Figure S1.

Monthly Average Temperature Versus Insolation Over North America Between 60-75°N for Obliquity and Precession

No Dynamic Ice
Annual Average Northward Heat Flux (VT) and Moisture Flux (VQ) Across 65°N for Obliquity and Precession

No Dynamic Ice

Figure S2.

a. Avg Ann Total VT at 65°N

b. Avg Ann Meridional VT at 65°N

c. Avg Ann Stationary Eddy VT at 65°N

d. Avg Ann Transient Eddy VT at 65°N

e. Avg Ann Total VQ at 65°N

f. Avg Ann Meridional VQ at 65°N

g. Avg Ann Stationary Eddy VQ at 65°N

h. Avg Ann Transient Eddy VQ at 65°N

Standardized Orbital Cycles (20 kyr PRE / 40 kyr OBL)
Supplementary Material

Figure S1. The correlation between monthly temperature and monthly insolation with a 1-month lag for the temperature response. The negative correlation between obliquity insolation forcing and temperature in the winter months is due to the overpowering annual insolation signal. Also, the large temperature range in the spring and fall without a large change in insolation is due to ocean and vegetation feedbacks.

Figure S2. The global annual-average northward heat (VT) and moisture (VQ) flux across 65°N separated into mean-meridional, stationary eddy, and transient eddy components. The total heat flux (S2a) response is almost identical for obliquity and precession. While there are some differences in the transient eddy heat flux (S2d), the variations are small and completely masked by the other heat flux transport terms.

There is a greater difference in the moisture flux between obliquity and precession, mainly due to the transient eddy component (S2h). Still, the differences are rather minimal, especially compared to the mid-latitude flux. It is possible that that greater moisture flux in response to precession during summer perihelion slows the rate of ice retreat. However, studies, including our own, suggest that ablation is more important than accumulation for determining ice sheet mass balance (Ruddiman, 2006).

References