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Mapping bibliometrics for Planetary Science

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1. Introduction

Digital access to scientific publications is largely performed via web-connected databases nowadays. Several are only subscription-based (e.g. Scopus), some are freely accessible, such as Google Scholar, although retrieved records might be not. Initiatives to extend the open access to citation data are ongoing [1]. The astronomy and planetary communities have substantial advantage over other disciplines in access to scholarly resources, mainly abstracts and papers via the SAO/NASA Astrophysics Data system (ADS) [2]. Most planetary-relevant conferences are indexed and accessible, with time series of decades. Some journals provide access to full-text after embargo of one year, via ADS. Linking publications to underlying data is desirable, and at least the location of study objects or areas in the scientific literature is very valuable. In the case of some astronomical data archives this is already a reality: the integration of the geometric and spatial dimension with bibliographic databases is implemented in astronomical web services such as ESA Sky [3]. Most objects are point-like at such scale. Planetary surface mapping generates data and requires access to a richer topology, including points, lines and polygons [e.g. 4, 5]. As a first approximation the centroid of features and their size can be used, but most features and landforms on Solar System bodies are better represented by polygons or lines.

2. OP Geometrics

Integration of base mapping data (raster) [6], vector nomenclature of Mars and other planetary bodies (Figure 1) from the updated USGS gazetteer [7] and pre-retrieved bibliographic searches of relevant toponyms have been performed in order to build a prototype, navigable bibliographic and bibliometric web mapping service (Figure 2). The system in development has been named OP Geometrics, i.e. OpenPlanetary [8] Geometrics (OPG).

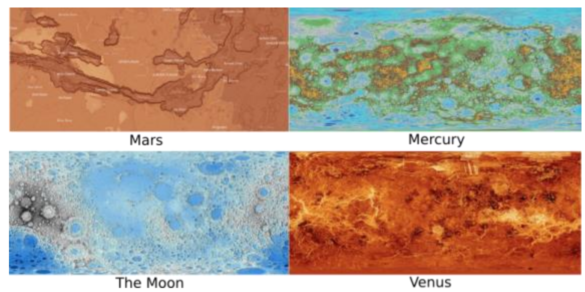

Figure 1: Global Base maps used within OP Geometrics (OpenPlanetaryMap and USGS Astrogelogy).

OpenPlanearyMap basemaps [6] offer high-quality surface feature visualization with labeling. In addition, the vector data retrieved from USGS Astrogeology REST interface [7] are served from a local PostGIS database and accessible and queried via simple forms within the web-based map interface. For the time being, toponym-based queries to the ADS have been cached and have been loaded onto the map interface. Exemplary metrics for each feature have been collected and can be visualized (Figure 2).

3. Discussion and future steps

The implications of such integration for past, ongoing and future mapping and planetary data analysis efforts [e.g. 9] are substantial: timely access to scientific literature for study areas is needed. The same approach is used for integrating bibliographic data and metadata with planetary surface geological units.

Moreover, the use of individual authors as well as teams, particularly experiment teams in combination with mapping data could be extremely valuable. One obvious application would be in obtaining geographically-linked metrics of scientific production (Figure 3) from both within and outside teams.

Figure 2: Early prototype of geo-bibliometrics integration on a web mapping platform (Mars).

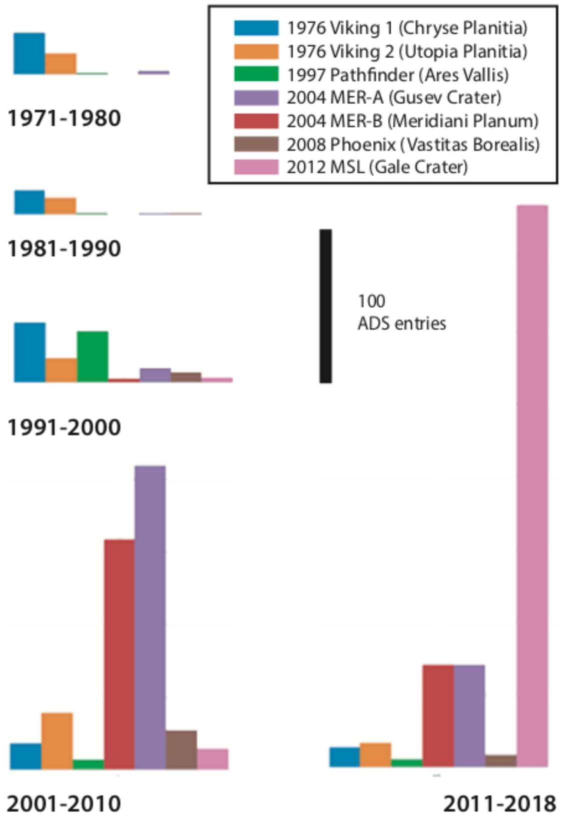

Figure 3: Example of ADS query results per geographic regions through time: Those include both results from lander missions, as well as work performed based on orbital data on the same areas.

The use of mapping bibliometric data could promote more and better data exploitation. Comparing for example the papers produced by a certain experiment team over a certain period of time and, possibly, over various geographic areas on a planet or moon, vs. the outside community, could be a good proxy on how much and how good data are used (or usable). Funding or support could be then adjusted accordingly.

Applications beyond the planetary case, with particular reference to Earth mapping data, not only geological in nature would be a natural extension of the OPG case.

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