"Fast" Trajectories Using Aerogravity Assist (AGA) that Might Reduce Duration to the Start of Science at Enceladus

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This paper presents the hypothesis that trajectories including AGA maneuvers using an ellipsled at Venus and Titan, followed by a 2.25-year moon tour [1] could deliver a spacecraft to Enceladus at durations half of those discussed in the 2020 "Orbilander" study [2]. Owing to recommendations by the 2023-2033 decadal survey that the Orbilander mission be considered as NASA's second highest priority new Flagship mission [3], it seems appropriate to present this hypothesis to the community and point out that new TPS technology, [4,5] used on "slender" bodies such as an ellipsled [6,7] could be studied in an analysis to confirm or refute that dual AGA maneuvers involving dual heat pulses are feasible. The duration for the transit from launch to Titan are based on recent interplanetary trajectories by Qu and a 2.25 year duration moon tour based on that from Ref. [1]. The duration of the moon tour for the Orbilander mission [2] is twice that from Spilker, et al. [1] since the trajectory in [2] did not use a Titan AGA maneuver.

Lacking at this time are analyses of whether or not velocity lost owing to drag during the Venus AGA could be recovered by a propulsive burn and if the HEEET TPS could perform satisfactorily for a dual heat pulse, dual AGA maneuver at Venus and Titan.

References

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