Examining Science Productivity of Data Analysis Programs (DAPs) with Comparison to Prime and Extended Missions. E. Shteynberg[1] and C. Niebur[2], [1]New York University (emilyshteynberg@gmail.com), [2]NASA Headquarters (300 Hidden Figures Way SW Washington D.C, 20546-0001; curt.niebur@nasa.gov).

Introduction: The ultimate goal of NASA's planetary missions is not data but the advancement of scientific knowledge. Archiving the data is insufficient to achieve this goal. Additionally, adequate support of scientists analyzing the data is needed. This support takes three forms: funding of the selected science team for science analysis during the prime mission, funding for the science team during the extended mission, and funding for the broader scientific community via data analysis programs (DAPs) during and after the mission's lifetime. The goal of this research project was to explore the scientific productivity of DAPs and compare that productivity to that of the mission science teams during the prime and extended missions.

DAPs provide grant funding to scientists who are not directly part of these missions but conduct research using mission data. The science productivity of prime and extended missions has previously been investigated [1]. This project completes the analysis by focusing on the DAPs. Examining trends in productivity over time and between different missions will help assess the adequacy of science team and DAP funding within the Planetary Science Division.

The objectives of this project were to 1) quantify and compare the productivity of prime missions, extended missions, and DAPs, 2) compare the productivity of DAPs for different types and classes of missions, and 3) compare the productivity of DAPs for older and more recent missions.

Methodology: This project was conducted using data from three DAPs covering six missions. The missions were Cassini, Messenger, Deep Impact, Dawn, New Horizons, and Juno. The DAPs were Cassini DAP, Discovery DAP, and New Frontiers DAP. DAP grants from 2006 to 2020 to examined. To measure productivity the metric of "publication rate" was created which was defined as the number of publications per grant per year. Grant data was obtained from NASA's NSPIRES website, which contains DAP grant selections of each year's ROSES solicitation. The latest progress reports for grants were reviewed to gather information on the number of publications resulting from the grant. Progress reports were obtained from NASA Shared Services Center and program scientists at NASA Headquarters who manage the DAPs. A total of 403 relevant grants were identified, and progress reports for 186 of these 403 grants were obtained. A DAP grant PI was considered the equivalent of a mission Co-I. For each mission, the grants were counted, the average publications per grant were calculated, and then divided by the number of years that the mission had grants. The resulting productivity metric was then compared to a similar metric from the prime and extended missions.

Results: Analysis showed that on average DAPs generate 3.0 publications per grant with a range among the DAPs of 2.5 – 3.2 publications per grant. DAP publication rates (number of publications per grant per year) for missions were slightly greater than those of extended missions, but publication rates for prime missions far exceeded the rate for both extended missions and for the DAPs (Figure 1). Productivity consistently fell dramatically after the prime mission ended. Comparing across mission type, DAPs for orbiter missions were found to have higher publication rates (and hence mor productivity) than flyby missions (0.45 vs. 0.32 publications per grant per year). A similar result was seen in previous work for the prime and extended missions. In terms of mission class, the New Frontiers DAP was more productive than flagship (Cassini DAP) and the Discovery DAP (Figure 2). There was no clear chronological trend across DAP grants for older and more recent missions.

Future Work: There are multiple extensions and improvements to this project suggested for the future. As with previous work, obtaining complete, consistent, and accurate publication data remains the greatest challenge. The data set for this project examining DAPs is incomplete, with only progress reports (and publication data) available for 46% of DAP grants. While this provides a large enough data set for robust conclusions, a complete data set is preferable. Additional time for the NASA Shared Services Center to locate and share progress reports is needed. More importantly, the scope of the project could be expanded by incorporating the two other DAPs (Mars DAP and Lunar DAP). Finally, it might be possible to use the Astrophysics Data System to collect publication data in a consistent manner across the prime mission, extended mission, and the DAPs. Future projects could also consider the effects of mission popularity and explore how interest in mission data and productivity change over time. The impact level of individual publications could also be factored into the analysis. Finally, financial data could be incorporated as a way to measure efficiency and cost associated with the productivity.

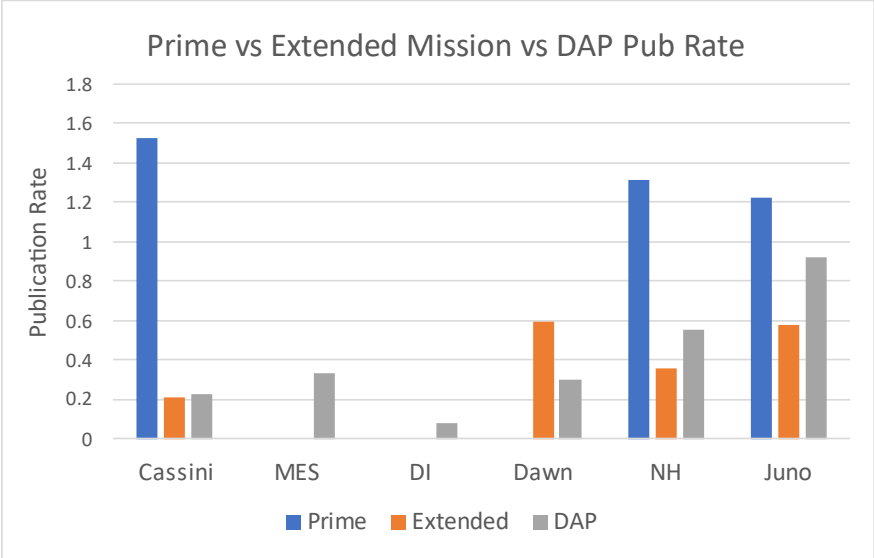

Figure 1. Publication rates for the science team during the prime missions, for the science team during the extended missions, and for PIs with DAP grants. This figure includes data from [1].

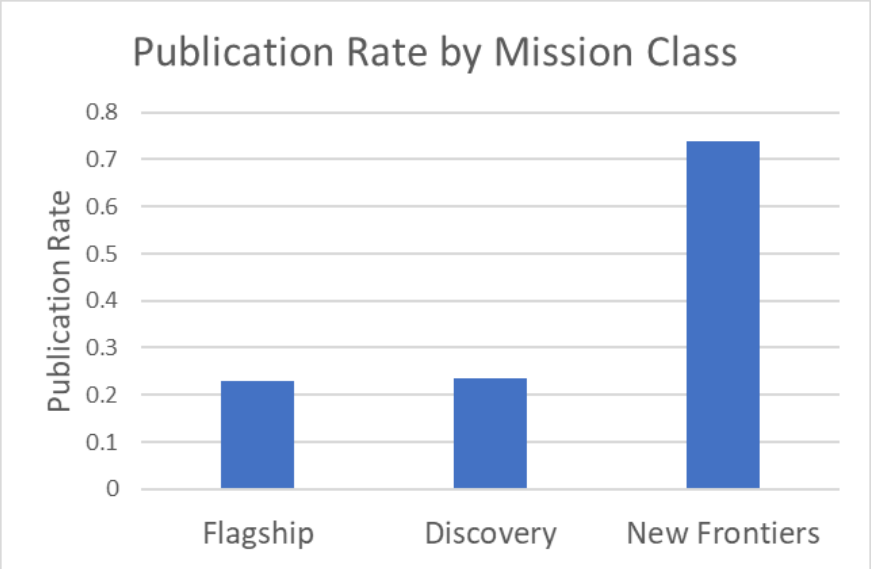

Figure 2. Publication rates for different mission classes. Cassini is the only flagship mission represented in this analysis.

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References: [1] Thompson and Niebur, LPSC 54, #2915, 2023