JPL Mission Bibliometrics

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For a number of years ongoing bibliographies of various JPL missions (AIRS, ASTER, Cassini, GRACE, Earth Science, Mars Exploration Rovers (Spirit & Opportunity)) have been compiled by the JPL Library. Mission specific bibliographies are compiled by the Library and sent to mission scientists and managers in the form of regular (usually quarterly) updates. Charts showing publications by years are periodically provided to the ASTER, Cassini, and GRACE missions for supporting Senior Review/ongoing funding requests, and upon other occasions as a measure of the impact of the missions. Basically the Web of Science, Compendex, sometimes Inspec, GeoRef and Aerospace databases are searched for the mission name in the title, abstract, and assigned keywords. All get coded for journal publications that are refereed publications.

The Cassini bibliography search requires additional search terms and coding. The request is for any publication using Cassini-Huygens science even if the mission name is not mentioned in the title, abstract, or assigned keywords. Thus search terms include all the 'objects' of the mission such as moon names, ring(s), etc. Also requested is a separate listing of any paper acknowledging the use of funding by the Cassini Data Analysis Program (CDAP). The most productive way for this CDAP search is a Google Scholar search which covers full text of publications. In February 2012, the Cassini Mission requested a Citation Report from the Web of Science Database as part of a project review. The most quoted paper was a general relativity paper. Feedback from the Mission included the statement "It's a very powerful message for us to be able to tell NASA HQ that this is a mission that is so very much more than just a planetary mission."

The Chief Scientist for the Solar System Exploration Directorate, the Cassini Project Scientist, and the Senior Executive Advisor for Strategic Planning, Solar System Exploration Directorate, in the spring of 2012 started discussing how to demonstrate the scientific impact of planetary missions. Because two of them knew what was being done in terms of bibliographic support for the Cassini Mission, they early on asked me to participate in a study of the science impact of planetary missions. The final study team includes other senior researchers not only from JPL but also from Ames Research Center, Goddard Space Flight Center, Marshall Space Flight Center, and Applied Physics Laboratory. The study goal is to "Evaluate the impact of competed and strategic planetary missions in order to inform discussion of the roles of these two types of missions in the context of a balanced program comprised of both." The "scientific impact" of nineteen planetary missions was examined by identifying the number of peer-reviewed papers included in the ISI Web of Science database for each mission. I searched the Web of Science for each mission name, and including the mission target for missions with common names. For the most recent Mars missions, instrument names were included in the search. I reviewed the resulting citation report for each mission and manually eliminated 'false drops' down through at least twenty-five publications beyond the h-index. Eliminating false drops for publications with zero or very few citations was found not to change the h-index location. False drops are defined as either a totally different subject or just an incidental mention of the mission. Incidental mention of a mission includes mentioning it just in the introduction, as the reason for a laboratory or modeling effort, or as background in the discussion of another mission's results. After the citation reports for a mission were

captured, I reviewed the publications for each year to get the Publications-By-Year numbers. Again incidental mention of mission names was filtered out manually. Posters presenting study results were presented by team members to the 2012 DPS and AGU fall meetings. Scientific Impact is presented with bar charts showing "Web of Science (WOS): h-index" and "WOS: Number of Papers Cited > 100" for the 17 planetary missions that have completed their prime phase.
For the AGU meeting a third set of charts was included for a few selected missions showing "10-Year Publication Statistics: How the Impact of Individual Missions Changes and Grows with Time." These 'Growth Curves' show "… the h-index comes close to its maximum value within about five to six years of initial mission data return." I compiled the data for the growth curves for the selected missions by looking at the Citation Reports for 10 years starting with the year the mission reached its destination. This involves creating a citation report for the first year, then creating a citation report for the first plus second year, etc. until the final citation report covers the entire10 year period. As a sideline, one of the team members got interested in the statistical background for the h-index and researched the topic. As a result, he feels confident in the current plots using the h-index.

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