WEB FEATURE SERVICE FOR PLANETARY NOMENCLATURE. S. Akins, R. Raub, T. Hare, and J. Blue, Astrogeology Research Center, U.S. Geological Survey, 2255 N. Gemini Dr., Flagstaff, AZ 86001 (sakins@usgs.gov).

Introduction: The Gazetteer of Planetary Nomenclature (http://planetarynames.wr.usgs.gov/) contains the International Astronomical Union (IAU)-approved names for surface features, planets, and satellites. Name proposals are reviewed by a body-specific task group and the Working Group for Planetary System Nomenclature [1] before the names are considered approved by the IAU and included in the gazetteer. Names must adhere to IAU rules and conventions and follow the themes set for each feature type [2, 3]. Researchers can use the Name Request Form [4] to request a name for a feature that has special scientific interest.

The gazetteer previously contained text lists of the names and accompanying database information (latitude, longitude, size, origin, etc.) as well as static maps showing the locations of named features. Updates have been made to the nomenclature database to store the individual features in a geospatial-enabled database. Along with the ancillary information such as that described above, a geospatial database also contains a special geometry field to, at a minimum, hold point, line, or polygon features. Our current implementation uses the open source PostgreSQL* database system and the geospatial PostGIS add-on, by Refractions Research*, to add geographic object support.

The current nomenclature database uses the geometry field to hold a center point for the feature and a square bounding box. Future versions of the database may be expanded to hold linear or polygonal boundaries for the nomenclature feature when appropriate. While at first glance this would not seem to be a great advantage over a conventional database, migrating to a geometry data format has many advantages. Some of the benefits of a geometry data format include spatial analysis and processing functions using Geographic Information System (GIS) data analysis directly from the database. It also allows us to more easily support on-line mapping standards and access to outside users.

Control Networks: With this new geometry data format, we are also adding support for multiple control networks which is an important feature. A control network is used to accurately calculate the location (latitude/longitude) of a feature on a planet or satellite. As we get more accurate data, new control networks are created and feature locations need to be updated. By associating the geometry for a feature with a control network identifier we are able to maintain the current data and provide new, updated coordinates as the control networks improve.

Web Feature Service: The next major improvement to the nomenclature database is the addition of a Web Feature Service (WFS). WFS is an Open Geospatial Consortium (OGC) standard for accessing geographical features, like points, lines, and polygons across the Web using standardized requests [5]. This is different from the popular OGC Web Mapping Service (WMS) which only returns an image of the data. WFS-enabled data can be used in real-time by many third party mapping tools (e.g., ArcGIS*, Quantum GIS*, OpenLayers*, etc.) to directly access not only the spatial location of nomenclature data but all the attributes. Currently the nomenclature website offers its data to be exported into a static file and off-site users of the database must regularly check for updates. Applications that make use of the WFS within their mapping application will be guaranteed the latest version of the database. Simply by using an informational query, the user can also request to receive only updated and new features.

In its simplest form, a WFS allows querying and retrieval of features via Hypertext Transfer Protocol (HTTP) requests. At a minimum, all WFS implementations require three methods; GetCapabilities, DescribeFeatureType, and GetFeature. The GetCapabilities method queries the WFS service to determine available options. The DescribeFeatureType retrieves how the database is defined using Extensible Markup Language (XML). And lastly, the GetFeature method carries out the spatial (or non-spatial) query and returns a Geographic Mark-up Language (GML) result containing the geometry and feature attributes. The returned results are provided to the user to plot or display within their own mapping application or website. Our WFS implementation will be based on the open source MapServer*, originally developed at the University of Minnesota. For more details on how to access the nomenclature WFS, see the on-line documentation at http://astrodocs.wr.usgs.gov/index.php/WFS.

One of the chief challenges we face, as with planetary WMS image services, is the lack of straightforward support for planetary bodies within the OGC standards. As previously described and implemented on several planetary WMS services [6, 7, 8], we will utilize the IAU2000 namespace within our WFS [9]. However, to ensure the service is usable by all WFS clients, the service will also support the Earth WGS84
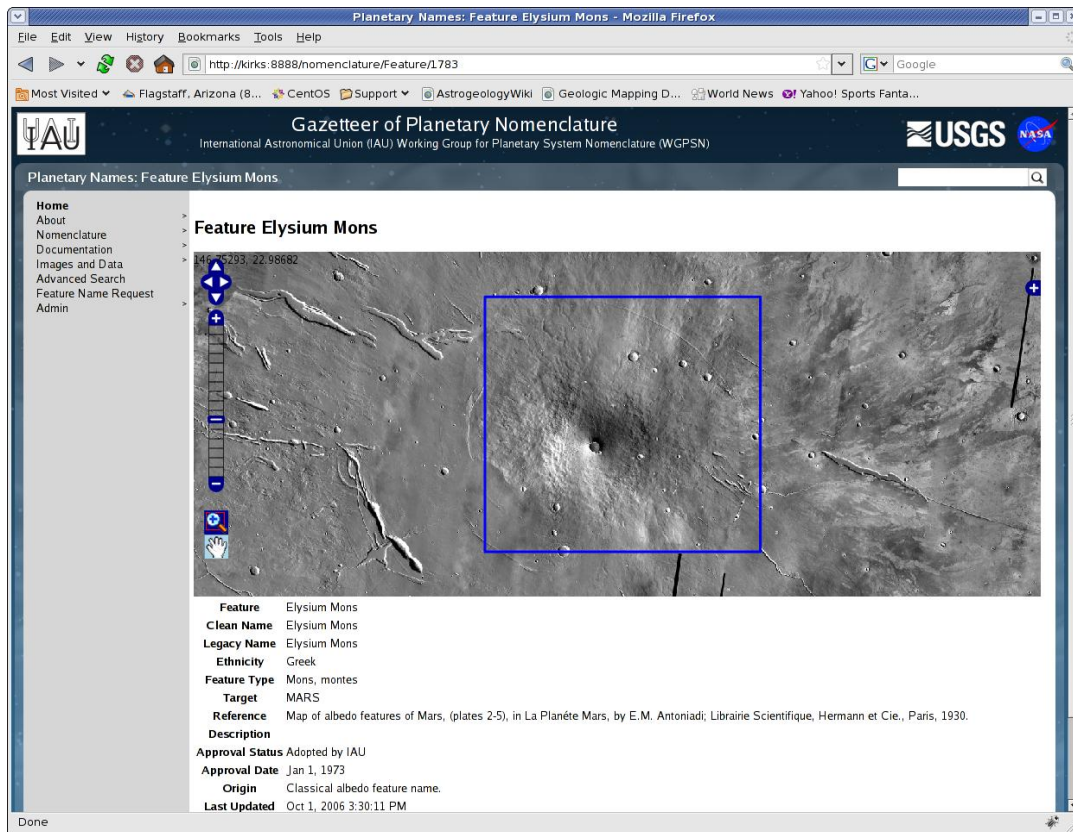
coordinate reference system (EPSG:4326), which simply returns the data using a latitude and longitude coordinate system. We expect to have an official OGC "Best Practices" paper on the use of planetary data sets with all the OGC Web standards by the end of the year.

Conclusion: The main goal of providing these updates for the Gazetteer of Planetary Nomenclature is to better enable real-time visualization and a standardized programmatic interface for the community. Not only will it let us offer better services for our simple HTTP and mapping websites but we expect outside users will find the WFS capabilities invaluable for displaying the continually changing nomenclature database.

Disclaimers:
* - Any use of trade, product for firm names is for descriptive purposes only and does not imply endorsement by the U. S. Government.

References:

[1] http://planetarynames.wr.usgs.gov/Page/Members
[2] http://planetarynames.wr.usgs.gov/Page/Rules
[3] http://planetarynames.wr.usgs.gov/Page/Categories
[4] http://planetarynames.wr.usgs.gov/FeatureNameRequest
[5] http://www.opengeospatial.org/standards/wfs
[6] http://www.mapaplanet.org/
[7] http://onMars.jpl.nasa.gov, http://onMoon.jpl.nasa.gov
[8] http://spatialreference.org/ref/iau2000/
[9] Hare T., et. al., 2006. Standards Proposal to Support Planetary Coordinate Reference Systems in Open Geospatial Web Services and Geospatial Application, LPI XXXVII, abs.1931.

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