

Regional Climate Change: The Role of Light-Absorbing Aerosols and Snow-Albedo Feedback

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Abstract

We present evidence of mountain snow-melt produced by climate change and global warming, followed by an introduction in areas of the Sierra-Nevada Mountains the presence of lightabsorbing black carbon and dust particles resulting from the trans-Pacific transport of these aerosols from East Asia. We use the observational data determined from the Moderate Resolution Imaging Spectroradiometer (MODIS) on board the NASA Terra and Aqua satellites and a chemical transport model to illustrate the trans-Pacific transport from China and Southeast Asia to the United States. The effects of absorbing aerosols on snow grains and snow albedo are illustrated on the basis of a theoretical radiative transfer model. Subsequently, we discuss the essence of snow-albedo feedback in regional climate change due to the increasing abundance of absorbing aerosols.