THE RECORD OF NASA FUNDING FOR STUDYING THE GEOLOGY OF PLANETARY IMPACT CRATERS. R. R. Herrick, Geophysical Institute, University of Alaska Fairbanks, Fairbanks, AK 99775-7320 (rrherrick@alaska.edu).

Introduction: Impact craters are the predominant landform on the solid surfaces of the solar system. Studying their geology has been considered an important component of planetary science since the earliest years of the field when it was established that lunar craters were formed by impacts of comets and astereoids [e.g., 1]. Nevertheless, my own experience has been that I have found it very difficult to get proposals funded through the NASA ROSES data analysis programs (DAPs) to study the geology of planetary craters. After receiving a set of negative reviews on what I thought was a strong proposal, I decided to take a look at what was successfully getting funded in the subdiscipline of planetary crater geology to see if I could identify what others were "getting right" so that I might alter my approach. What I found was surprising enough that I felt it worthy of sharing with the Planetary Cratering Consortium.

Methodology: I examined the records of program selections for a six-year period (ROSES 2012-2017; not all ROSES 2017 selections have yet been made) on NSPIRES for the research and analysis (R&A) programs that I thought would be appropriate for submission of proposals to study the geology of impact craters on bodies other than the Earth. This would include either studying planetary craters to learn about cratering mechanics (e.g., examining pit craters to learn how they form) or using crater geology to learn about the planetary crust (e.g., using the type of ejecta for a martian crater to assess subsurface ice content). Proposals not counted include those that are exclusively crater counting, are exclusively modeling or experiments, study craters on Earth but not the planets, or study craters only as a setting for an unrelated geologic process (e.g., crater lakes on Mars; ice deposits in permanently shadowed craters). The programs that I selected for analysis are Discovery Data Analysis Program (DDAP) and its predecessor the Planetary Mission Data Analysis Program (PMDAP), the Cassini Data Analysis Program (CDAP) and the related Outer Planets Research (OPR) program, the Lunar Data Analysis Program (LDAP) and its predecessor the Lunar Advanced Science and Exploration Research (LASER) program, the Mars Data Analysis Program (MDAP), the New Frontiers Data Analysis Program (NFDAP), Solar System Workings (SSW), and Planetary Geology and Geophysics (PGG).

Results: Table 1 summarizes the results of my analysis. Results are categorized by ROSES year, which generally involves a proposal cycle with due dates starting in May of the named year running through February of the following year. A couple of the more remarkable findings:

- In the latest complete year studied, 2016, there were no R&A proposals funded to study planetary craters outside of the Earth-Moon system.
- Between CDAP, DDAP/PMDAP, and NFDAP, during this six-year period there was a single planetary-crater-geology proposal funded, mine to study Mercurian craters in 2012. In other words, there was one R&A proposal funded to study craters on Mercury, and none to study craters on Ceres, Vesta, any of the smaller astereoids, any of the Saturnian satellites, and any bodies in the Pluto system.

Of course, without knowledge of how many planetary-crater-geology proposals were submitted, it is impossible to know whether their success rate is higher or lower than the mean, although the success rate is certainly lower in programs with no funded cratering proposals. To get a feel for the overall prevalence of planetary crater geology studies, I applied the same criteria to the list of oral presentations at LPSC in two

Table 1. Listing of proposals selected by ROSES year that study the geology of planetary craters / total selected proposals.

Program	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**Total**
DDAP/PMDAP	1/13	0/8	0/9	0/11	0/11	0/7	1/59 (1.7%)
MDAP	0/28	1/30	3/28	1/20	0/29	2/21	7/156 (4.5%)
CDAP	0/20	0/11	0/19	0/20	0/11	0/20	0/101 (0%)
OPR	0/32	1/28	--	--	--	--	1/60 (1.7%)
NFDAP	--	--	--	--	0/6	NC	0/6 (0%)
SSW/PGG	0/26	1/26	2/78	1/65	0/58	NC	4/253 (1.6%)
LDAP/LASER	1/12	NA	3/14	3/12	4/10	NC	11/48 (22.9%)
Total	2/131	3/103	8/148	5/128	4/125	2/48	24/683 (3.5%)
Total minus LDAP	1/119	3/103	5/134	2/116	0/115	2/48	13/635 (2.0%)
Total minus LDAP, SSW/PGG,OPR	1/61	1/49	3/56	1/51	0/57	2/48	8/322 (2.5%)

NA – Selections not posted, NC- Selection process not completed, -- Program not offered

widely separated years, 2005 and 2018. In 2005 there were 16 talks on planetary impact craters of the 504 oral presentations (3.1%) and in 2018 the numbers were 22 of 565 talks (3.9%). However, at LPSC there are presenters funded by several other ROSES R&A programs with no connection to planetary cratering, such as Emerging Worlds, Habitable Worlds, Exobiology, PSTAR, Lab Analysis of Returned Samples, and Rosetta DAP. In other words, one should remove from the count the LPSC sessions that are exclusively about sample analysis, modeling of the early solar system, and other topics that would not fall under SSW or the crater-relevant DAP programs. Doing this would raise the percentage of planetary-crater-geology talks to ~6-7% of the total. Anecdotally, it looks to me like most of the planetary cratering talks at LPSC are coming from foreign scientists and younger scientists funded through mission money, and very few through scientists funded by general R&A programs in ROSES.

Conclusions and response from NASA HQ: My analysis indicates that, with the exception of LDAP/LASER, proposals to study the geology of planetary craters probably have a much lower success rate than the mean for the programs to which they are being submitted. I encourage others to conduct their own analysis to verify my counts. I sent the data that I compiled to Jonathan Rall at NASA HQ at the end of May, along with a request for information on the numbers of planetary-crater-geology proposals submitted to the program and basic (anonymous) demographic information regarding both proposers and panel reviewers for cratering proposals. I received an initial response expressing interest in my analysis with a promise to look into the matter, and I have received no further response. Without additional information that only NASA HQ can provide, I do not think credible or testable hypotheses can be developed for the cause(s) of the putative low proposal success rates. In turn, it is thus challenging to propose viable solutions. Certainly, an excellent place to start would be to examine what is different about LDAP compared to all the other programs.

References: [1] Baldwin R. B. (1949) *The face of the moon*,239 pp.