The paleocene is marked by rapid and dramatic temperature changes. Some of these dramatic changes, such as the initiation of glaciation in the northern hemisphere and the increase in the mean temperature of the northern hemisphere in the beginning of the Holocene, coincide with the opening of major gateways. For instance, the initiation of northern hemisphere glaciation is associated with the closure of the Panama Gateway 3-5 millions years ago and the increase in temperature at the beginning of the Holocene about 12,000 years ago is associated with the most recent opening of the Bering Strait. (During glaciation the sea level was 130 meters lower than it is today so that the Bering Strait, which is presently only 50 meters deep, was closed.)

Analytical models involving calculations which take the Americas to be a gigantic island relate the deep water formation process to the opening and closing of these passages. This gigantic island approach enables one to obtain analytical solutions to the problem because the sea level must be continuous along the island so that one can relate the wind, atmospheric cooling and the geography to the deep water formation. These calculations show that both passages act like "entrance and exhaust valves" allowing anomalous water to be pushed in and out of the North Atlantic.

When both the Panama isthmus and the Bering Strait were open, low salinity Pacific water invaded the Atlantic through the Bering strait and exited through the Panama Gateway. This low salinity water prevented deep water formation in the North Atlantic so that the northern hemisphere was cooler. As a result, the atmosphere couldn't hold much moisture, there was not much snow and, hence, no glaciation. When the Panama Isthmus closed, the low salinity Pacific water could no longer exit the Atlantic so that most of it couldn't enter it either. As a result, the Atlantic became saltier, deep water formation started, and the atmosphere of the northern hemisphere got warmer. Consequently, it held more moisture which lead to snow and the initiation of glaciation.

With the present situation of a closed Panama isthmus and an open Bering Strait, the deep water formation is so stable that almost no physical process can stop it. By contrast, when both passages are closed (during glaciation) even a fairly small perturbation (e.g., a small fresh water anomaly) can kill it off.