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Spatial Variability of Physical Forcing over Varying Arctic Surfaces

E. Key (1), P. Minnett (1), and D. Barber (2)
(1) University of Miami, RSMAS, (2) University of Manitoba

The magnitude of the ice-albedo feedback (O(10ˆ2 W m-2)) and sensitivity of this feedback to small changes in surface conditions ranks it of primary importance to accurate modeling of recent Arctic change. Previous studies of net cloud forcing in the SHEBA region indicate that precise knowledge of surface albedo is important to determine not only the magnitude, but also the sign of the forcing. If the feedback between the surface and atmosphere is positive, the transfer of energy is into the surface, causing warming and possible melt; if negative, the feedback contributes to cooling and likely re-freeze of the surface. In light of recent record retreats in sea ice extent, especially in the SHEBA region and east to Banks Island, in situ data from multi-disciplinary process studies become key for improved modeling and forecasting of the de/re-stabilization of the ice pack. Cruises of the CCGS Amundsen, including a year-long deployment in the Cape Bathurst Polynya, provide much-needed radiometric, radiative, and meteorological data on nearshore, fast ice, marginal ice zone, and open water systems in the Canadian Archipelago and Beaufort Sea. These data are further supported by a telemetered network of meteorological towers sited in several Inuit communities bordering on Cape Bathurst Polynya. Comparing the shipboard data from 2002-2004 with coastal sites and striating this data by surface type allows for a geographical survey of physical forcing in a dynamic environment, and for parallels to be made with the larger basinwide sea ice variability.