New method to estimate sea ice thickness

March 5 2008

Scientists recently developed a new modeling approach to estimate sea ice thickness. This is the only model based entirely on historical observations.

The model was developed by scientists with the U.S. Geological Survey and the Russian Academy of Sciences, Moscow.

Using this new technique, the thickness of Arctic sea ice was estimated from 1982 to 2003. Results showed that average ice thickness and total ice volume fluctuated together during the early study period, peaking in the late 1980s and then declining until the mid-1990s. Thereafter, ice thickness slightly increased but the total volume of sea ice did not increase.

Scientists propose that the volume stayed constant during the study's latter years because while the ice was thickening in the high latitudes of the Arctic, the surrounding sea ice was melting. Sea ice, however, can only become so thick, and if Arctic sea ice continues to melt, the total volume of sea ice in the Arctic will decrease.

The most dramatic losses in sea ice cover have occurred since 2003, and as scientists acquire newer data, they will apply the new model to study recent years of ice thickness and volume change.

This modeling approach uses sea ice motion data to follow parcels of ice backward in time at monthly intervals for up to 3 years while accumulating a history of the solar radiation and air temperature to

which the ice was exposed. The model was constructed by fitting these data with an ice parcel's known thickness to determine how the thickness of sea ice changes in response to different environmental conditions. Data on the known thickness are obtained from measurements by submarine cruises and surface coring missions.

"Sea ice is affected by the accumulation of environmental factors to which it has been exposed," said USGS Director Mark Myers. "Understanding the natural variability of sea ice thickness is critical for improving global climate models. Sea ice regulates energy exchange and plays an important role in the Earth's climate system."

This model, built on historical observations, complements thermodynamic models that simulate ice thickness. Science benefits from having different models. Comparing different model outputs can help improve predictive capabilities. Many scientists worldwide are using satellite and ground observations of the Arctic's atmosphere, ice and ocean to gain a better understanding of how changes at the top of the world affect ecosystems both locally and globally.

Source: United States Geological Survey

Citation: New method to estimate sea ice thickness (2008, March 5) retrieved 24 April 2024 from https://phys.org/news/2008-03-method-sea-ice-thickness.html