

# Gypsum Aerosol Downwind of White Sands, NM

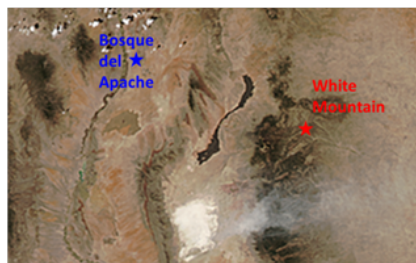
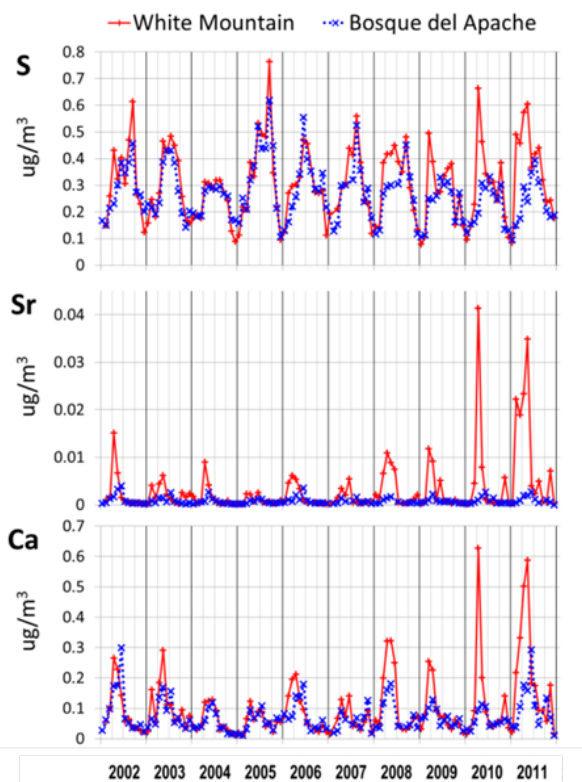
W.H. White<sup>1</sup>, K. Trzepla<sup>1</sup> and T.E. Gill<sup>2</sup>

<sup>1</sup>University of California at Davis, Crocker Nuclear Laboratory, Davis, CA 95616; 5307521213, E-mail: WHWHITE@UCDAVIS.EDU

<sup>2</sup>University of Texas at El Paso, Department of Geological Sciences, El Paso, TX 79968

White Sands National Monument in southern New Mexico preserves a major portion of the world’s largest gypsum dunefield. The field sits in the 60km-wide Tularosa Basin, bounded by the San Andres Mountains to the west and the Sacramento Mountains to the east. Since January 2002, the Interagency Monitoring of Protected Visual Environments (IMPROVE) network has operated samplers at White Mountain in the Sacramento Mountains, generally downwind of White Sands, and Bosque del Apache on the Colorado River, generally windward of the San Andres Mountains.

On a steady one-in-three day schedule, IMPROVE monitors collect 24-hour samples of ambient fine particles (PM<sub>2.5</sub>, with aerodynamic particle diameters D<sub>ap</sub> ≤ 2.5 μm) on multiple filter media. In recent years a spring pulse of sulfate aerosol has appeared at White Mountain, eclipsing the usual summer peak attributed to atmospheric reactions of sulfur dioxide emissions. These sulfate increases have been accompanied by increased concentrations of calcium and strontium that indicate a significant contribution of mineral gypsum to atmospheric sulfate in this region.



r	Al	Si	K	Ti	Mn	Fe	Rb	Na	Mg	Cl	Ca	Sr	V	Cr	Ni	Br	S
Al	1	0.99	0.93	0.99	0.95	0.99	0.75	0.4	0.73	0.6	0.76	0.6	0.73	0.72	0.54	0.41	0.64
Si	0.99	1	0.94	0.99	0.96	0.99	0.77	0.39	0.74	0.61	0.78	0.63	0.73	0.69	0.54	0.43	0.65
K	0.93	0.94	1	0.94	0.96	0.95	0.78	0.4	0.77	0.65	0.82	0.67	0.74	0.65	0.55	0.59	0.71
Ti	0.99	0.99	0.94	1	0.95	1	0.76	0.41	0.74	0.61	0.78	0.63	0.72	0.72	0.54	0.44	0.66
Mn	0.95	0.96	0.96	0.95	1	0.96	0.79	0.36	0.73	0.6	0.8	0.64	0.73	0.7	0.55	0.48	0.67
Fe	0.99	0.99	0.95	1	0.96	1	0.76	0.42	0.76	0.63	0.8	0.64	0.73	0.73	0.54	0.43	0.68
Rb	0.75	0.77	0.78	0.76	0.79	0.76	1	0.43	0.7	0.62	0.72	0.68	0.57	0.52	0.28	0.34	0.64
Na	0.4	0.39	0.4	0.41	0.36	0.42	0.43	1	0.58	0.59	0.49	0.62	0.3	0.26	0.01	0.09	0.65
Mg	0.73	0.74	0.77	0.74	0.73	0.76	0.7	0.58	1	0.93	0.94	0.95	0.5	0.47	0.25	0.23	0.84
Cl	0.6	0.61	0.65	0.61	0.6	0.63	0.62	0.59	0.93	1	0.92	0.93	0.47	0.33	0.13	0.16	0.8
Ca	0.76	0.78	0.82	0.78	0.8	0.8	0.72	0.49	0.94	0.92	1	0.94	0.58	0.49	0.33	0.34	0.84
Sr	0.6	0.63	0.67	0.63	0.64	0.64	0.68	0.62	0.95	0.93	0.94	1	0.42	0.35	0.17	0.2	0.85
V	0.73	0.73	0.74	0.72	0.73	0.73	0.57	0.3	0.5	0.47	0.58	0.42	1	0.5	0.56	0.6	0.61
Cr	0.72	0.69	0.65	0.72	0.7	0.73	0.52	0.26	0.47	0.33	0.49	0.35	0.5	1	0.43	0.25	0.39
Ni	0.54	0.54	0.55	0.54	0.55	0.54	0.28	0.01	0.25	0.13	0.33	0.17	0.56	0.43	1	0.48	0.34
Br	0.41	0.43	0.59	0.44	0.48	0.43	0.34	0.09	0.23	0.16	0.34	0.2	0.6	0.25	0.48	1	0.47
S	0.64	0.65	0.71	0.66	0.67	0.68	0.64	0.65	0.84	0.8	0.84	0.85	0.61	0.39	0.34	0.47	1

**Figure 1.** Left: Monthly average concentrations of every-third-day 24h samples. Top right: MODIS image, 4/14/2013, 20 UTC (<http://lance-modis.eosdis.nasa.gov/cgi-bin/imagery/gallery.cgi>). Bottom right: Correlation (r) for 2011 daily data from White Mountain (n = 105).