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# First observations of the global sodium layer

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A layer of sodium atoms occurs between 75 and 110 km in the earth's atmosphere. The source of Na is meteoric ablation, and the metal is largely in its atomic form over this height range because of the substantial concentration of atomic oxygen. While Na resonance lidars have provided an enormous wealth of data on the Na layer, with impressive height and temporal resolution, these measurements are restricted to a handful of observatories around the world.

In this paper we will describe measurements of the global sodium layer, derived from satellite limb-scanning observations of the radiance at 589 nm from solar-pumped resonance fluorescence of Na atoms. Measurements were made using the OSIRIS spectrometer on the ODIN satellite, which provides data at $\sim$ 0600 and 1800 hrs local time. Optimal estimation theory is used to retrieve the vertical profile of the Na layer. The vertical resolution varies from 2 to 4 km, depending on altitude, and the retrieval ranges from 70 – 120 km. Corrections are included in the forward model for variations in albedo and stratospheric $O_3$ density, and the Fraunhofer lines in the solar spectrum. Ground-truthing of the retrieved Na layer was made with overflights of the Colorado State Na lidar at Ft. Collins (US), courtesy of Prof. C.-Y. She. Excellent agreement was found in the absolute Na density and the layer profile.

Measurements over three years show some very consistent features. These include nearly complete removal of Na atoms below 90 km at high latitudes during summer, when polar mesospheric clouds are present. During the equinoxes, the very large diurnal tide is clearly seen in the diurnal behaviour of the Na layer. The satellite measure-

ments will be compared with a new global model of the Na layer.