

NASA ice images aid study of Pacific walrus arctic habitats

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The Arctic ice pack is home to thousands of Pacific walrus. Their preferred habitat is an ice floe that has enough density and surface area to support a herd of 12-foot-long, 3,000 pound mammals. In the spring, walrus 'haul out' on this floating ice to rest, mate and rear their young. Recently, NASA collaborated with the Department of Interior's U.S. Fish and Wildlife Service (USFWS) in Alaska to determine the usefulness of satellite imagery for studying the effect of climate change on the Pacific walrus ice habitat in the Bering and Chukchi seas.

Pacific walrus (*Odobenus rosmarus divergens*) is the only subspecies of walrus that inhabits U.S. waters. Native Alaskans rely on a bountiful walrus population for their food, clothing and shelter, and as a spiritual totem, making it an important part of Alaska's economy and cultural subsistence. Because the walrus is vital to these native people, a stable walrus population is crucial to their survival and way of life.

Walrus live on sea ice where wind-driven rills and flats vary in thickness and landscape. The dynamic nature of sea ice and its uniform appearance pose unique challenges to remote-sensing studies. In the past, researchers were literally in the dark when searching for walrus.

To study the population dynamics and supporting habitats of the Pacific walrus, students from the NASA Develop program worked with the U.S. Fish and Wildlife Service in Alaska to determine the relationship between polar sea ice formations and the preferred habitat of the Pacific walrus. For the first time, radar sensors were used to study the walrus in

the Alaskan Yukon-Kuskokwim Delta.

"Last spring, the largest census ever performed on the walrus population was undertaken," said Jay Skiles, senior research scientist in biosphere science at NASA Ames Research Center, Moffett Field, Calif. "The count took almost two months, required the use of ships and smaller craft, airplanes and helicopters with thermal sensors. Russia provided valuable support by supplying an ice-breaker for the study," said Skiles.

Skiles co-manages the Develop program with Cynthia Schmidt at Ames. The Develop program, supported by the NASA Science Mission Directorate Applied Sciences Program, encourages student teams to investigate the use of NASA science research results and observations relevant to societal concerns and perform advanced, analytical experiments demonstrating their contribution to national policy and decision-making.

Researchers say there are big advantages to knowing where to find the walrus. When conducting surveys, researchers know where to go to make the count and fewer resources are used, which make the studies more cost-effective.

During the USFWS survey, a low-flying aircraft with a thermal sensor onboard scanned for thermal signatures, or walrus. Since walrus are warmer than the ice surrounding them, each point on the flight path, or scanline, represented the presence of walrus. Satellite imagery is used to supplement the airborne thermal data to classify ice types, which is difficult to do because of its contiguous nature.

Once the two sets of data were collected, flight-path imagery was overlaid on satellite imagery of the same region and similar time period. Understanding certain sea ice features such as density and proximity to open water is key to identifying areas where the walrus can be found.

Results from analysis of the synthetic aperture radar (SAR) data suggests that walrus seem to prefer regions composed almost entirely of medium thickness approximately 2–4 ft. (70 -120 cm.) first-year ice.

"This study is by no means exhaustive. Our data suggest the possibility that sea ice features may be critical factors for the walrus when choosing a habitat. Using techniques developed during this project, the U.S. Fish and Wildlife Service may be able to determine, over time, if climate change is affecting Pacific walrus populations," said Skiles.

Source: Goddard Space Flight Center

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