

Observations of the thermal structure, composition, and energy budget of the mesosphere and thermosphere from 15 years of data from SABER

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The Sounding of the Atmosphere using Broadband Emission Radiometry (SABER) instrument has been observing the thermal structure, chemical composition, and energy budget of the Earth' s mesosphere and thermosphere for over 15 years. The instrument is on the NASA Thermosphere-Ionosphere-Mesosphere-Energetics and Dynamics (TIMED) satellite and continues to operate nominally, routinely collecting over 1500 profiles of limb radiance daily in each of its 10 channels. These measurements produce over 30 unique data products. The length of the SABER dataset continues to enable scientific discovery on topics ranging from solar-terrestrial connections to global change due to carbon dioxide increases. In this talk we will review in particular the influence of solar variability on the energy balance, composition, and thermal structure of the upper atmosphere. A specific focus will be on the current state of the Sun as it progresses towards the next solar minimum, and the corresponding effects seen in Earth' s atmosphere. We also will examine the effects of recent high speed solar wind stream events that are now becoming more common in this phase of solar activity, searching for evidence of previously-observed harmonics of the solar rotation period in the infrared cooling budget of the thermosphere. Prospects and requirements for new observations of the ionosphere-thermosphere-mesosphere will also be presented.

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