Dust entrained from the Colorado Plateau is deposited over large areas of the snowcover of the San Juan Mountains, southwest Colorado. In most years, 3-4 dust layers occur in the snowpack in this region in most years, yet in water year 2005/2006 at time of submission (April 28, 2006) the snowpack had received 7 dust layers. These include the February 15, 2006 major dust deposition that reached across the Colorado Rocky Mountains to the Great Plains. In this paper, we quantify the impact of dust deposition on snowmelt processes during the 2004/2005 and 2005/2006 snow seasons. Measurements of surface energy fluxes, snow temperature, snow water equivalent and dust concentration in the snowpack were made at two meteorological towers in the Senator Beck Study Basin, San Juan Mountains. Exposure of dust at the snow surface significantly enhanced the role of shortwave radiative fluxes in both ripening the snowpack and in runoff generation. In 2004/2005, dust was first exposed at the snow surface on April 13 but was covered by snowfall. Dust was exposed again on May 5. Snow albedo decreased from between 0.7 and 0.9 to 0.6 as a result of dust exposure. Absorption of shortwave radiation increased between 35% and 75%. Total energy available to raise snowpack temperature and melt snow increased between 17% and 40%. Initial exposure of dust coincided with an increase in snowpack temperature in the top layers from -5 °C to 0 °C. In May 2005, dust exposure coincided with rising runoff from the basin. Results from 2005/2006 are still under observation and analysis at time of writing but will be presented for comparison.

Keywords: snow, dust, snowmelt, runoff, albedo.