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# Did the opening of the Drake Passage play a significant role in Cenozoic cooling?

Z. Zhang (1,2), K.H Nisancioglu (1), F. Flatøy (1), M. Bentsen (3,1), I. Bethke (3,1), and H. Wang (2)

(1) Bjerknes Centre for Climate Research, N-5007, Bergen, Norway, (2) Nansen-Zhu International Research Center, Institute of Atmospheric Physics, Chinese Academy of Sciences, 100029, Beijing, China , (3) Nansen Environmental and Remote Sensing Center, N-5006, Bergen, Norway

Following the Early Eocene climatic optimum ($\tilde{5}$5–50 Ma), climate deteriorated and gradually changed the earth from a greenhouse into an icehouse. It is widely believed that the opening of the Drake Passage had a marked impact on the cooling. Here, we infer from climate model simulations that the early opening of the Drake Passage played only a limited role, while the later constriction of the Tethys and Central American Seaways is more important in explaining the observed Cenozoic cooling. Based upon an Early Eocene model simulation, we study the sensitivity of the climate to major tectonic events such as the closing of the West Siberian Seaway, the deepening of the Arctic-Atlantic Seaway, the opening of the Drake Passage, and the constriction of the Tethys and Central American seaways. The opening of the Drake Passage weakens the Southern Ocean Deep Water (SODW) dominated ocean circulation and cools the earth weakly. It might have been a cause for the symmetrical cooling in the Early Cenozoic, together with the closing of the West Siberian Seaway, and the deepening of the Arctic-Atlantic Seaway. However, the constriction of the tropical seaways causes the development of ocean circulation dominated by North Atlantic Deep Water (NADW). The transition of ocean circulation from SODW-dominated to NADW-dominated mode results in significant cooling in the South Hemisphere. In particular, the closing of the Tethys Seaway appears to be key in the transition.