Sodium layer in the thermosphere (110-130 km) observed at Syowa Station (69.0S, 39.6E) in Antarctica

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The neutral metallic atom layers (such as sodium, iron, potassium layers) are normally distributed at a height range of 80-110 km (in the upper mesosphere and lower thermosphere). Resonance scattering lidar observations of these metallic layers have been used as an important tool for investigation of the upper mesosphere and lower thermosphere. On the other hand, ground-based observations of the neutral atmosphere at higher altitude (above 110 km) are quite limited. Recently, observations of metallic layers above 110 km up to 155 km have been reported from McMurdo (77.8S, 166.7E) in Antarctica (Chu et al., GRL, 2011) and other stations. Such high-altitude metallic layers (so-called thermospheric metallic layers) is currently well-unknown phenomenon, and has possibility to greatly improve our understanding of the lower thermosphere.

Intensive sodium temperature lidar observations were carried out at Syowa Station (69.0S, 39.6E) in Antarctica between 2000 and 2002 as a part of JARE observations. From the observational data, we investigate thermospheric sodium layer (above 110 km). In this presentation, we will report a thermospheric sodium layer event (up to 130 km) observed on 23 September 2000. In this event, the lidar detected significant signals not only from 80-110 km but also from 110-130 km. More detailed analysis has provided the temperature and the sodium-density measurements at this height range up to 130 km. The estimated sodium density reached about tens of cm^{-3} at around 120 km. The temperature profile in the thermospheric sodium layer was fairly comparable to that from the NRLMSISE-00 model. We will show these results and discuss similarity and difference between the observed thermospheric sodium layer event and previously reported thermospheric metal layer events.