

# Is the ice at the South Pole melting?

October 29 2010

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The change in the ice mass covering Antarctica is a critical factor in global climate events. Scientists at the GFZ German Research Centre for Geosciences have now found that the year by year mass variations in the western Antarctic are mainly attributable to fluctuations in precipitation, which are controlled significantly by the climate phenomenon El Nino. They examined the GFZ data of the German-American satellite mission GRACE (Gravity Recovery and Climate Experiment). The investigation showed significant regional differences in the western coastal area of the South Pole area.

Two areas in Antarctica are of particular interest because of their potential sensitivity to [global climate change](#): the [Antarctic Peninsula](#), which is currently experiencing a warming exceeding the global mean and the disappearance of large ice shelf areas, and the Amundsen Sector of West Antarctica, where currently the largest flow rates and mass loss of the [Antarctic Ice Sheet](#) is occurring. For some glaciers the ice thickness is decreasing rapidly, and glaciers and ice streams are notably retreating back into the interior. With 0.3 millimeters per year, both regions are currently contributing considerably to the global sea level change of about three millimeters per year.

In the study, the mass balance of both regions is reevaluated from gravity data of the satellite mission GRACE. As a result, the estimates were lower than those of conventional mass balance methods. "With the GRACE time series, it was for the first time possible to observe how the large-scale ice mass varies in the two areas due to fluctuations in rainfall from year to year," said the GFZ scientists Ingo Sasgen. It has long been

known that the Pacific El Niño climate phenomenon and the snowfall in Antarctica are linked. The complementary piece to the warm phase El Niño, the cold phase known as La Niña, also affects the Antarctic climate: "The cooler La Niña years lead to a strong low pressure area over the Amundsen Sea, which favors heavy rainfall along the Antarctic Peninsula - the ice mass is increasing there. In contrast, the Amundsen area is dominated by dry air from the interior during this time. El Niño years with their warm phase lead to precisely the opposite pattern: reduced rainfall and mass loss in the Antarctic Peninsula, and an increase in the Amundsen Sectorfield, respectively" explains Professor Maik Thomas, head of the section "Earth System Modelling" at the German Research Centre for Geosciences (Helmholtz Association).

The recording of the entire ice mass of the South Pole and its variations is a central task in climate research and still raises many unanswered questions. In principle, the study could show that the continuous gravity data of the GRACE [satellite mission](#) contain another important medium-term climate signal.

**More information:** Sasgen, I. Dobson, H., Martinec, Z. and Thomas, M., "Satellite Gravimetry Observation of Antarctic Snow Accumulation Related to ENSO," *Earth and Planetary Science Letters* (2010), [doi:10.1016/j.epsl.2010.09.015](https://doi.org/10.1016/j.epsl.2010.09.015)

Provided by Helmholtz Association of German Research Centres

Citation: Is the ice at the South Pole melting? (2010, October 29) retrieved 26 April 2024 from <https://phys.org/news/2010-10-ice-south-pole.html>

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