

## **A Local Aeolian Influence in the Surface Roughness of Melting Snow, Byers Peninsula, Antarctica**

S.R. Fassnacht

Watershed Science Program, College of Natural Resources, Colorado State University, Fort Collins, CO

M. Toro Velasco

Área de Medio Ambiente Hídrico, Centro de Estudios Hidrográficos (CEDEX), 28005 Madrid, Spain

**Abstract.** The presence of aeolian deposits on a snowpack decreases its albedo and alters the roughness of the surface. The deposition-based decreased albedo has been shown to increase melt rates and yield a more rapid vanishing of the snowpack. Winds that dry soils where snowmelt occurs first may enable the movement of those soil particles and results in the deposition of clay, silt and/or sand onto a melting snowpack.

At the start of snowmelt in the Lake Limnopolar basin on Byers Peninsula of Livingston Island of the South Shetland Islands, Antarctica, soil moisture increases under the snowpack and near its edge but can decrease in areas blown bare through preferential wind flow. In a southern area of this watershed, large grained soil particles were blown over part of a gentle south-facing slope. Within several days during snowmelt subtle sun cups appeared within the zone without the aeolian soil deposition while the zone with the particles had a much smoother surface.

To estimate the nature of the snow surface roughness, a roughness board was inserted into the snowpack surface and photographed. A set of snow surface roughness photographs was taken considering the directionality of the wind. To investigate the impact of the aeolian particles, the photographs were converted into digital data and analyzed using the random roughness metric and a fractal-based variogram investigation. The difference between the clean and aeolian deposition surfaces was substantial and illustrated a likely influence on near surface meteorological characteristics.