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TRACING THE EVOLVING SCIENTIFIC AND MEDIA IMPACT OF SPACE SCIENCE MISSIONS

**Abstract**

Space science missions are initially selected with the intention of meeting specific objects within broader science goals. These prioritized goals are identified through a rigorous process that takes into account perspectives sampled from the scientific community at the time. However, many space missions live far beyond the duration of their primary missions and go on to address questions that were not considered during initial mission planning. In this work, we trace science output from the Hubble Space Telescope, Cassini-Huygens, and the Viking program to illustrate how impactful their legacies became beyond their initial primary science return, and how that impact evolved over time. We also explore the James Webb Space Telescope's initial impact in the media. We sift through databases of both scientific literature and media articles to trace keywords, such as mission names (e.g. "Hubble") and science topics (e.g. "exoplanets"). We present plots illustrating scientific output over time, as well as media interest in these missions and science topics.

It has long been assumed that the science return from space missions far exceeds that of their initial mission, but this work seeks to robustly quantify that assumption. Additionally, this study reveals evolving science interests from both the science community and the general public, illustrating the growth of new subfields in space science. Results may be used in the defining of science priorities, as well as the development of future missions, and optimization of communicating those results to the public. Finally, the tool developed to conduct this literature and media mapping is valuable for conducting fast literature reviews on any number of topics. The tool will be presented for others, particularly early career individuals, to use as they build familiarity with a new subfield, hopefully making the vast scientific literature more accessible. In this paper, we first introduce the tracing tool, then walk through results for each of the missions, and finally discuss implications for future space exploration.