

Long-Term Observations of the Upper Atmosphere

Martin G. Mlynczak [m.g.mlynczak@nasa.gov], NASA Langley Research Center, Hampton, VA, USA

The past 40 years have been a “golden age” for observations of the stratosphere, mesosphere, and lower thermosphere. Beginning with the Nimbus satellites mid-1970’s and continuing until the present day, numerous dedicated satellites and specific instruments have been flown to measure the thermal structure and chemical composition of the Earth’s middle atmosphere. Largely driven by the need to understand ozone, which is the main radiative driver in the middle atmosphere, missions were routinely flown to study this fascinating region. Today, two aging NASA satellites (AURA, at 11 years, and TIMED at 14 years) are the last satellites providing comprehensive data from the tropopause into the thermosphere. The SAGE III mission will launch in 2016 and will largely focus on stratospheric ozone and aerosols for climate. Thus middle atmosphere science is facing the likely prospect of a gap in data, especially in the mesosphere and lower thermosphere. Despite compelling scientific questions, many related to long-term global change, there are presently no new missions or instruments under development to continue critical global data records of temperature, ozone, water vapor, carbon dioxide, and energetics in the middle atmosphere. In this talk we present a concept for an infrared limb sounder that can continue legacy measurements and add significant new science at low cost and existing high technical readiness. The MASTER instrument will be presented as well as possible candidate complementary instrument concepts that could form the basis of a new mission combining data continuity and scientific exploration of the upper atmosphere.