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Laboratory simulations of atmospheric entry of micrometeoroids: ablation of magnesium

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We address the uncertainty in the cosmic dust input into the Earth's atmosphere by simulating the atmospheric entry of micrometeoroids in a custom built chamber, capable of heating particles to 3000 K in 2 s and able to precisely reproduce representative heating profiles. In lieu of interplanetary cosmic dust, we use a range of ground-up recovered meteorites and mineral analogues. We measure the ablation of two metals simultaneously with laser induced fluorescence (LIF). The resulting ablation profiles can be compared with the composition of the remaining, unablated particle, as determined from scanning electron microscopy-energy dispersive x-ray (SEM-EDX) analysis. Building on earlier studies of Na, Fe and Ca, here we present Mg profiles and compare them with results from our chemical ablation model (CABMOD). In general, Mg behaves as predicted, beginning to ablate steadily as one broad ablation peak once temperatures reach 2000 K. In contrast Fe, which should behave similarly to Mg, typically has two ablation peaks due to being present in two distinct phases.