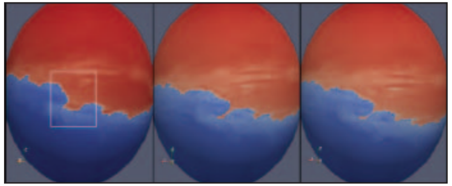
RESEARCH SPOTLIGHT

Highlighting exciting new research from AGU journals

Potential solution to the cool tropics paradox

The "cool tropics paradox" has been a thorn in the side of paleoclimate researchers, who draw on diverse techniques to improve their estimates of ancient climates. For the early Paleogene, between approximately 56 million and 49 million years ago, atmospheric reconstructions hint at a world much warmer than present, yet estimates of tropical sea surface temperatures determined by looking at the shells of foramanifera—a type of marine plankton—skew low, falling below present values. Throughout their lives, foramanifera form a calcium carbonate shell that records chemical parameters of the ambient seawater, and analyzing the oxygen isotope ratios in preserved shells is one of the dominant methods of estimating ancient ocean temperatures. Recently, however, researchers have found that posthumous alteration can displace the original biological structures, changing the oxygen isotope ratio and presenting a potential explanation for the source of the cool tropics paradox.



Viacheslav Merkin

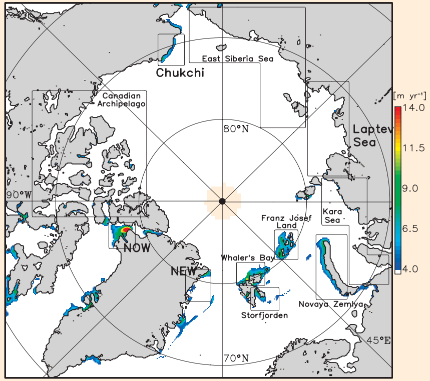
Using a numerical model of the inner heliosphere, researchers track the development of a heliospheric current sheet fold as it propagates outward from the Sun. The heliospheric current sheet divides the (red) outward polarity and (blue) inward polarity regions of the Sun's magnetic field.

behavior of the heliospheric current sheet during the winter of 1995, when NASA's Ulysses spacecraft traversed the heliosphere from the southern to northern hemispheres. The model's high resolving power allows the analysis of structures that span just 1° solar latitude by 1° solar longitude. As a highlight of the model's power, the authors focus on the development and eventual destruction of a small-scale feature within the current sheet

First map of sea ice production in Arctic coastal polynyas

In Arctic coastal polynyas, persistent areas of thin ice, a large amount of new ice forms during winters. Significant heat is lost through these regions of thin ice. Knowing how much ice is produced in polynyas is important for determining overall cold saline water formation in the Arctic Ocean. However, because of the difficulty of making in situ measurements, there have been few studies of ice production in coastal Arctic polynyas.

Tamura and Ohshima developed an algorithm for detecting polynyas and estimating sea ice thickness using data from satellite microwave sensors. They used their method to create the first map of sea ice production in coastal polynyas over the entire Arctic Ocean. They also investigated the interannual variability of sea ice production in 10 Arctic coastal polynyas from 1992 to 2007. They found that sea ice production was better correlated with polynya extent than with surface air temperature. (*Journal of Geophysical Research-Oceans*, doi:10.1029/2010JC006586, 2011) —EB



Mapping of annual cumulative sea ice production averaged over 1992–2007.