ACES Mission Update: Scientific Objectives and Ground Station Requirements

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With the launch of the Atomic Clock Ensemble in Space (ACES), we have a unique opportunity to compare space-based clocks and those on the ground, as well as between geographically distant ground stations. This mission significantly contributes to fundamental physics and improves geodetic products. Within the European Laser Timing (ELT) on board, the Satellite Laser Ranging (SLR) stations have the opportunity to participate in ACES tracking and time synchronization through the free-space optical link. One key goal of the recently established research unit in Germany named ”Clock Metrology” is to accurately determine the height difference between optical ground clocks via gravitational potential measurements, made possible by ACES observations. This allows for the realization of chronometric leveling. Additionally, it enables the investigation of systematic errors between space geodetic techniques using so-called clock-ties. To support these efforts, microwave and optical links are deployed on board ACES. This presentation will discuss the current status of the ACES mission, including ongoing efforts at the Geodetic Observatory Wettzell, where the ESA microwave terminal was recently deployed. Additionally, the presentation will outline the technical and operational requirements for participating SLR tracking stations.