



The Meteoric Metal Layers and Mesospheric Ice Clouds

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There is growing evidence that mesospheric ice clouds interact with the layers of metal atoms that are produced by the ablation of meteors. Dramatic depletion of meteoric Fe within mesospheric clouds have been measured by lidar at South Pole. The Na and K layers are also depleted when ice particles form in the summer mesosphere (She *et al. priv. comm.*; Lübken and Höffner, GRL, 2004). In an experimental study we have measured the uptake of Fe, Na and K atoms on ice films over a temperature range of 80-150 K, a range relevant for the polar mesopause region. This has been done using a liquid nitrogen cooled fast flow tube with the inside walls coated with an ice film that is thought to approximate mesospheric ice. The uptake coefficient, defined as the probability of an atom being permanently removed from the gas phase on collision with a surface, of the metal atoms on ice is close to unity under conditions pertinent to the summer mesosphere for all three metals. Combining the mesospheric ice particle profile from the CARMA model (von Zahn and Berger, JGR, 2003) with a model describing the chemistry of the Fe layer, we have shown that the uptake of Fe atoms on mesospheric ice particles is sufficiently rapid to compete with the input of the metal atoms from meteoric ablation.