

Gwyneth Glissmann

Senior Division Earth & Space Sciences

Analyzing Arctic Solar Flux And Ice Extent Loss Projections

Utilizing satellite data, this project showed that September ice extent is significantly below the standard deviation of 16 computer models used by the IPCC to predict conditions in the Arctic. Applying a trend analysis to this data, 2035 is projected to be the year when the Arctic will be ice-free in September. Several scientists at NSIDC and at NASA have concluded similar projections. To investigate the correlation between the reducing ice extent and solar flux absorbed by the ocean, a worst-case calculation was used. The results showed that between 1979 and 2006, ice extent had a general trend downward while the flux was constant. This indicates melting is not occurring due to ocean flux. Other possible reasons for melting are rising average surface to air temperatures or warm ocean currents from the tropics. Minimum ice extent typically happens in September, well after the higher latitudes experience their peak solar incidence. This may explain why there is not a general rising trend in flux. The lack of correlation between ocean flux and ice melting does not support the use of high-albedo platforms for mitigating the greenhouse effect. In September 2006, a significant spike in flux occurred and it appears melting happened earlier in the summer possibly due to a general thinning of the ice. This precipitated the largest loss of ice extent in 2007, leading to a possibility that ocean flux is now contributing to significant melting and with ice loss occurring earlier, a feedback loop between melting and ocean flux may now lead rapidly to an ice-free Arctic. Many more years will be needed to establish this relationship; however, the Arctic has already passed the point at which it could have recovered.