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SOFTWARE FOR PLANNING RESEARCH USING REMOTE SENSING SATELLITES

Abstract

When launching any Earth remote sensing spacecraft, it is necessary to know in advance at what points in time the territory to be explored will be in the field of view of the satellite's instruments. Often this area is small compared to the size of the planet. For example, if it is a city that needs to be monitored by satellite, or a crop area where crop growth needs to be monitored, or a plot of land where a cadastral map needs to be drawn up. Thus, the time this area will be in the satellite's field of view will be very short compared to the lifetime of the hardware. Accordingly, it is necessary to use some software to calculate this time. A large number of programs such as Orbitron, GPredict and HeavensAbove do already exist to calculate satellite passes over the specified area, but they are not able to take into account additional conditions such as time of year, time of day and the Sun's altitude. For example, for agricultural satellites, relevant are only those passes that occur in summer, not in winter, during the day, not at night, and only with specified Sun altitude. Nowadays, there is no publicly available program capable of taking into account all of the above conditions in the calculation. More precisely, there is SaVoir, but this software, due to the methods used (first calculating all passes over the polygon and then selecting those that satisfy the necessary conditions) is not able to quickly calculate the satellite flight over a time interval exceeding 30 days. Therefore, in this paper we propose a program designed to calculate the passages of a near-Earth spacecraft over a given territory, taking into account the above additional conditions. The methods used in this program allow making fast calculations (1 year of satellite flight is calculated in 19 minutes of real time). The usage of this software will allow to calculate the satellite camera operation time in the most efficient way and sell the remaining free shooting time to other organizations interested in remote sensing of any other areas.