Ice911 – Albedo modification

Floating removable materials are used to interrupt the ice-albedo feedback effect and also to promote evaporation. The materials block sunlight without blocking other natural processes, and are designed to be inexpensive and simple, ecologically respectful, and are based on abundantly available, naturally occurring materials.

The system is designed to affect (1) the absorption and/or reflection of incident solar energy (albedo), and (2) the rate and amount of evaporation of water. Additionally, if an increase in cloud cover results from the added evaporation, this could aid in cooling and potentially in added snowfall, but the effects of water and cloud cover on albedo/warming/cooling are complex.

Experimental results at small scale have been very good, including tests in the Sierra Nevada over the winter of 2008/2009. The project has been endorsed as important by climate experts, and has been nominated for a Tech Museum Award for technology in the service of humanity. Armond Cohen, Executive Director, Clean Air Task Force, has stated, "There is no question in my mind that Dr. Field's work is one of the half dozen or so most important research projects underway globally on mitigating climate change – measured by ability to provide large scale (as opposed to marginal) leverage on the problem. The reason for its importance stems from the dearth of options to control warming already underway from CO_2 emissions."

As an example, for the Wilkins Ice Shelf, with an insolation in December and January averaging to 0.46 kW/m^2 at mid-day and an albedo calculated from experimental results, scaled to 0.575 for open ocean with a materials fill factor of 50%, it is estimated that 264.5 W/m^2 could be kept away from a covered ocean area, and that the estimated raw material cost may be as low as \$0.50/m^2 at 50% fill. For an area of 50,000 km^2, this would give a raw material cost of \$25 Billion to keep 13.23 Terawatts of insolation from a critical area during the mid-day, December/January period of peak insolation.

Because of the complex nature of climate and change, the materials and deployment are also designed to be removable, and they could even to be made to reverse the effects, in case predictions of future warming are incorrect or if the solution eventually overcorrects. One of the useful features of this type of localized solution is that the materials can be deployed selectively at the most critically needed locations. For instance, if a critical area of ice seems close to breaking off, the materials may provide a temporary stabilization of the situation, slowing down the collapse. Or, if an area of the Arctic that climate models indicate may be particularly sensitive, a localized deployment of materials can slow down and moderate the change at that location. Using selected deployments, the technique might even help return the earth's ice past the "tipping point", wherein the natural albedo of the earth's surface is again high enough, on average, that the polar icecap and glacial melt is slowed, or even reversed.