

Due to the effects of global warming, many glaciers close to the north and south poles are melting. The glacier water is redistributed more evenly across the equator. What effect does this have on the length of a day?

A: Day will be shorter B: Day will be longer C: No change D: Effect cannot be determined

The earth can be considered as a system that conserves angular momentum: $(H_{sys1}) = (H_{sys2})$

$$I_1 \omega_1 = I_2 \omega_2$$

Since water moves from the axis of rotation, the moment of inertia about that axis increases:

$$I_2 > I_1$$

$$\frac{I_1 \omega_1}{I_2} = \omega_2$$

Since momentum is conserved: $\omega_2 < \omega_1$

The angular velocity decreases, and the day will be longer.

B