OBSERVING MARS FROM AREOSTATIONARY ORBIT: BENEFITS AND APPLICATIONS

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Executive summary

The first geostationary communication satellite (Syncom 3) was launched in 1964, and about 400 orbit Earth today. Geostationary satellite imagery revolutionized Earth weather forecasting in the 1970s. The areostationary orbit is the Mars-equivalent of the geostationary one. This white paper has the objective to detail what scientific and operational applications would highly benefit from satellites in this type of orbit. Areostationary orbiters are innovative platforms for space-based Mars science, from its moons to its sub-surface. Equally important, the first areostationary orbiter will blaze a trail for the orbital infrastructure that will enable humans to explore Mars's surface and sub-surface safely and efficiently. In order to achieve truly global coverage and synergistic perspective, such platforms can work in conjunction with, or as a complement to, satellites in polar or eccentric low-altitude orbits. They will also be platforms for testing general planetostationary satellite operations away from Earth, a concept possibly applicable to several other planetary bodies in the Solar System. The needs are compelling and the technology is mature to see the first areostationary satellites orbiting Mars in the next decade. Therefore, we, the authors and signatories of this white paper, recommend that areostationary orbiters be considered and prioritized by NASA and other space agencies in any architecture studied or developed for Mars in the next decade, including where the focus is exploring the surface and sub-surface *in situ* by robotic and human missions. We also recommend that the development of technologies areostationary orbiters can benefit from (e.g. optical communication) continue in the next decade. Finally, we encourage the study of the possible applications of planetostationary orbits for future planetary exploration outside of the Mars system.