
ABSTRACTS (MASTER THESIS)

**Study on Observation Plan for Space Debris
Using the MU Radar**

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The purpose of this study is to develop appropriate observation plans for the effective observation of identified and unidentified space debris. We used the MU radar as an observatory of the debris.

As to the identified debris, we can get information about their orbital elements as two-line elements (TLE). We made an observation plan by calculating debris' orbits from TLE and relative positions to the MU radar. Based on the organized plan, we observed debris with the MU radar. According to the plan, six debris can be observed with the MU radar, and as a result of the observation, we identified signals of debris from all observed data. The time errors between the estimated time of the organized plan and measured one were within 10 seconds. Furthermore, concerning range, the organized plan was accurate. Thus, the method of planning we used in observing the debris was verified as reliable for the debris observation.

As to the unidentified debris, which will be generated from explosions and collisions of space satellites in the future, we proposed an observation plan by estimating debris' orbit for 72 hours from the generation and the direction in which more debris pass. To assume more realistic conditions, we reproduced past two accidents of satellites which generate debris in this study. As a result of calculation, we found the deviation of the debris to particular directions.

In the present study, as to the identified debris, we proved the reliability of our observation plan by the observations with the MU radar. As to the unidentified debris, we proposed a method of planning by simulating the real fragmentation accidents. Evaluating the validity of the method we proposed for the unidentified debris is our future work.