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Operations in Space Debris Environment, Situational Awareness - SSA (7)

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THE UAE SPACE SITUATIONAL AWARENESS PROGRAM AT THE SHARJAH ACADEMY FOR ASTRONOMY, SPACE SCIENCES, AND TECHNOLOGY

Abstract

In this paper, we highlight the different programs that promote "Space Situational Awareness (SSA)" at the Sharjah Academy for Astronomy, Space Sciences, and Technology (SAASST) in the United Arab Emirates. There are three main components of SSA: (1) natural space debris, (2) orbiting space objects, and (3) space weather. For natural space debris detection, SAASST runs the UAE Meteor Monitoring Network (UAEMMN), a system sponsored by the UAE Space Agency and the University of Sharjah. It is a unique three towers system, located at three different UAE locations, monitoring the UAE sky from sunset to sunrise to detect crossing meteors and other flying objects. To date, the system was able to observe more than 32,000 meteors. Orbit determination is performed to find these objects' possible falls, referred to as meteorites. In terms of orbiting space objects, we distinguish between the artificial ones, i.e., human-made satellites, or the natural ones, i.e., asteroids. The SAASST Sharjah Optical Observatory (SOO) has the capabilities to observe both of them. With SOO, hundreds of geostationary satellites were located with exact orbit determination using the 17-inch reflecting telescope. SOO is also credited with the discovery of two asteroids using the Pan-STARRS database. For space weather, the main drive is the

Sun. Several systems are used to follow the day-by-day solar activities. Daytime GNSS Scintillation over the Arabian Peninsula is a major research concern for the SAASST space weather program. Two principal instruments to study Earth's upper ionosphere, a GNSS station, and a CADI Ionosonde, are operational. The goal is to understand the electromagnetic and sub-atomic particle fluxes derived from the Sun's activities that impact our atmosphere as it is primordial for GPS locations and satellite operations. The SAASST Sharjah Decametric Radio Telescope (SDRT) that operates at 20.1 MHz was able to detect tens of solar radio bursts related to sunspots' appearance. These spots are observed by SOO whenever they appear on the Sun's surface. All of these SAASST systems are contributing to the UAE Space Situational Awareness in the United Arab Emirates. This paper will highlight all the details of these systems and expose the primordial role of SAASST in this domain.