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The mesospheric metal layer topside: A direct measure of meteoric input?

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We present the results of two recent publications (Höffner & Friedman, Atmos. Chem. Phys., 4, 801-808, 2004; Höffner & Friedman, JASTP, in preparation) on what we call the topside of the mesopause region metal layer. The meteor-generated metal layer is generally thought to extend from 80 to under 110 km. However given a combination of good signal with precise background determination, the metal layer is almost always observable above 110 km and sometimes higher than 130 km for integrations of several hours. Here we present observations of the potassium layer topside from two disparate latitudes (Arecibo: 18° N and Kühlungsborn: 54° N) as well as those of several metals at a single location. We show that, in spite of the radical differences in seasonal and nightly behaviour of different metals in the main layer, the layers' topsides show remarkably similar morphologies. In addition, for one metal to this point, we demonstrate that the seasonal variability of the topside has no apparent latitude difference. We contend that the similarity in morphology, independent of metal species and location, supports the hypothesis that the metal layer topside is directly controlled by meteoric input, rather than chemistry or dynamics. The strongest indication for such a mechanism is in the remarkably constant metal abundance ratios and their agreement with observations of single meteor trails by lidar. The observed metal abundance ratios are in good agreement with these even though lidar-observed single meteor trails can only be observed at lower altitudes.