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Dust Transport from Io to Europa, Ganymede, and Callisto

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The active volcanos of Jupiter's moon Io are sources of small (radius $r_g < 0.1\mu$m) dust particles that comprise the high speed dust streams discovered by *Ulysses* in 1992 and continuously monitored by the *Galileo* spacecraft in 1995-2003.

The dust flux emitted from Io's volcanoes showed a large variability due to both systematic and stochastic changes. On average it remained in the range of 0.1 to 1 kgs^{-1}, and exhibited short-lived extreme excursions spanning a much larger range of 10^{-3} to 10 kgs^{-1}.

The dynamics of the sub-micron sized particles escaping from Io is primarily set by Jupiter's gravity and electromagnetic forces. The dust particles collect electric charges in the Io's plasma torus and in the Jovian magnetosphere and respond to the magnetic and the co-rotational electric fields in Jupiter's magnetosphere. For small particles the outward pointing electric force overcomes gravity and accelerates the grains to high velocities ($v > 100$ km/s), resulting in the ejection of the small dust particles from the Jovian magnetosphere. Here we report on our modeling of the flux and deposition pattern of the Io's volcanic dust particles onto the surfaces of the Galilean icy moons Europa, Ganymede and Callisto. The deposition of sulfur rich material and the subsequent weathering of the surfaces of these moons is of interest for the correct analysis and interpretation of remote sensing as well as future in situ investigations.