

SYMPOSIUM ON FUTURE SPACE ASTRONOMY AND SOLAR-SYSTEM SCIENCE MISSIONS (A7)
Technology Needs for Future Missions, Systems, and Instruments (3)

Author: Dr. Muthanna AlMahmoud
UAE Space Agency, United Arab Emirates

Prof.Dr. Ingyin Zaw
new entry, United Arab Emirates

THE BENEFITS OF A DEEP SPACE GROUND STATION IN THE UAE

Abstract

In July 2014, the United Arab Emirates (UAE) announced its first science mission to Mars, "Al Amal," to be launched in 2020 to arrive at Mars in 2021. On February 2017, the UAE unveiled its ambitious long term plan "Mars Project 2117" which aims at its final stage to establish the first human settlement in Mars by 2117. In its efforts to diversify the space industry and enriching the capabilities of its engineers and scientists, the UAE Space Agency (UAESA) investigated hosting its first Deep Space Ground Station to communicate with its Mars probe, supporting future deep space missions, conducting radio astronomy science, in addition to supporting international missions and space exploration collaborations.

This paper will outline the unique advantages of the geographical location of the UAE in terms of building a site similar to those of NASA's Deep Space Network (DSN), capable of a dual function: support of UAESA and international deep space missions and participation in the international very long baseline interferometry (VLBI) networks for supporting radio astronomy activities. This dual function is made possible through the UAE Ground Station's (UAEGS) ability to communicate and support navigation of deep space missions, inter-operability with international spacecraft and ground systems using accepted standards (CCSDS for example), and frequency agility which allows for the addition of frequency bands (at least between S and Ka band) without major changes and to quickly switch between all supported frequency bands¹.

The UAEGS geographic location complements that of other deep space sites. With respect to the NASA DSN, UAEGS can provide coverage as spacecraft transition from support by an antenna in Spain to an antenna in Australia. In addition to functioning as a single dish telescope, the UAEGS may participate in the Australian Long Baseline Array (LBA), adding north-south baselines as well as filling in gaps in the east-west baselines between Australia and South Africa. Similarly, it will help the European VLBI Network (EVN), linking the stations in Europe with those in East Asia and South Africa. In doing so, the UAEGS will significantly improve the Fourier space sampling (UV coverage) of these arrays and lead to better images of astronomical sources.

¹The UAESA would like to acknowledge Joseph Statman, JPL, and NASA for their contributions to this paper