

Science Operations Analysis for BepiColombo for Periods of Low Resource Availability

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Abstract

BepiColombo is a joint mission between ESA and JAXA that aims to explore the planet Mercury and its magnetosphere. It will launch in 2016, arrive at Mercury in early 2024, and perform science investigations for at least one Earth year.

1. Introduction

Current analysis indicates that there will be short periods of limited power availability when the planet is close to the Sun. At the Science Ground Segment at ESAC, Spain, Science Operations Analyses have been performed to investigate strategies to mitigate potential loss of science at those times. The aims of these analyses were in particular:

- To explore scientifically valuable operational options for times of limited power availability
- To demonstrate that the science goals of BepiColombo can be met
- To identify problem areas and to propose mitigation actions

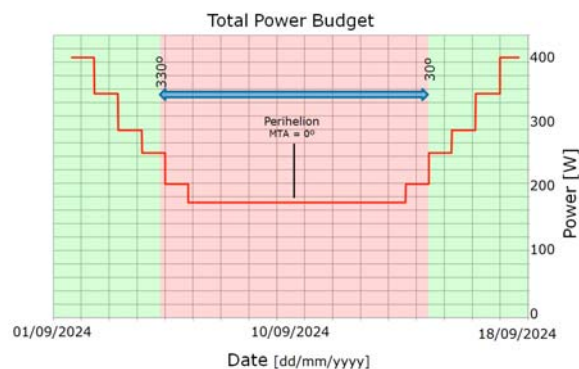


Figure 1: Total power budget for perihelion time.

In Figure 1 we show the power availability (red line) during the perihelion time. The most critical time is

$\pm 30^\circ$ MTA (Mercury True Anomaly) before and after the perihelion passage (blue bar).

2. Studies and Options

To this end, grouped observations, called "Study Scenarios", were developed where each Scenario focused on observations and experiments which are scientifically connected. Thus priority was given to a Scenario rather than to individual instruments. Additionally, "Options" were calculated for which different Studies were prioritized for each of the four periods of low power availability.

In Figure 2 we show the analysis results of the "Option" where "Surface Studies" were prioritized (details will be explained in the presentation).

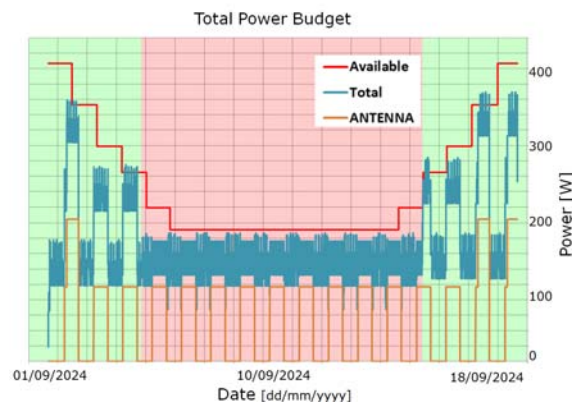


Figure 2: Total power budget for perihelion time.

3. Summary and Conclusions

We present here the outcome of this study where we show that almost all proposed science can be recovered when applying this suggested approach and the impact on the total science return of the mission is very limited.