The Great Ocean Conveyor begins near Greenland and Iceland in the North Atlantic where the dry, cold Polar Easterly winds blowing from the Arctic Circle chill surface waters. The combined chilling by the winds, evaporation, and sea-ice formation produces cold, salty water that sinks and becomes North Atlantic Deep Water (NADW). The newly formed NADW flows toward South America and Antarctica (illustrated by dark blue line and white arrows). On the map, two areas are identified where evaporation and sinking occurs. One is in the Greenland Sea, just north of Iceland. The other is in the Labrador Sea, near the southern tip of Greenland.

On the final leg of the return trip, warm surface water joins the wind driven currents in the North Atlantic, becoming saltier by evaporation under the intense sub-tropical sun. Atlantic surface waters eventually return northward to the Labrador and Greenland Seas in the North Atlantic. Western European winters are mild compared to the same latitude in eastern North America. It is the Gulf Stream that carries sensible heat energy to western Europe and causes the moderating influence in this region of the world. Without this warm ocean current and its associated winds, western Europe would experience much harsher winters.

Sources:
Broecker, W.S. "Thermohaline Circulation, the Achilles Heel of Our Climate System: Will Man-Made CO2 Upset the Current Balance?" Science 1997 Nov. 28; 1582-1583.