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2008 IAVCEI (International Association of Volcanology and Chemistry of the Earth's Interior)
General Assembly, Reykjavik, Iceland, August 17–22, 2008

Deposits of Eolian Reworked Tephra at Sunset Crater, Arizona (USA)

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Primary fall deposits are generally the focus of volcanological investigations, but significant eolian deposits of reworked coarse to fine basaltic ash from Sunset Crater (Arizona, USA) can also be identified in the distal area where wind has redistributed tephra from the site of initial deposition. Sunset Crater is a 900-year-old scoria-cone volcano in which tephra dispersal is divided into continuous and discontinuous regions. The continuous fall deposit, which is often greater than 1 m [3.3 ft] in thickness, mantles the preexisting landscape and extends in an east-northeast direction for approximately 10 km [6.2 mi] along the main axis of deposition—an indication of prevailing wind direction—and for approximately 4 km [2.5 mi] along the west axis. The discontinuous deposit comprises the distal region and is also most extensive to the east-northeast, reaching a distance of approximately 20 km [12.4 mi] along the main axis of deposition. Throughout the distal region and in some instances beyond 20 km [12.4 mi] from the vent, Sunset Crater tephra may be present as black, patchy eolian deposits composed of coarse to fine ash particles. These eolian deposits often form coppice dunes, which develop where particles are trapped by clumps of vegetation to create small hummocks or mounds. Dune heights measure from 0.5–2.5 m [1.6–8.2 ft], and the mean grain size from collected eolian samples is about 2 phi {0.25 mm [0.01 in]}. Local gradations from coarser grained primary fall deposits to eolian reworked tephra also were observed. Other eolian deposits composed of tephra are related to local topographic effects, including sand ramps and falling dunes. Small transverse dunes and wind ripples occur in the proximal zone. The total volume of these distal volcanoclastic eolian deposits is less than one percent of the estimated total volume of the fall deposit. Redistribution of tephra represents a potential volcanic hazard, especially if the tephra is contaminated by radioactive waste (e.g., the potential repository at Yucca Mountain, Nevada).

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