Professor foresees rising Antarctic snowmelt

December 3 2009

The 30-year record low in Antarctic snowmelt that occurred during the 2008-09 austral summer was likely due to concurrent strong positive phases for two main climate drivers, ENSO (El Niño - Southern Oscillation) and SAM (Southern Hemisphere Annular Mode), according to Dr. Marco Tedesco, Assistant Professor of Earth & Atmospheric Sciences at The City College of New York.

Professor Tedesco, who is also on the doctoral faculty at the CUNY Graduate Center, added that Antarctic snowmelt levels should revert to higher norms as one of the drivers, the SAM, subsides as the damage to the ozone layer is repaired. His conclusions, which are based on space-borne microwave observations between 1979 and 2009, were reported in "*Geophysical Research Letters*" earlier this fall.

"The study's goal was not only to report on melting but also on the relationship between melting and the climate drivers, El Niño and the SAM," he explained. Low melt years during the 1979-2009 satellite record are related to the strength of the westerly winds that encircle Antarctica, known as the Southern Hemisphere Annular Mode (SAM).

"When the SAM is in a positive phase - meaning that the belt of winds is stronger than average - it has a cooling effect on Antarctic surface temperatures," he explained. "The SAM was especially strong in austral spring and summer 2008-2009, and subsequently the 2008-2009 snowmelt was lower than normal."

During the past 30-40 years, the SAM has gradually strengthened during

austral summer, due mainly to human-caused stratospheric ozone depletion, he continued. However, as the hole is repaired as a result of compliance with the Montreal protocol, the winds will weaken and Antarctica will be subject to more warming air.

The increasing summer SAM trends are projected to subside, he added. "It is likely that summer temperature increases over Antarctica will become stronger and more widespread because the warming effect from greenhouse gas increases will no longer be kept by the weakened circumpolar winds. The bottom line is as the ozone layer recovers we'll likely have more melting on Antarctica."

According to Professor Tedesco, variability in El Niño and the SAM account for up to 50 percent of the variations in Antarctic snowmelt. However, the melting trends over the whole continent derived from satellite data are not statistically significant, he noted.

"If you add one year of data, the trend could shift from positive to negative or vice versa. Thirty years is not enough to tell the overall trend for Antarctica." However, he noted that studies based on land observations with data going back to the 1950s support a warming trend, especially on the Antarctic Peninsula.

Source: City College of New York

Citation: Professor foresees rising Antarctic snowmelt (2009, December 3) retrieved 2 May 2024 from https://phys.org/news/2009-12-professor-antarctic-snowmelt.html