Sources of Atmospheric Dust in Class I Areas of the Western U.S.

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Aerosol data from the Interagency Monitoring of Protected Visual Environments (IMPROVE) network were examined in conjunction with several other tools. These included air mass backward trajectories, land use maps, soil characteristics maps, diagnostic ratios of elemental composition, and multivariate linear regression of local wind parameters versus measured dust. The purpose of this work was to use a "weight of evidence" approach to determine the types of dust-causing events that contribute to low visibility. The analysis was restricted to 70 IMPROVE sites in the Western U.S. and to sample days when the sum of extinction from coarse mass (CM) and fine soil (FS) was larger than any other component and the reconstructed aerosol extinction coefficient was among the 20% highest, calculated on a calendar year and a site by site basis. The above-mentioned tools were used to ascribe the cause of low visibility to one of three event types which were defined operationally: (i) transcontinental transport of dust originating from Asia; (ii) windblown dust events from sources located nearby the site and; (iii) transport of windblown dust from sources upwind of the site. Of 610 sample days when visibility was significantly impacted by dust over the 2001 - 2003 period, 51% were associated with one of the three event types with high confidence and an additional 30% were accounted for with low confidence. All in all, the methods and results of this study can be used to retrospectively uncover the cause of dust-resultant haze at a given IMPROVE monitor. Such information is helpful for improving the performance of large scale dust emission models and providing insight into the distribution of the types of events that cause dust resultant haze in relatively remote areas of the Western U.S..