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A LOW-COST GLOBAL SPACE DEBRIS TRACKING NETWORK BASED ON HETEROGENEOUS METEOR DETECTION INFRASTRUCTURE

Abstract

It is estimated that more than 750,000 debris objects larger than 1cm orbit Earth. As the amount of space debris grows, the probability of a collision with spacecraft or other debris increases. In addition to being a threat to space assets, the proliferation of space debris can interfere with astronomical observations around the world, as debris falling back to the atmosphere are inconveniently recorded by meteor impact detection systems and mistaken as "fireballs". There are currently several international networks to detect, document and track space debris, and predict their re-entry. However, these efforts are often segregated, with single space debris networks being far from having a global scale, and currently leaving a large population of space debris untracked. In this article, the value of implementing existing meteor observation networks to detect and track space debris and their re-entry, is proposed. First, a review of current meteor observation facilities, regarding their location, sky coverage, facilities, and detection methods, is presented. Second, these networks are evaluated according to the adjustments or modifications required to address space debris at the network level. Later, the requirements for unifying heterogeneous meteor detection networks, to form a global space debris detection and tracking network, are evaluated. Finally, the benefits and drawbacks of such project are discussed. The results of this study suggest that adapting existing meteor observation infrastructures can be a low-cost alternative to global detection and tracking of space debris.