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EVOLVING HELIX: INTEGRATING MULTIPLE DATA SOURCES, AI, AND NEXT-GEN TECHNOLOGIES FOR SUPERIOR SSA

Abstract

ArianeGroup's Helix network has been continuously providing SSA optical data to its customers for more than 10 years. With its catalogue covering all orbits, Helix offers services such as zone surveillance, research of lost satellites, conjunction / fleet protection, automatic maneuver detection, satellite pattern of life characterization or collision risk assessment for rocket launch. Innovation and Continuous improvement are key drivers for Arianegroup and a lot of work was done last year to improve spatial situational awareness and fulfill our customers' needs, through new developments, new test technologies or new services. One way to improve the cataloguing and the orbit determination is to use data from multiple sources. Therefore, we developed datafusion algorithms using data from different technologies to improve the orbit determination. A specific simulator has been developed to analyze the complementarity of optical ground data and optical space-based data, according to the ground network performances and the chosen orbit for the satellites. In addition, now that the operational Helix network includes infrared and survey stations, the number of tracked objects increases significantly. To analyze this large volume of data, AI algorithms have been developed to allow data clustering in order to facilitate the global understanding of the spatial situation. Finally, in terms of new technologies, High Frequency imaging and adaptive optics have been successfully tested last year. In this paper, we will describe these latest developments and tests as well as the future work in the coming years.