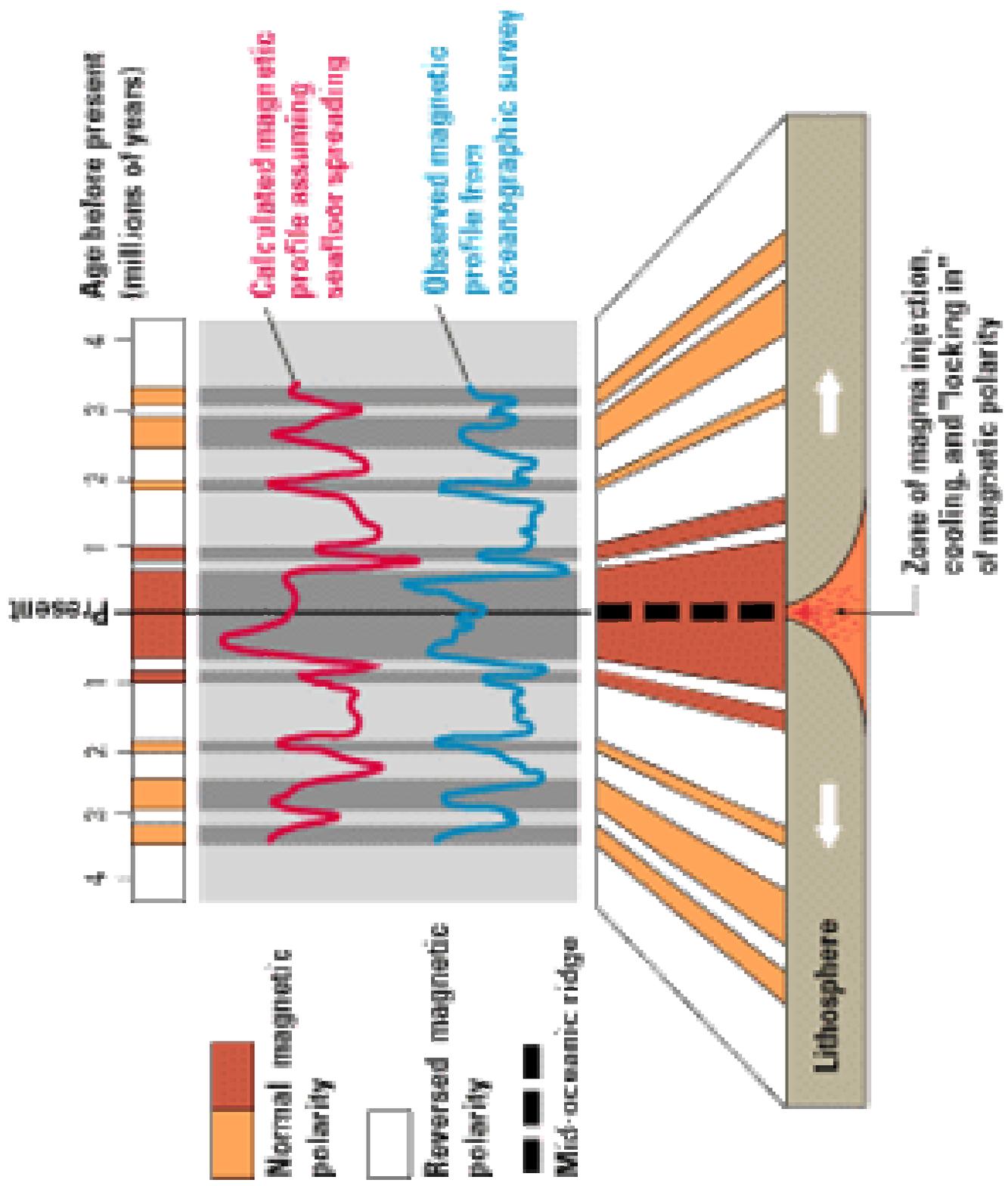
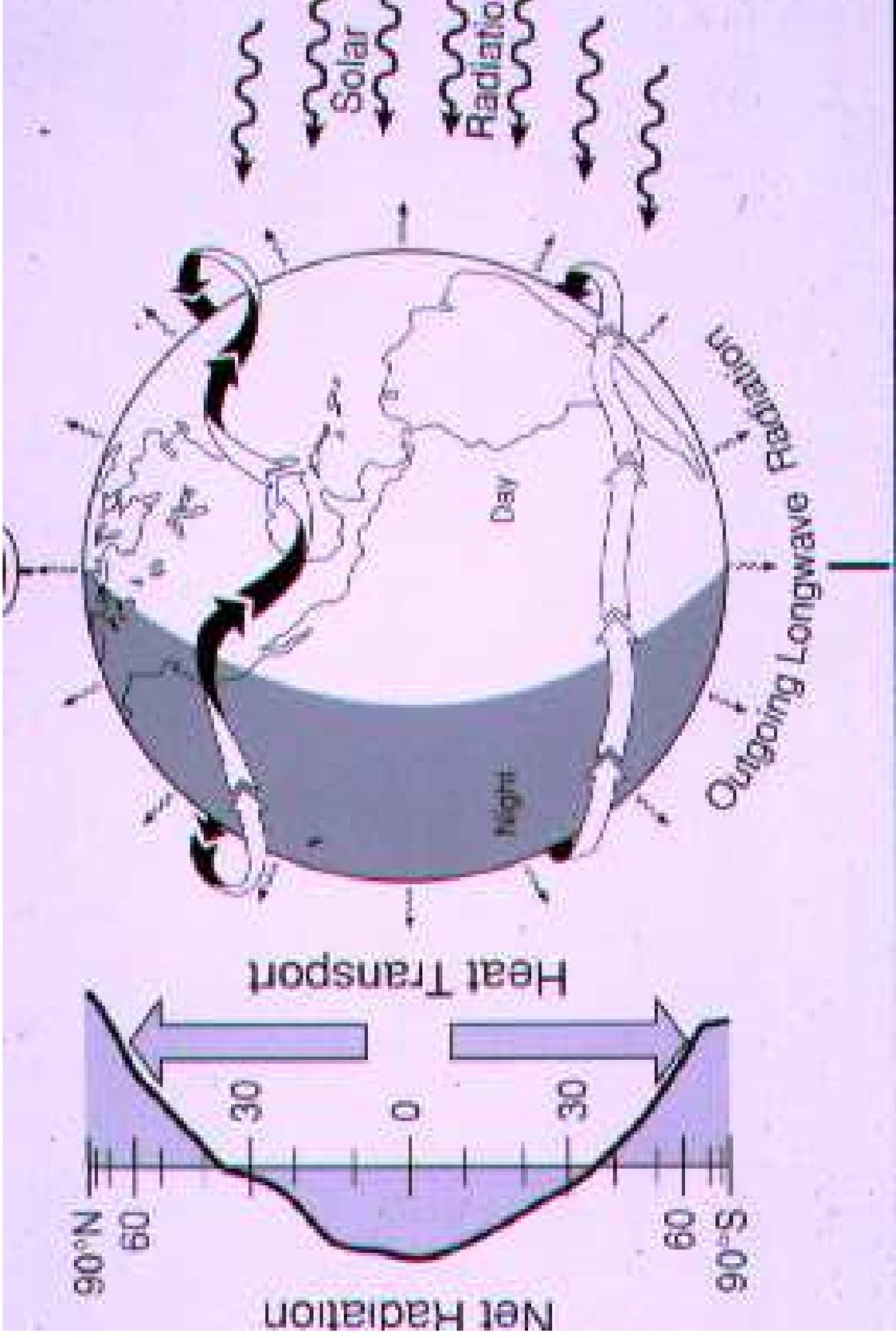
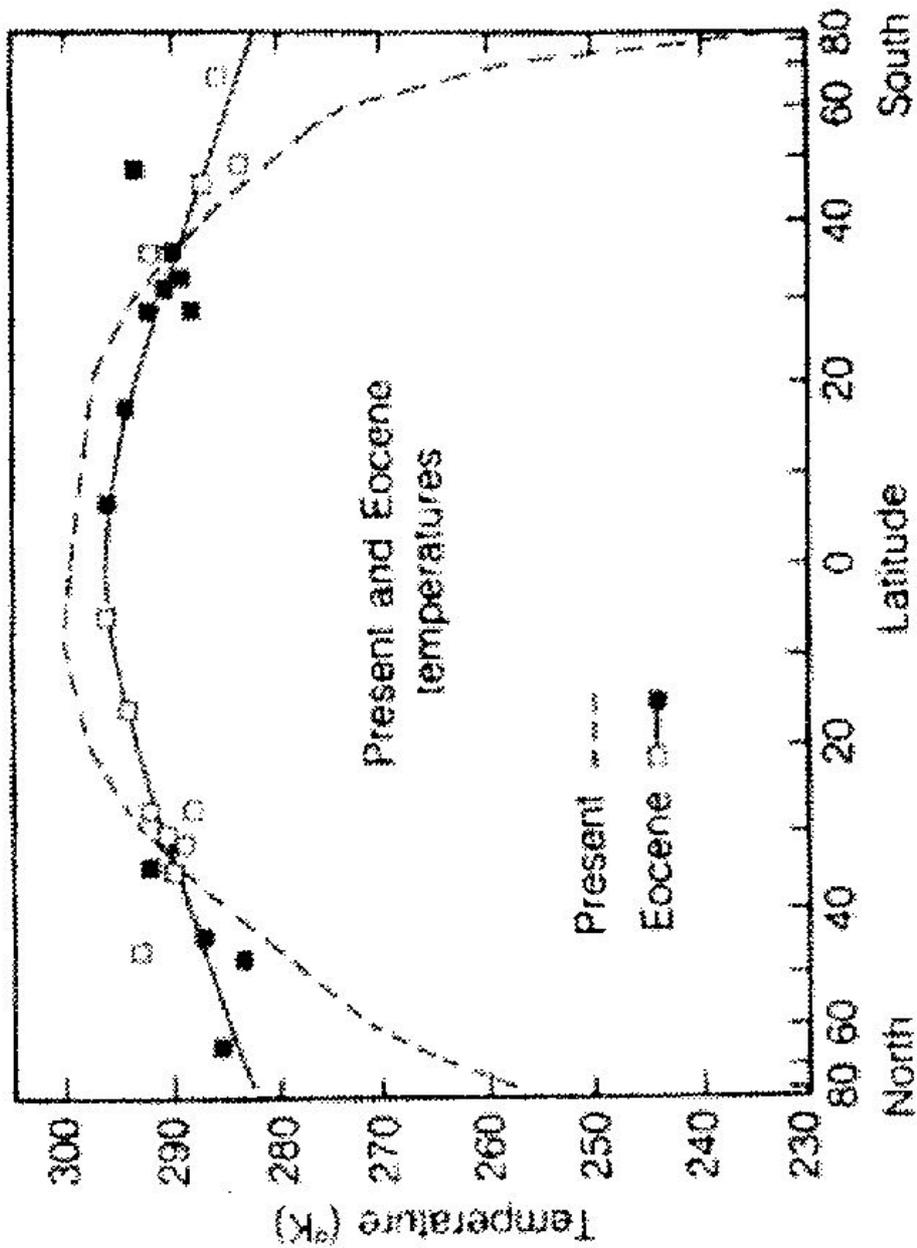


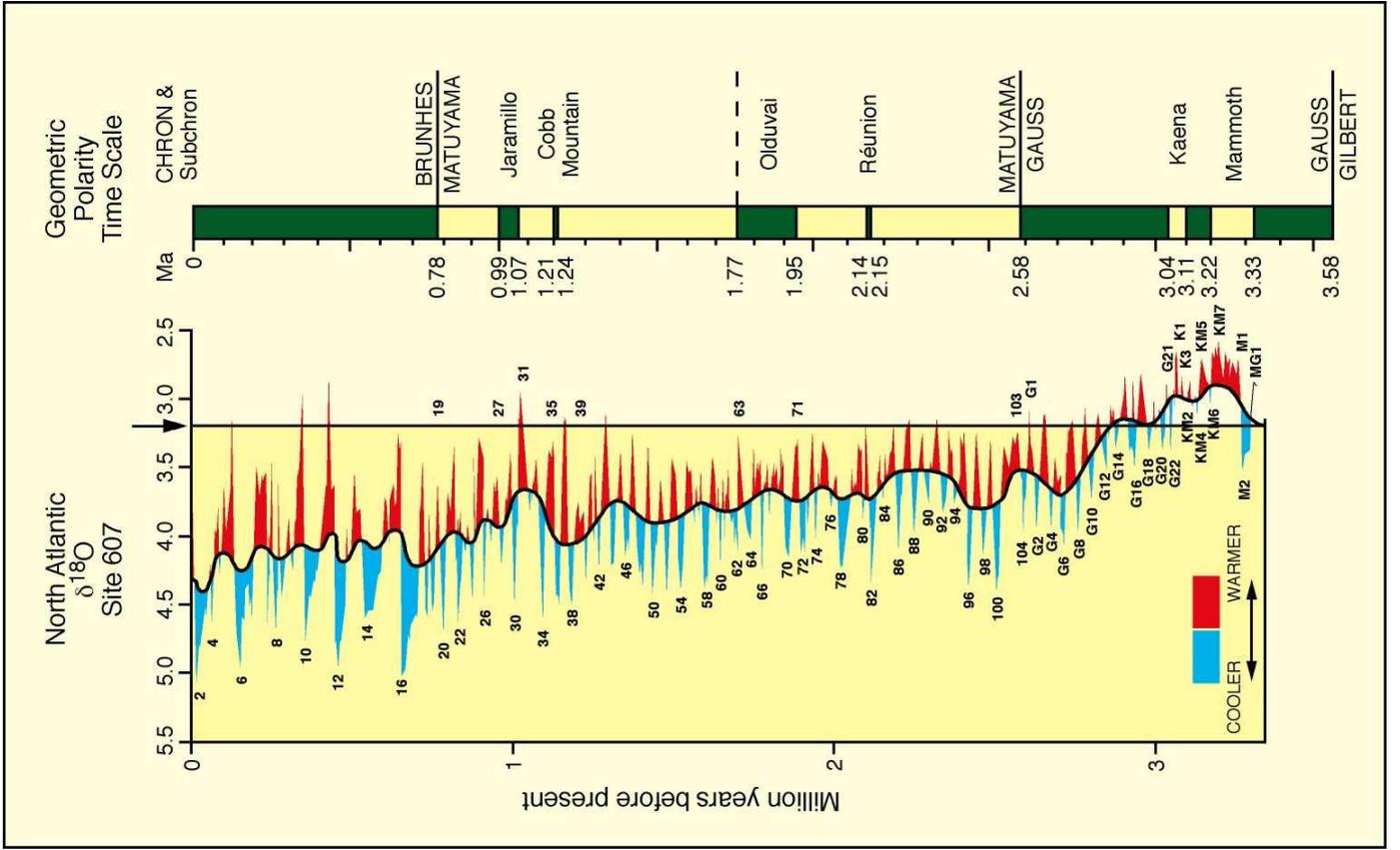
Understanding the Earth?

Geoffrey Boulton





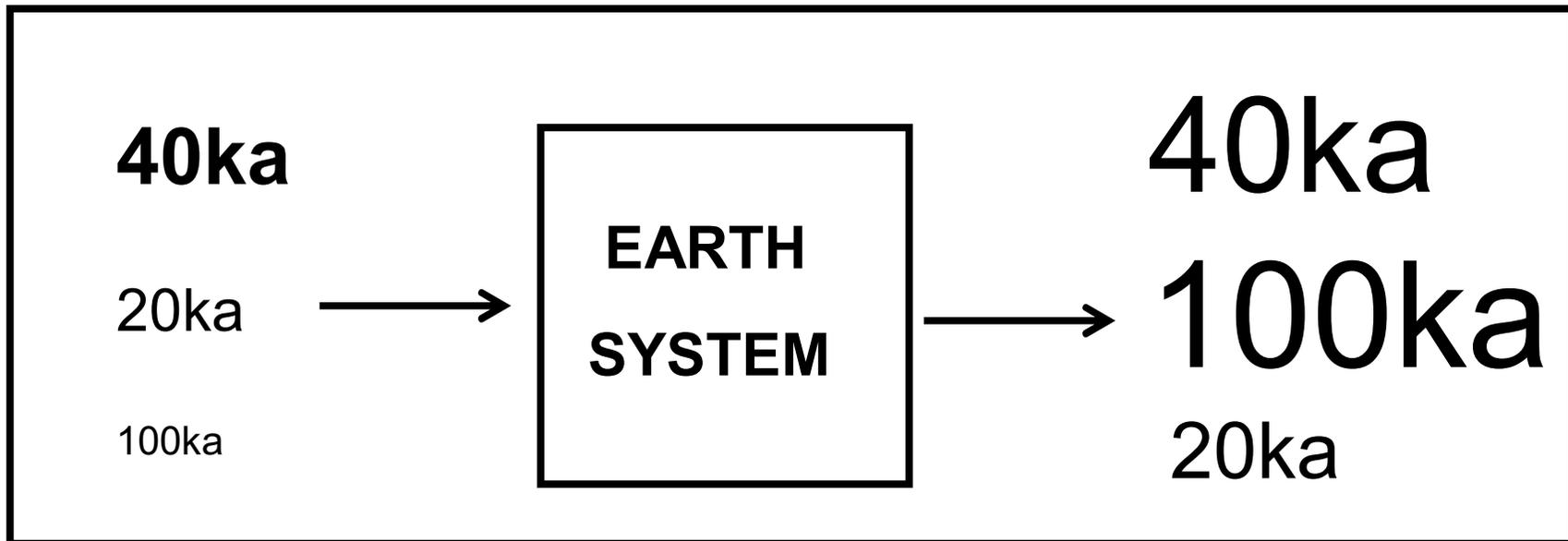




LOW FREQUENCY BEHAVIOUR OF THE CLIMATE SYSTEM IN THE LAST 750ka

INPUT
(ORBITAL
FORCING)

OUTPUT
(CLIMATE)



PRINCIPAL COMPONENTS OF THE COUPLED CLIMATE SYSTEM & THEIR RESPONSE TIMES

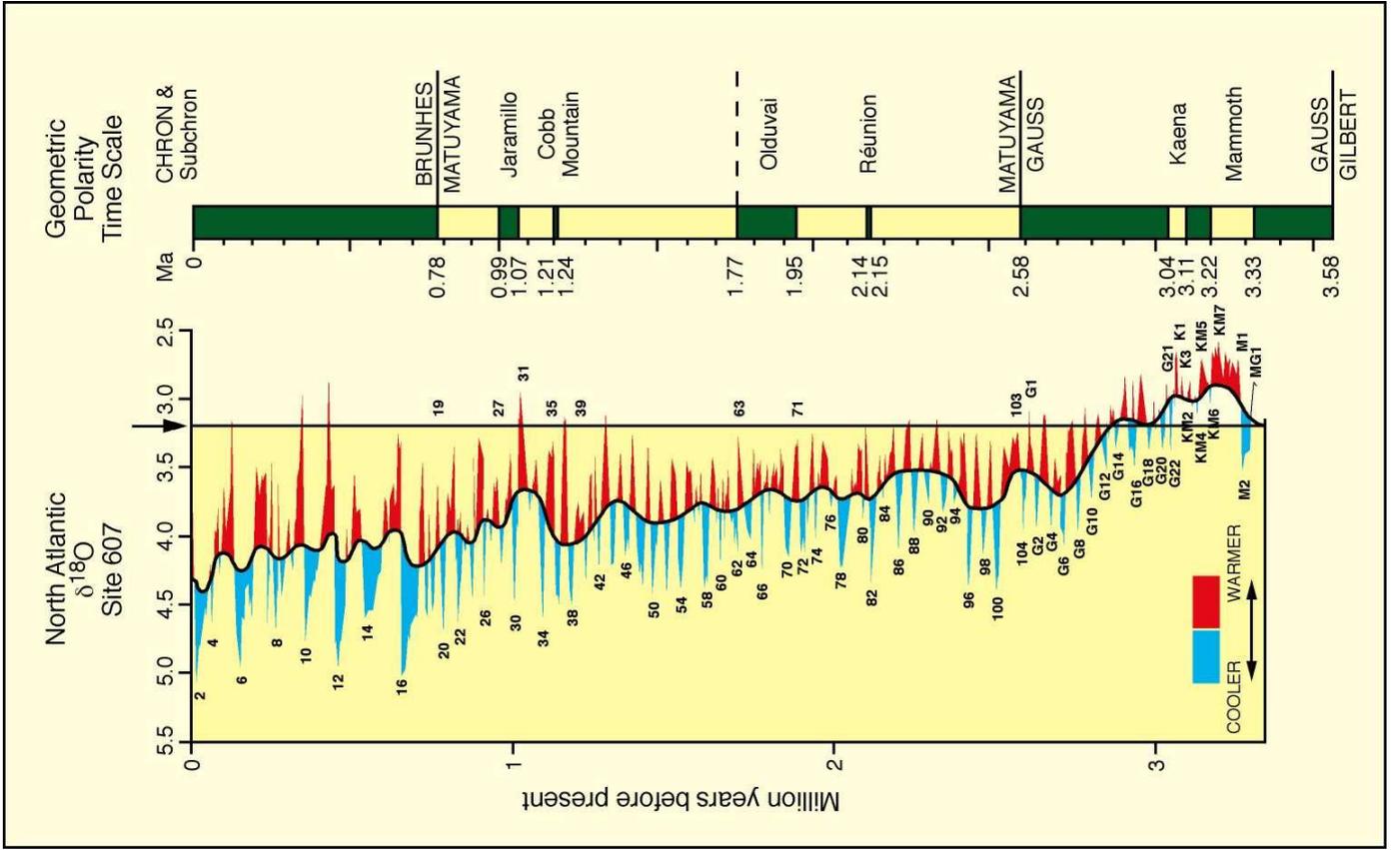
ATMOSPHERE - DAYS

BIOSPHERE - 1-100s YEARS

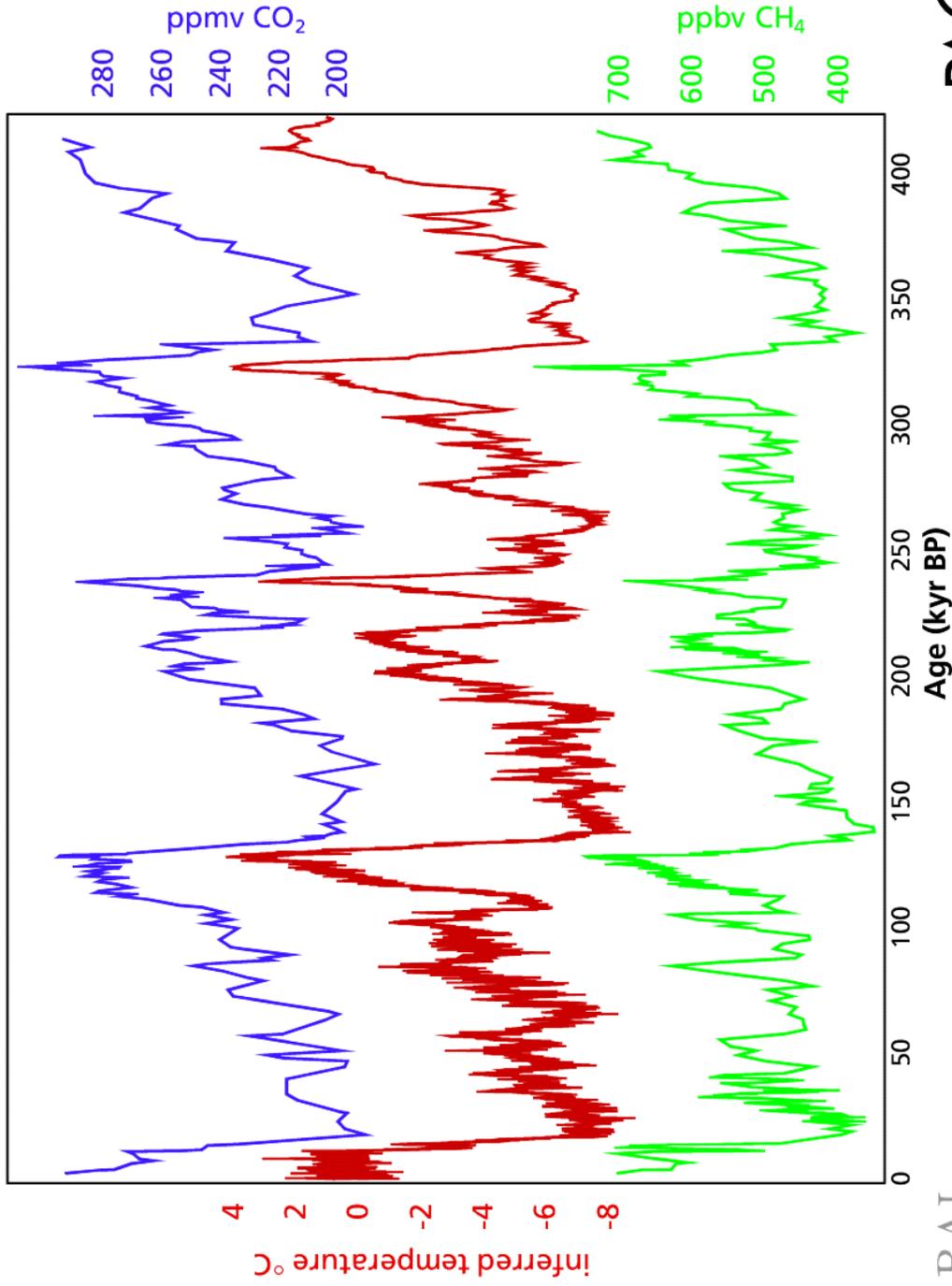
OCEANS - 10s-1000s YEARS

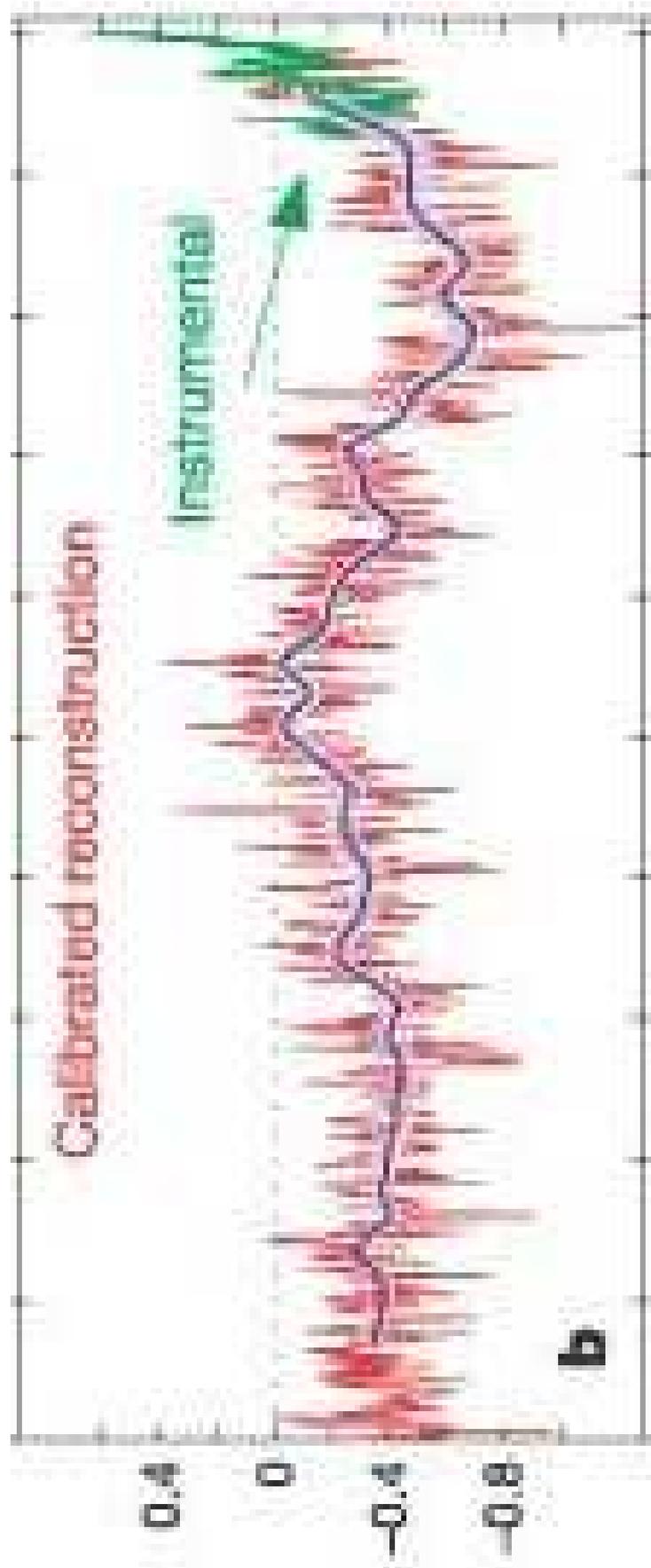
ICE SHEETS - 10s-10,000 years

LITHOSPHERE >1 MILL. YEARS



4 glacial cycles recorded in the Vostok ice core





a

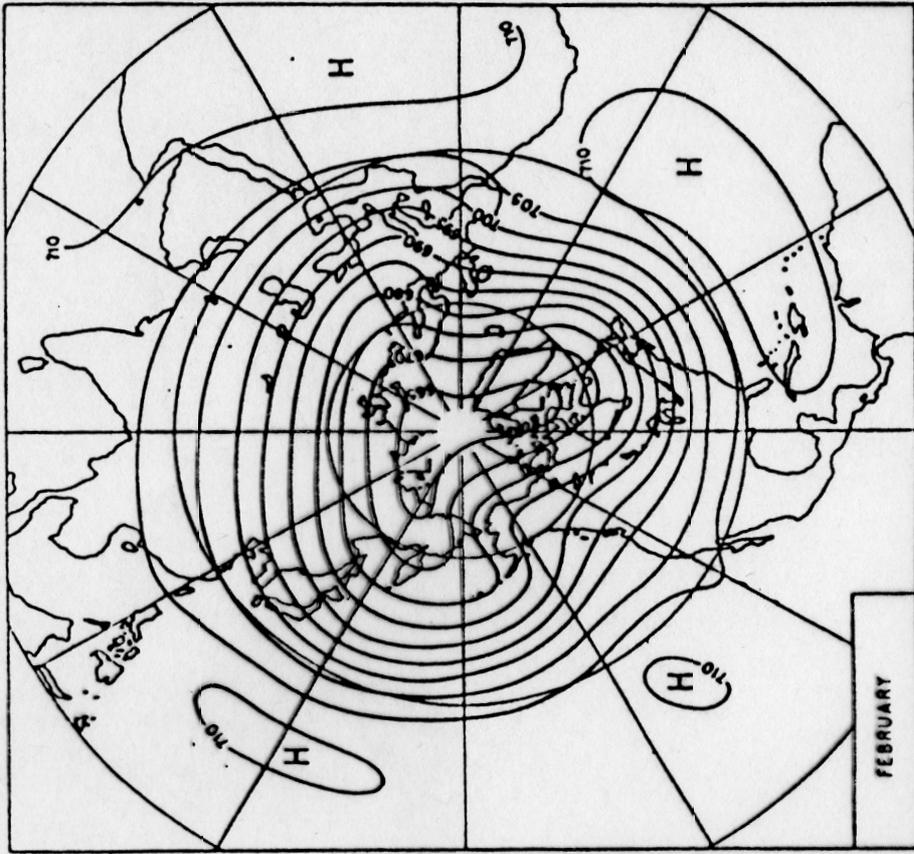
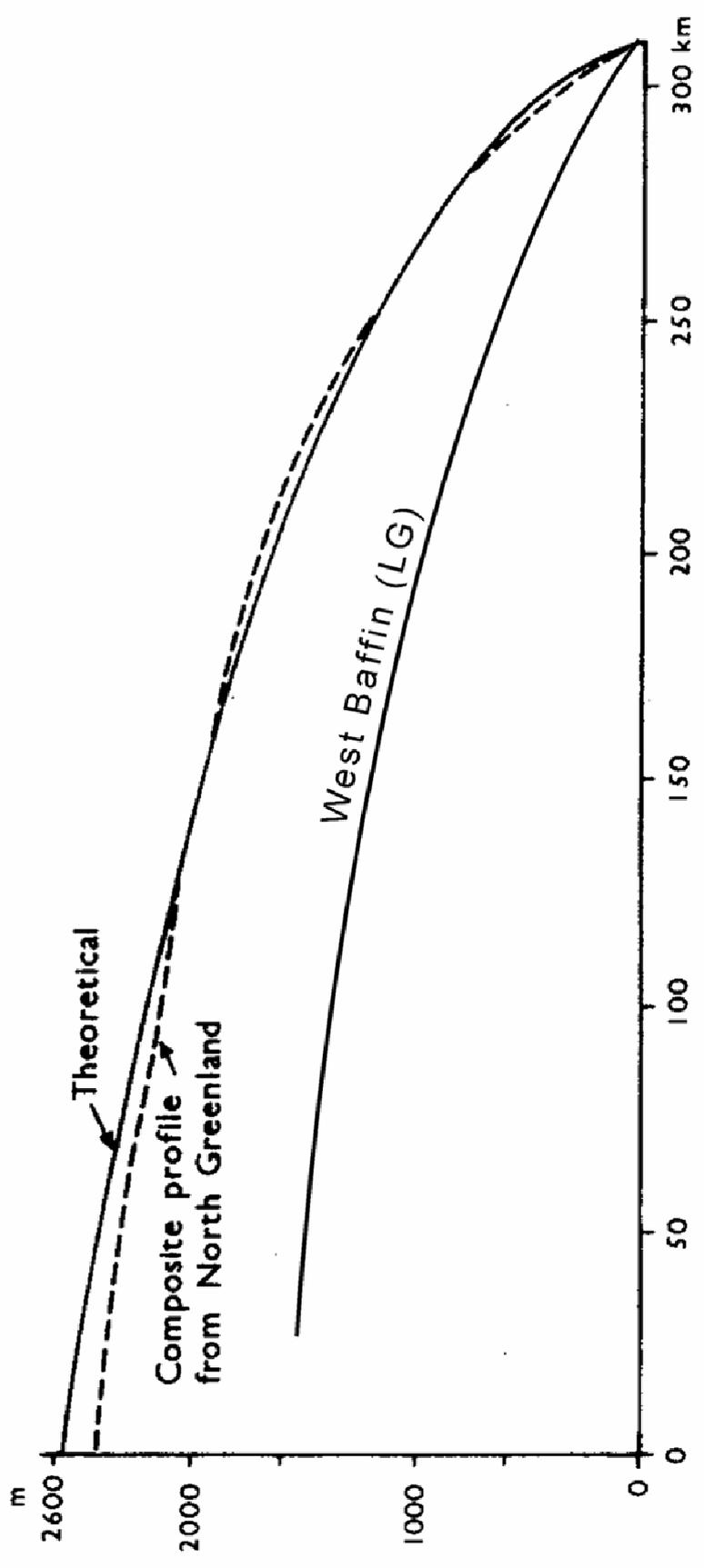
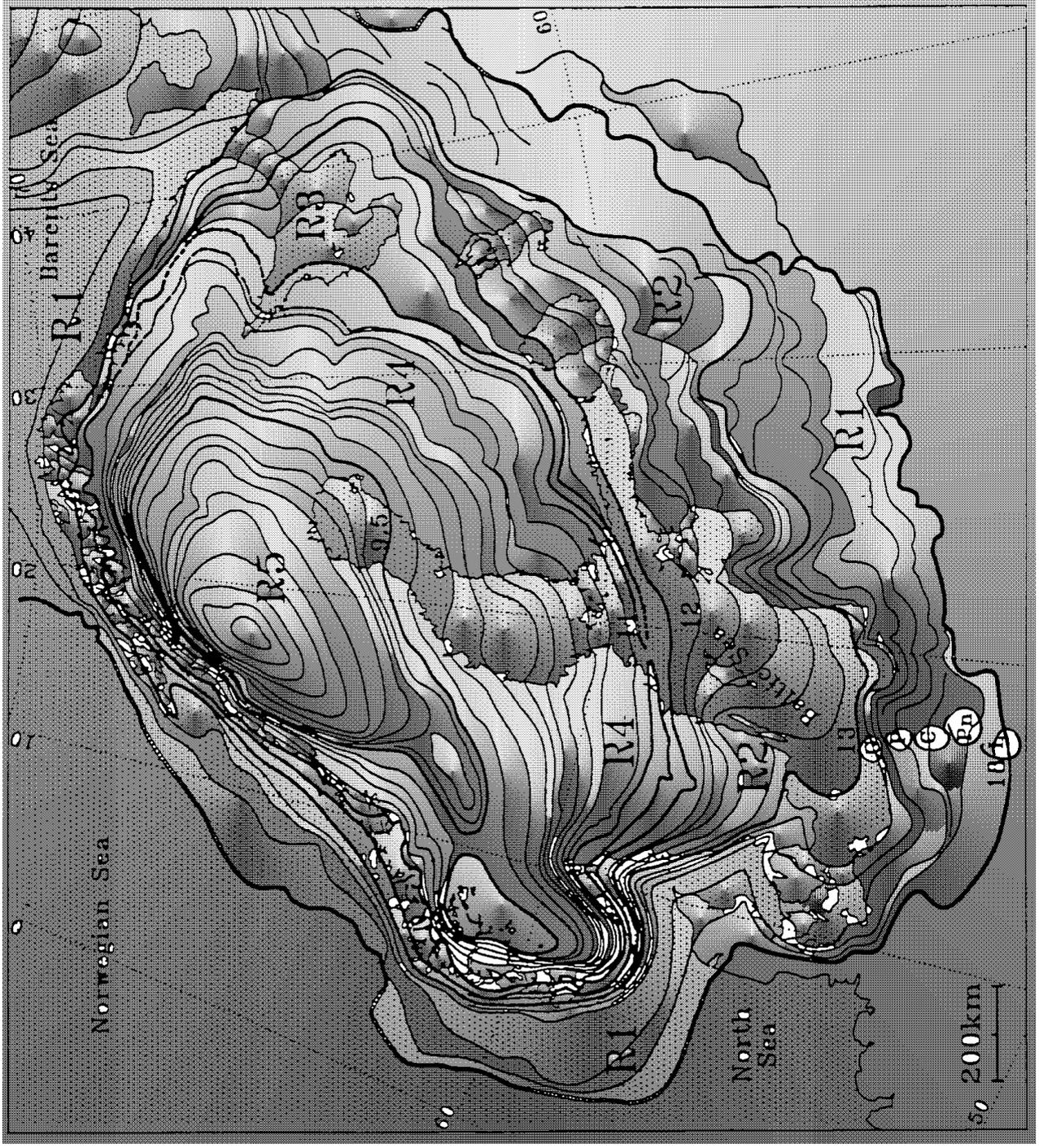
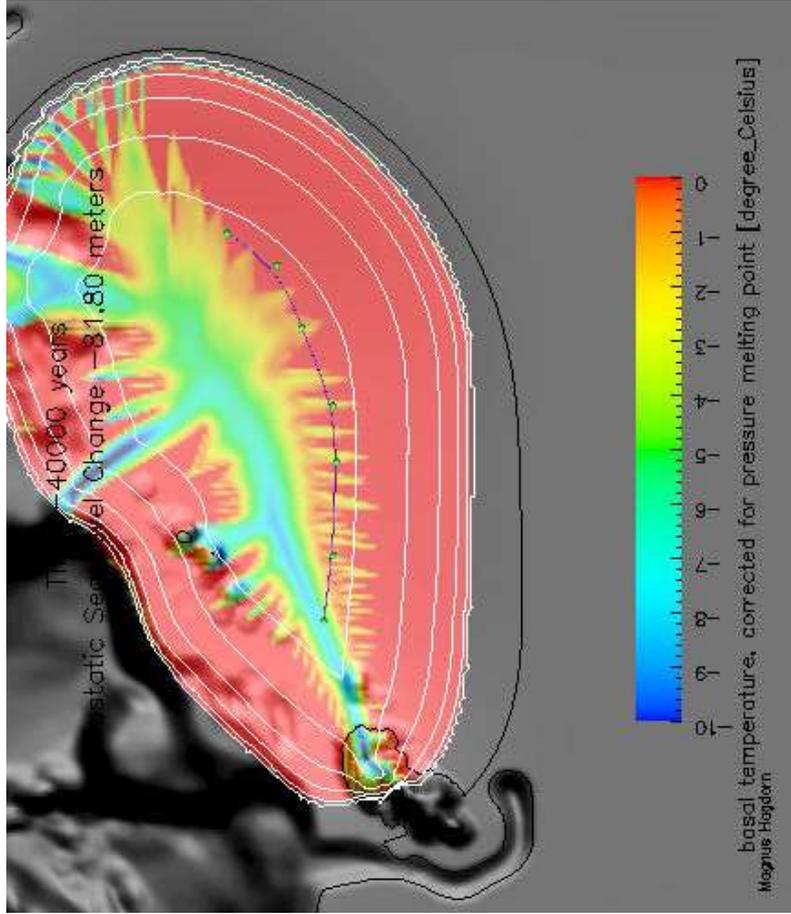
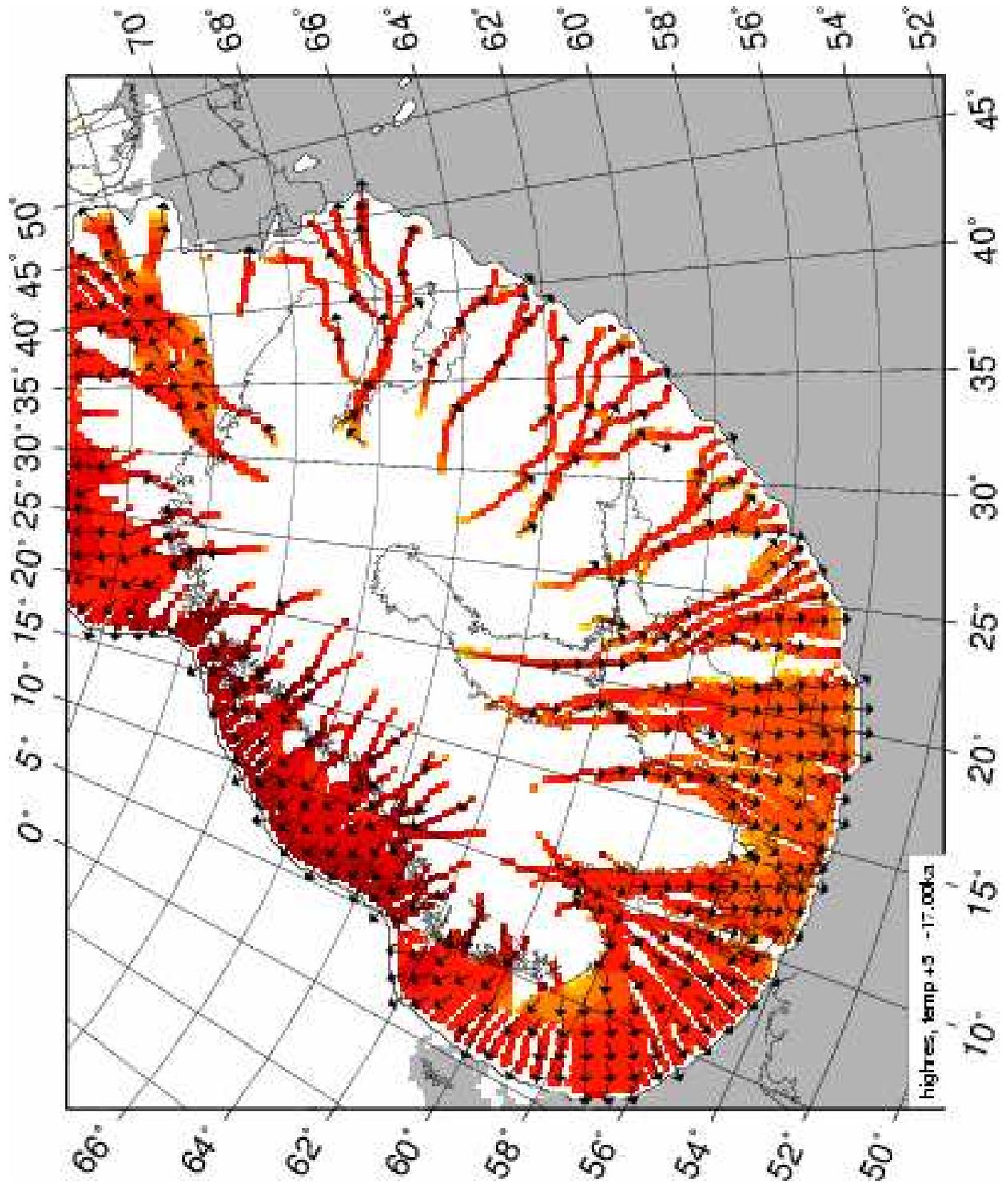


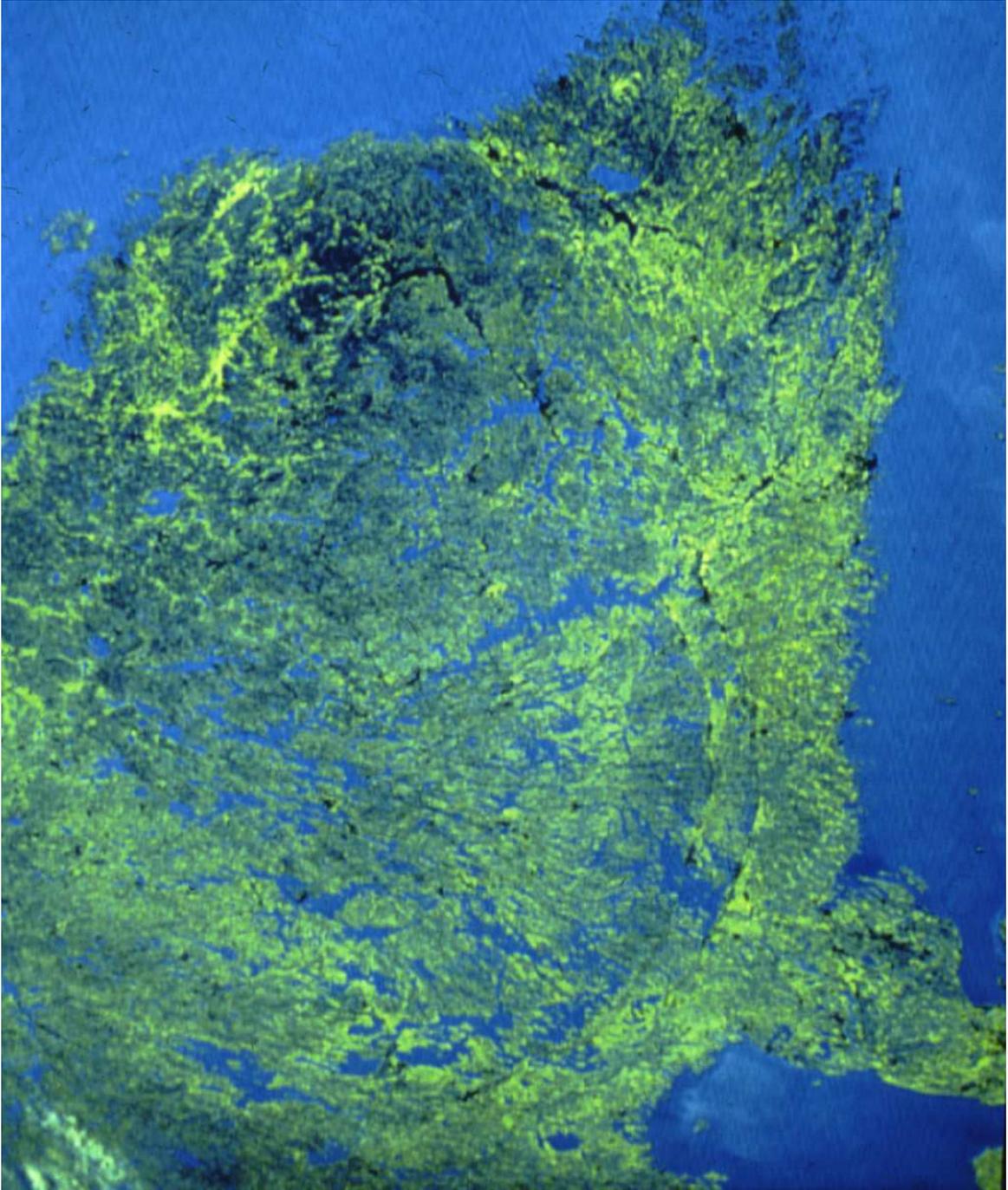
Fig. 125. Mean pressure at the 10,000-ft level in winter. (After U.S. Weather Bureau.)

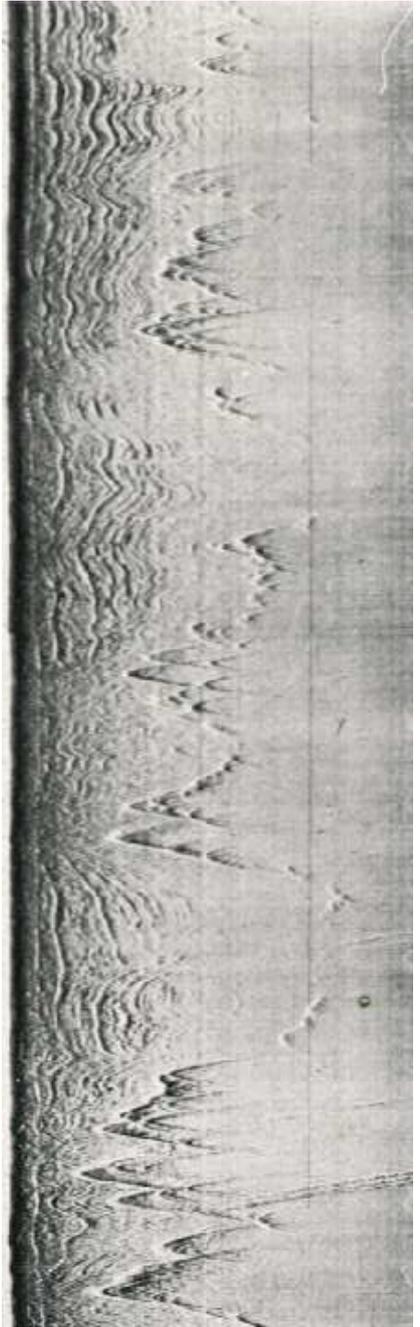


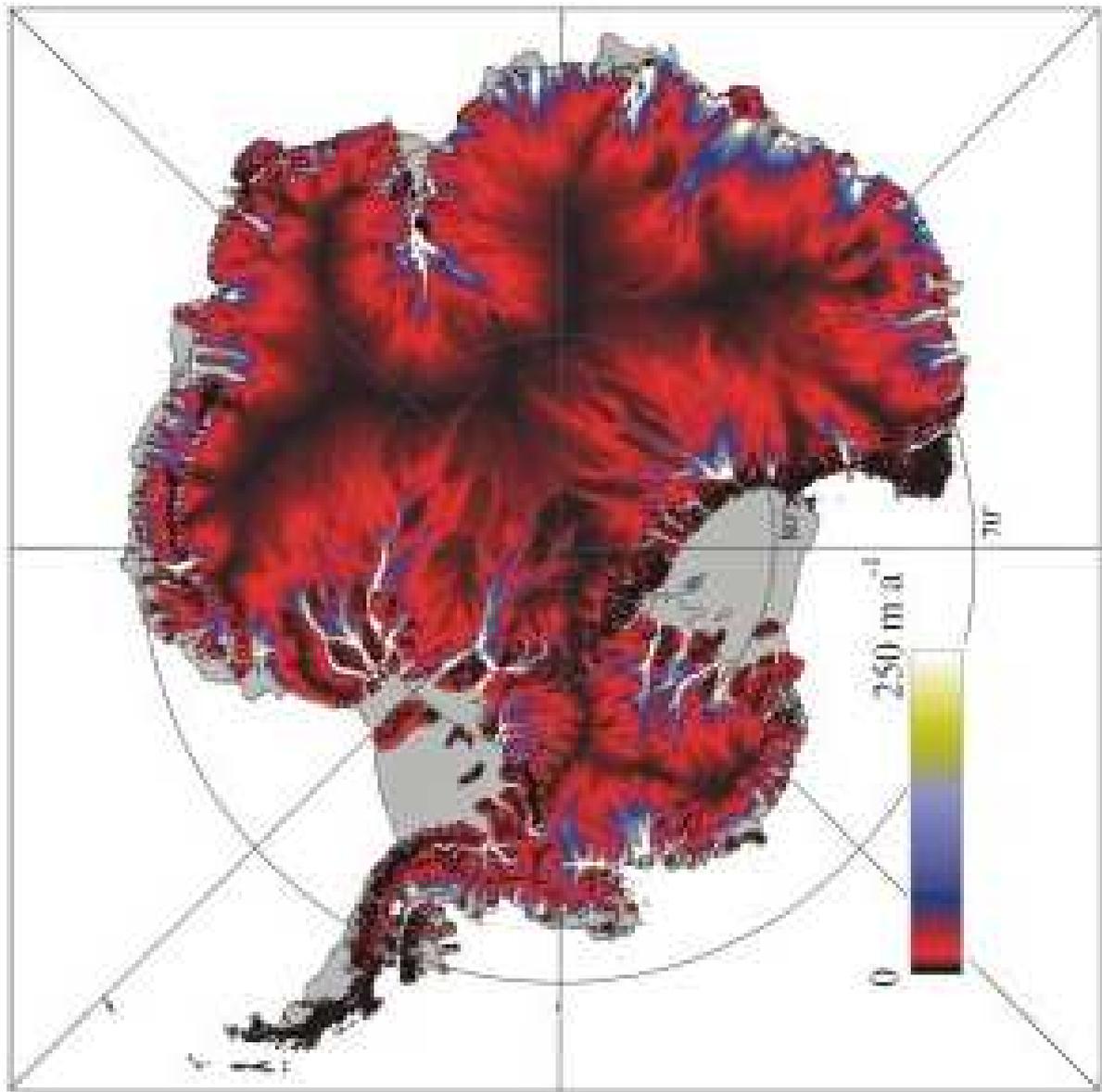




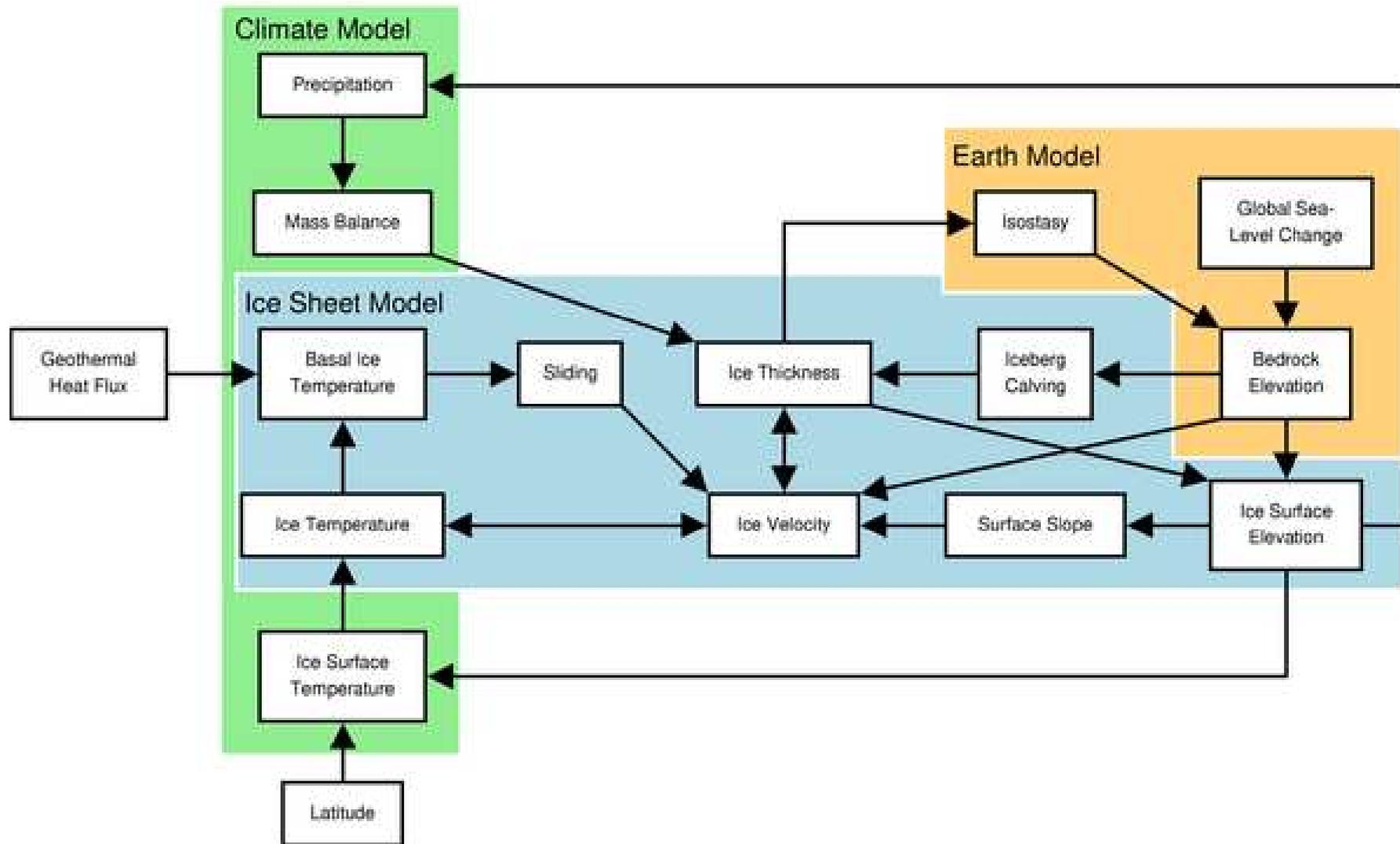




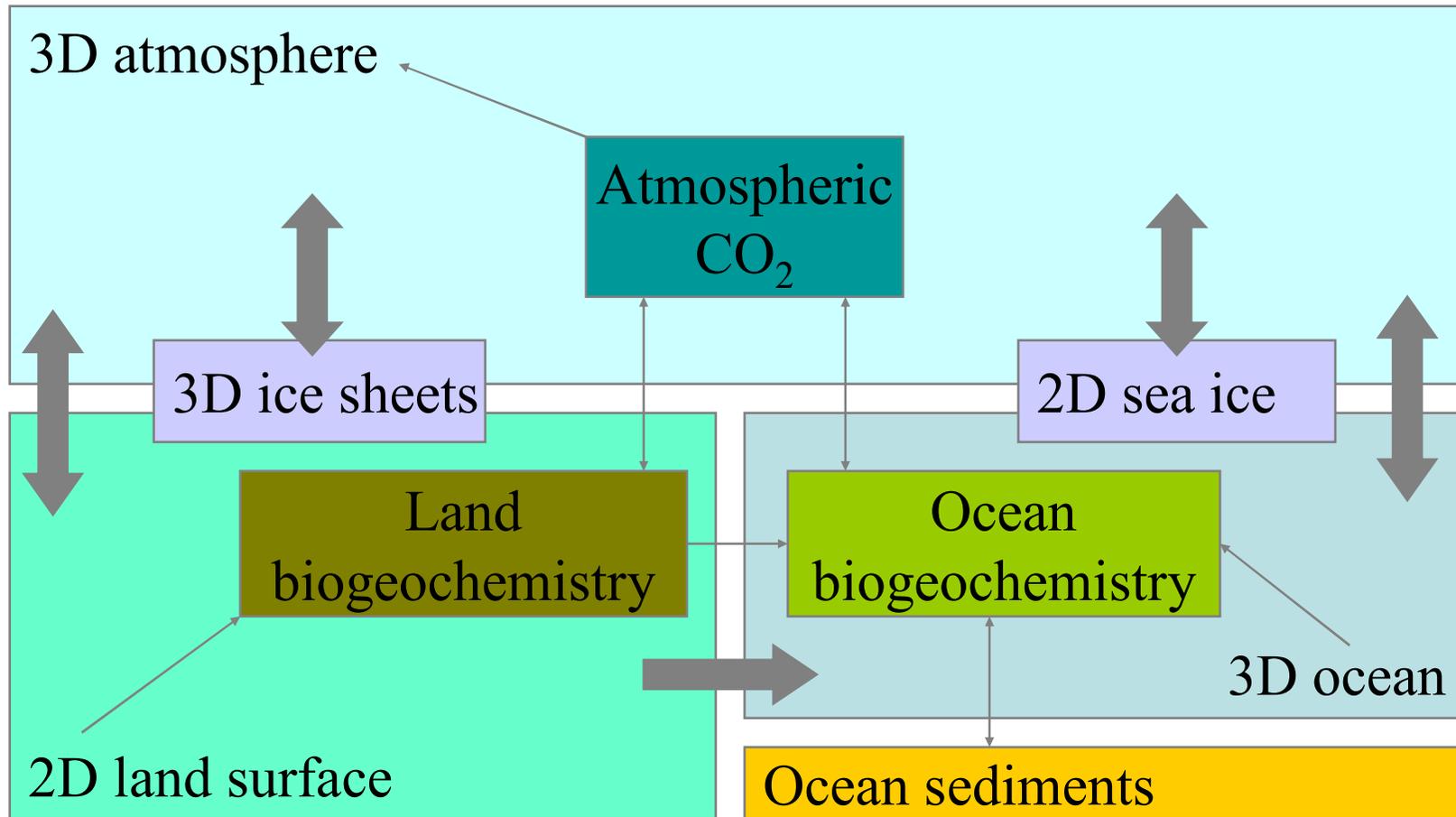




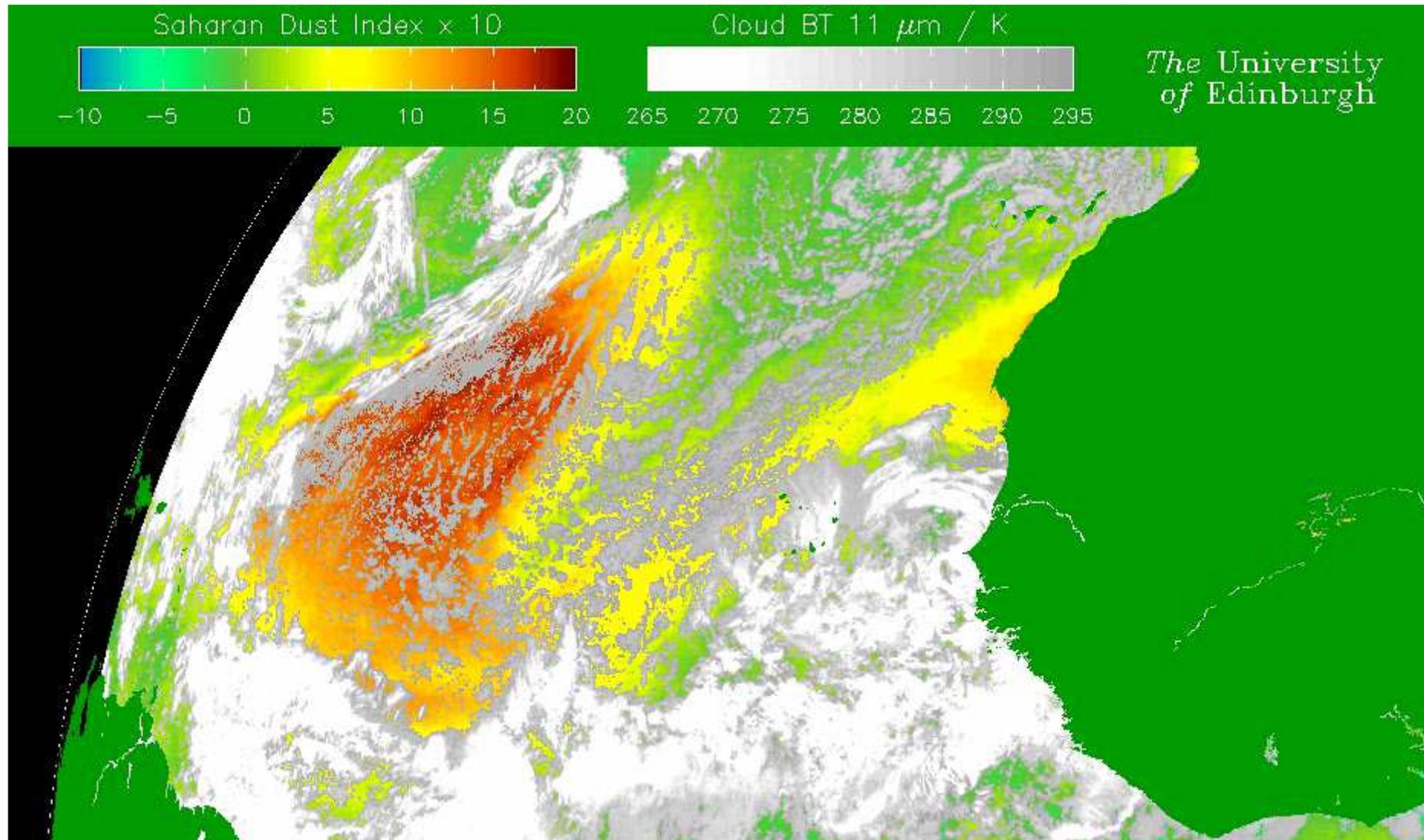
GLIMMER ICE SHEET MODEL



FULL EARTH SYSTEM MODEL



Saharan Dust, 48 hours of data from August 2005



Dust is an important correction for satellite SSTs; also an important climate forcing.

Spanning the Model Spectrum

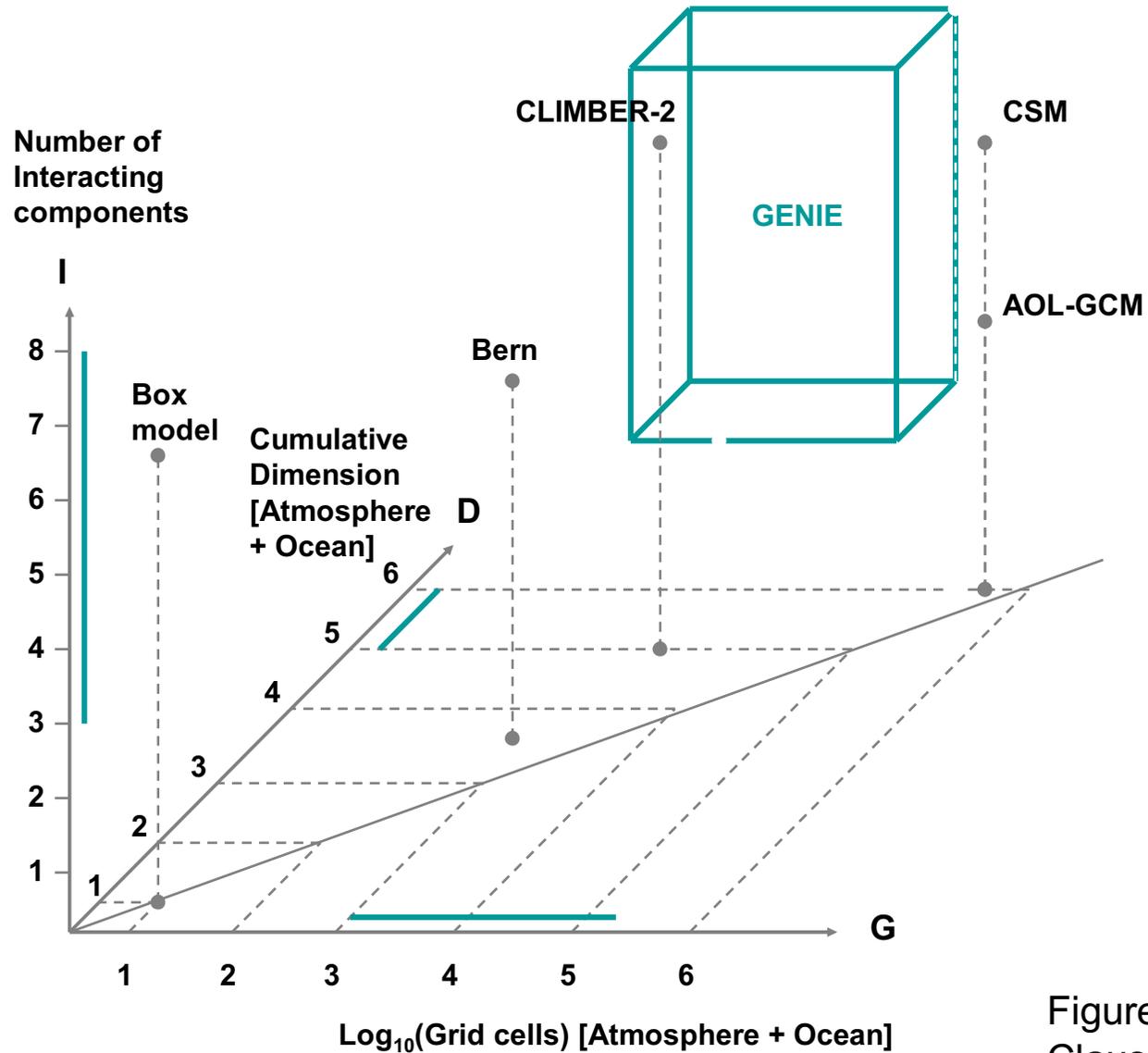
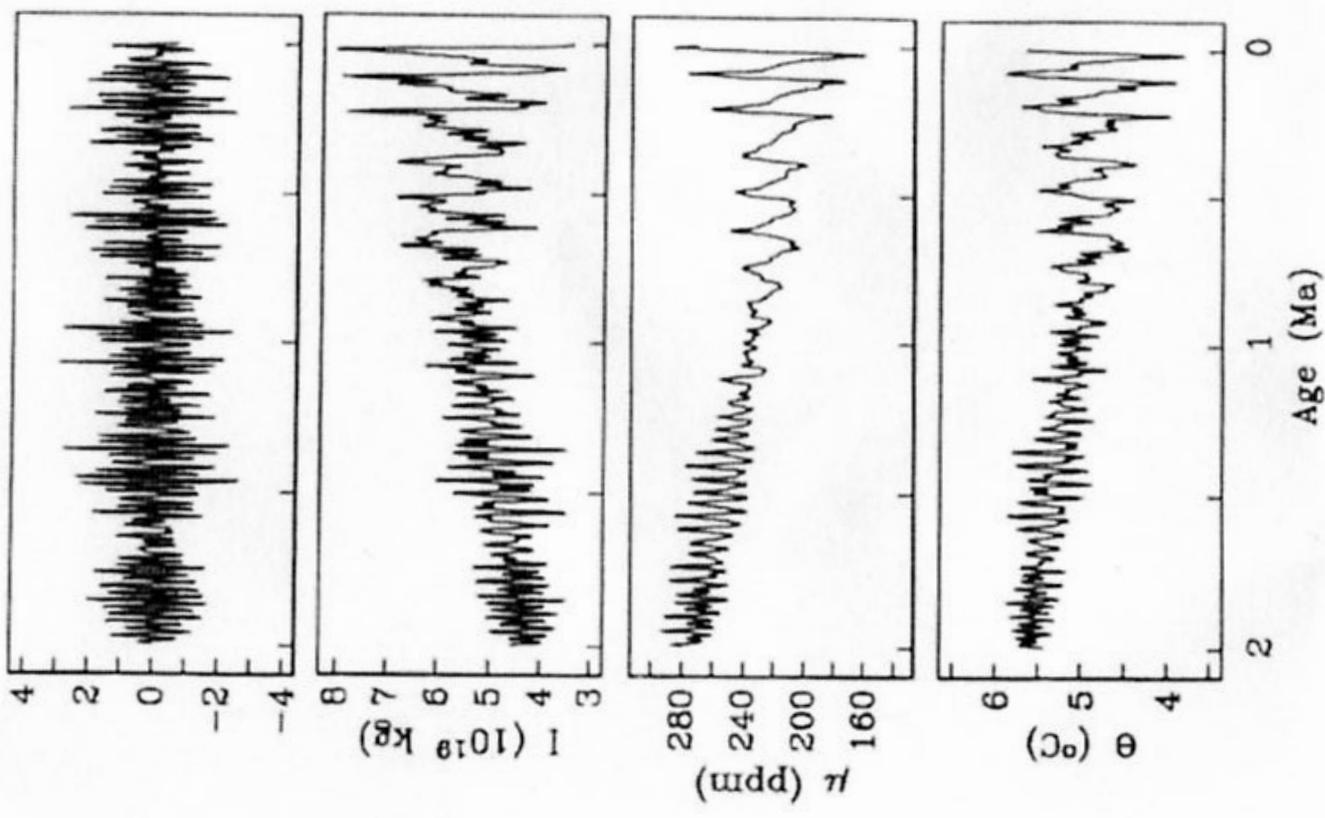
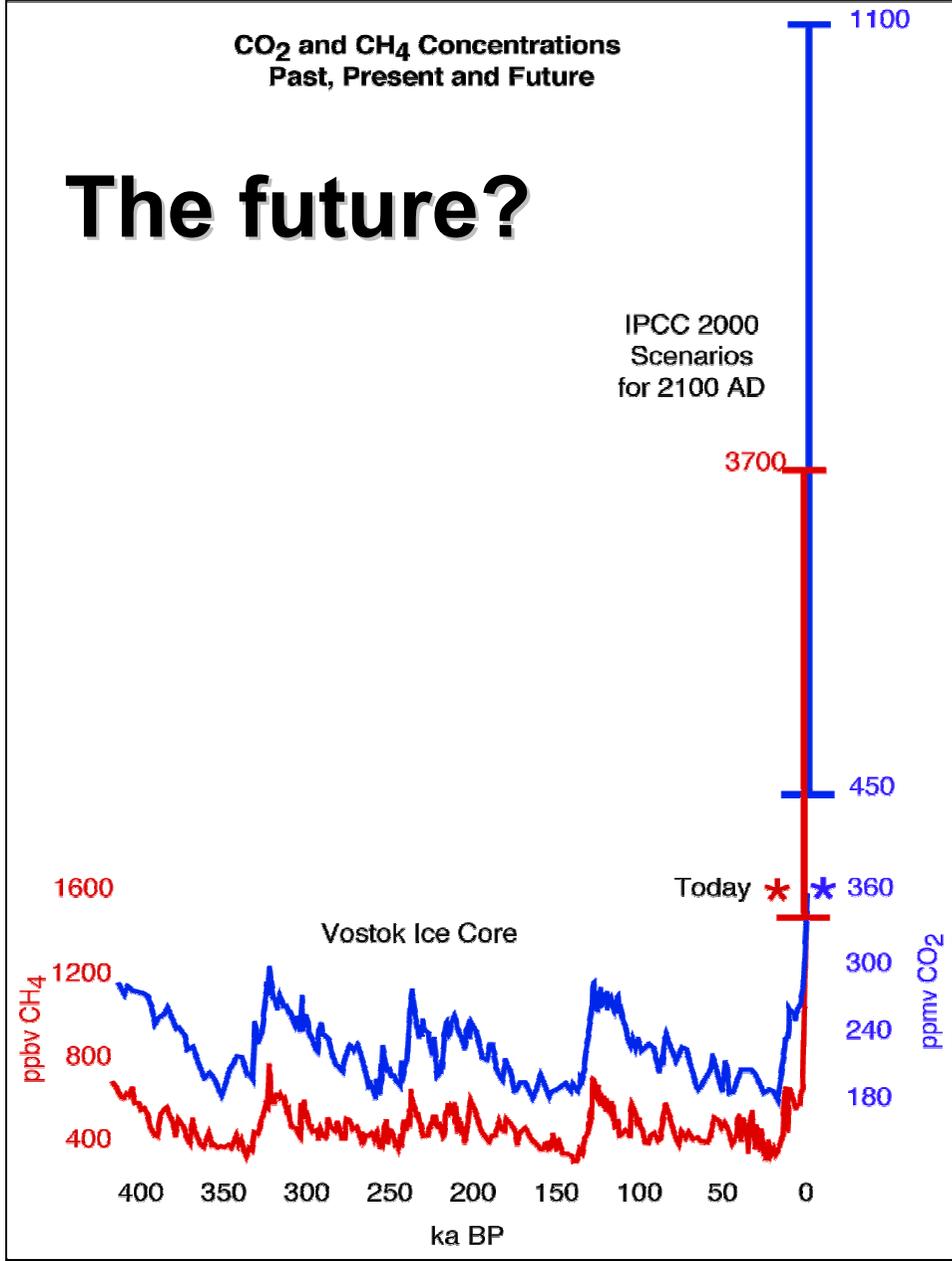


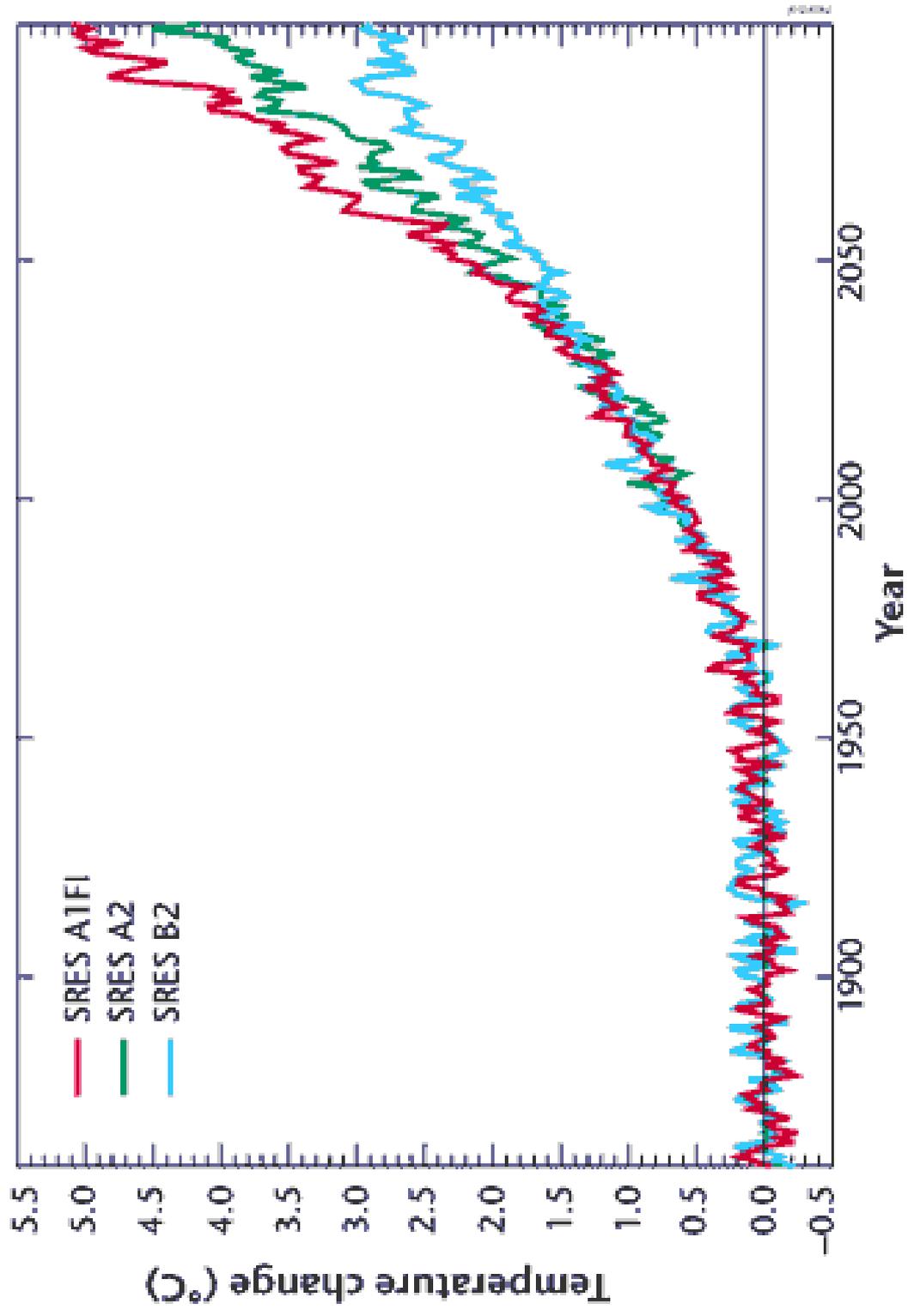
Figure based on
Claussen et al. (2002)



CO₂ and CH₄ Concentrations
Past, Present and Future

The future?





Extreme Circulation States

