Annual Arctic sea ice less reflective than old ice

May 17 2012

In the Arctic Ocean, the blanket of permanent sea ice is being progressively replaced by a transient winter cover. In recent years the extent of the northern ocean's ice cover has declined. The summer melt season is starting earlier, the winter freeze is happening later, the areal extent of the ice has decreased, and more ice is failing to last through the summer.

A key uncertainty in this ongoing climate transformation is how seasonal sea ice affects and responds to climate dynamics as compared to the traditional multiyear sea ice. Tackling an important branch of this issue, Perovich and Polashenski analyze how the albedo of seasonal sea ice changes throughout the summer melt season. The ice's albedo affects how much sunlight enters the system and hence influences biological productivity, ice extent, and future rates of warming.

For four years, the authors measured the albedo every 2.5 meters (8 feet) along a 200-m (656-ft) stretch of seasonal ice off the northern coast of Alaska. They find that though the albedo of snow-covered winter seasonal ice is the same as that of multiyear ice, the equivalence fades rapidly with the summer thaw. They find that seasonal sea ice albedos experience seven distinct phases: cold snow, melting snow, pond formation, pond drainage, pond evolution, open water, and refreezing. Though the albedos of seasonal and multiyear ice experience similar transitions, the rate and extent for the two types of ice vary drastically with the potential for a large effect on the Arctic Ocean energy budget. The authors find that over the course of one melt season nearly 40

percent more energy would enter an ocean system with seasonal sea ice cover than one with multiyear ice.

More information: Albedo evolution of seasonal Arctic sea ice, *Geophysical Research Letters*, doi:10.1029/2012GL051432 , 2012