

SPACE EXPLORATION SYMPOSIUM (A3)
Poster Session (P)

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A GENERIC TRADE-OFF OF ASTEROID MINING MISSION CONCEPTS FOR NEAR-EARTH
ASTEROIDS**Abstract**

The usage of raw material originating from asteroids plays a big role in future space exploration missions. Space resources such as water, metals and semi-conductors can support the supplies of human missions and the maintenance of their spacecraft (S/C). The research on asteroids does not only hold economic advantages but also answers to scientific questions concerning the origin and formation of the universe. Thus, the scope of this paper is to investigate concepts for asteroid mining missions. First, this article gives a short introduction on Near-Earth Asteroids (NEAs) specifying their known, physical properties. Then, possibilities for mission concepts are described with the objective to extract material for further utilization as well as important characteristic options. On the basis of the orbital data of all known objects of the NEA subgroups Apollo, Aten, and Amor (status: September 2012), nine mining mission concepts are compared by means of four criteria: Δv , propellant mass, system complexity, and transfer periods. The concepts include one in-situ mining concept and eight asteroid captures on different mining orbits. The study leads to a final trade-off that ranks the different concepts according to the criteria results. In a final step, the ten most promising targets with respect to the overall best mission concept are listed.