, 123–126; 1993). If different varieties of ordinary nuclear matter can be suspected of generating a fifth force, what of the invisible component, plausibly exotic, that astronomers say makes up 90% of our Galaxy? In the event Smith *et al.* find that galactic dark matter has no differential effect on aluminium, beryllium or copper (their test masses of choice), which would have shown up as a diurnal signal from their apparatus as the Earth rotated. Nor does any effect show up from extragalactic material. Where to look now?