

LUNASERV: ADDING A GEOSPATIAL FRAMEWORK TO APOLLO SAMPLES

LUNASERV
Your data, your way

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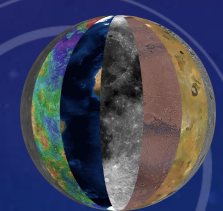
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ERNEST CISNEROS

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WHAT IS LUNASERV?

- Lunaserv is a custom-built Web Map Service with native support for planetary IAU projections
 - Not a data portal – Lunaserv is a WMS geospatial content delivery system service
- Key part of infrastructure for LROC Science Operations
 - LROC SOC is a PDS Data Node and Lunaserv is the public-facing geospatial data delivery system
 - Also used for internal targeting operations and science team research
 - Ease of use provides flexibility for time-critical mission operation tasks and was a major design focus of the Lunaserv platform
 - Compatible with JMARS desktop software, QGIS, ArcMAP, etc. – any desktop client that can access the WMS standard
 - Free and Open Source
- Also used by the ISS Earth Observing team to serve Crew Earth Observations and other ISS remote sensing data in a geospatial framework
 - <http://issearchserv.jsc.nasa.gov/i4.html>
- For more information, visit: <http://lunaserv.lroc.asu.edu/>



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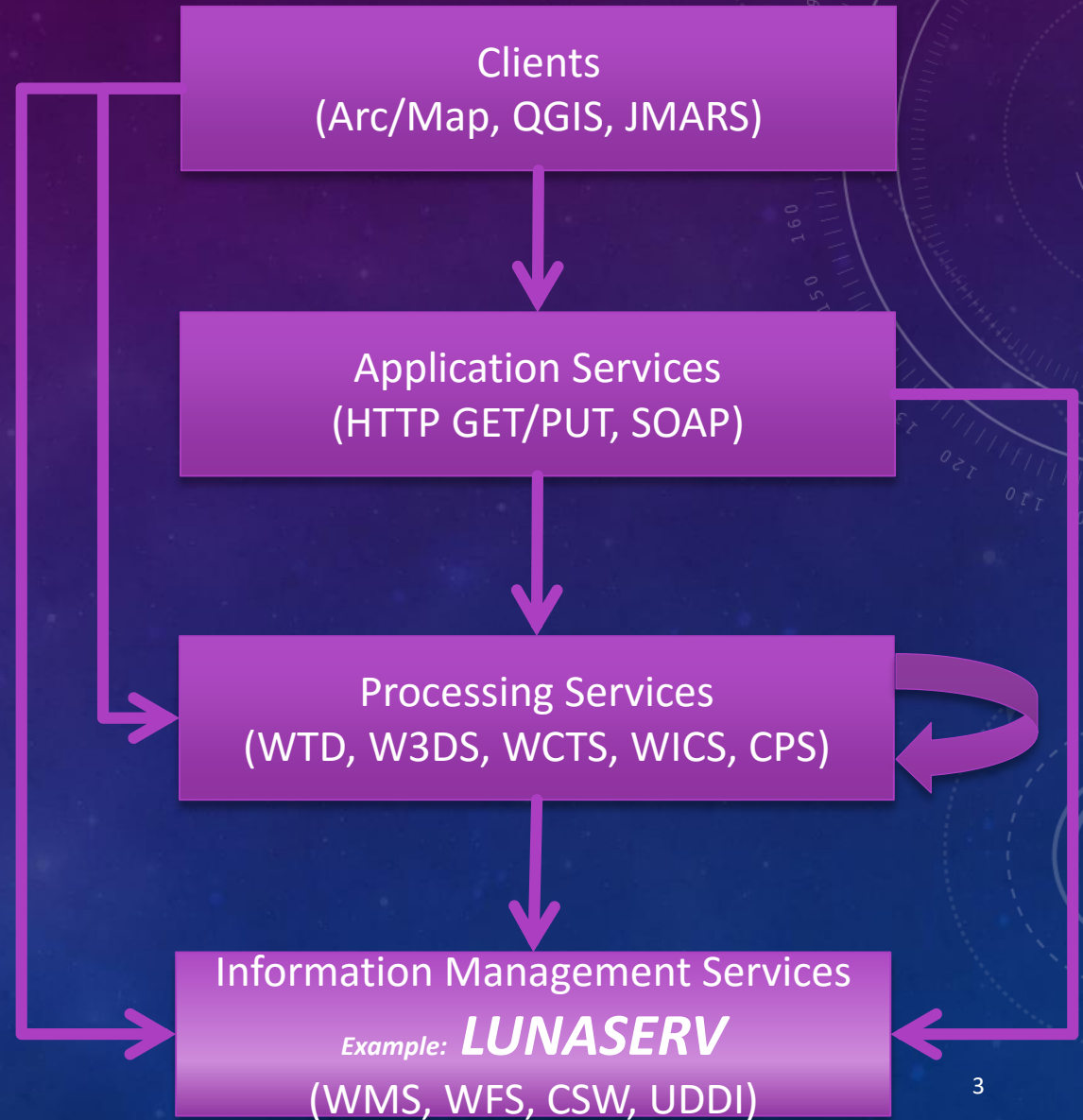
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SERVICE TIERS: DEFINITIONS

Open Geospatial Consortium (OGC)

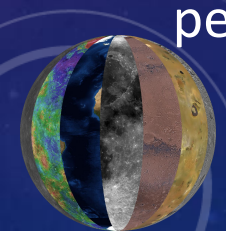
OGC Web Services (OWS) Architecture

http://portal.opengeospatial.org/files/?artifact_id=13140



PROTOTYPE APOLLO SAMPLE GEOSPATIAL FRAMEWORK

- Goal is to place Apollo samples into a contextualized geospatial framework
 - WMS compatible data service is platform independent, simplifies interface, broadens possible tools
- New paradigm for extraterrestrial sample context
 - Flexible
 - Easy to update
 - Scalable for future growth
- Building on Lunaserv platform, requires <1 workday (8 person-hours) of effort
- Data used for this Proof of Concept:
 - ASU Apollo Digital Petrographic Slide Collection (Howard Wilshire, USGS)
 - See <http://ser.sese.asu.edu/DPSC/about.html>
 - LROC PDS-released data (LRO NAC and WAC) – global to m-scale data from Moon through last PDS release
- Ultimate goal is to seamlessly combine the km-scale global images with the micron-scale petrology to enhance science and exploration



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USER INTERFACE TOUR

- Each ASU DPSC slide has been assigned to station number and mission locations for each Apollo landing
- Location “eyeballed” – full-scale effort would require manual control and historical expertise
- User activates DPSC query layer

The screenshot shows a central view of the Moon's surface with several green and blue dots labeled 'LM' representing landing sites. Surrounding the map are several UI panels:

- Map Options:** A panel on the left containing:
 - Cursor Latitude: 6.602
 - Cursor Longitude: 2.299
 - Object to view: The Moon
 - Projection: Orthographic
 - Center Latitude: 0.63
 - Center Longitude: 23.143
 - Recenter & Reproject button
 - Single-click action options: None (double-click to zoom), Recenter, Recenter & Zoom (selected), Get Footprint Info
 - Permalink link
- Layers:** A panel on the right with a 'Help' button and a list of layers:
 - Base layer
 - Regional Products
 - Instrument Observation Footprints
 - Miscellaneous
 - Apollo Digital Petrographic Slide Catalog
 - LRO's ground track (green = next 24 hours, blue = previous 24 hours)
 - The Sun's ground track (now +/- 24 hours)
 - Lunar nomenclature
 - Nighttime shading (now)
 - GLD100 DEM based illumination (now)
 - Grids
- Overview:** A panel at the bottom left showing a smaller map of the Moon with a red dot indicating the current view's location. It includes a 'Click the overview to recenter' instruction and a scale bar for 453.76km.

Note positions of Apollo landing sites – user queries with mouse

EXAMPLE: APOLLO 11

The screenshot displays a lunar map interface with several panels:

- Map Options:** Shows cursor coordinates (0.67, 23.472), object to view (The Moon), projection (Orthographic), center coordinates (0.671, 23.47), and a 'Recenter & Reproject' button. It also lists single-click actions: None, Recenter, Recenter & Zoom, and Get Footprint Info.
- Overview:** A circular inset map showing the Moon's surface with a scale bar (200m) and a north arrow.
- Query results:** A table of search results for Apollo 11 Station LM samples:

Apollo 11: Station LM	Apollo 11: Station LM	Apollo 11: Station LM
Sample: 10056 Piece: n/a Roll: 6 Slide: 19	Sample: 10056 Piece: n/a Roll: 6 Slide: 20	Sample: 10056 Piece: n/a Roll: 6 Slide: 21
Apollo 11: Station LM	Apollo 11: Station LM	Apollo 11: Station LM
Sample: 10017 Piece: 59 Roll: 7 Slide: 3	Sample: 10017 Piece: 59 Roll: 7 Slide: 4	Sample: 10017 Piece: 59 Roll: 7 Slide: 5

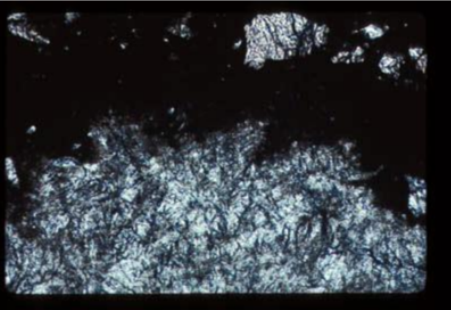
- Layers:** A list of map layers including 'Base layer' (LROC WAC global 100m/px, etc.) and 'Regional Products' (LROC NAC GigaPan, etc.).

Result of user query for samples collected near lunar module on Apollo 11

From DPSC layer, user can access images and data about a given sample straight from the geospatial framework

Digital Petrographic Slide Collection
[Main Page](#) [Search](#) [About](#)

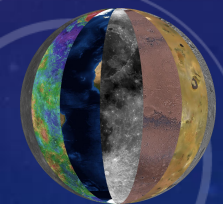
Sample 10056



[PNG - 100%](#) [PNG - 50%](#) [PNG - 25%](#)

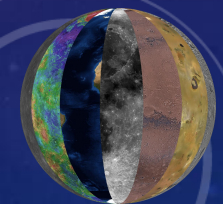
Position: ap1101_01_03
Mission: Apollo 11
Station: LM
Comments: Border of clast in #19,20 frayed edge; clast-free matrix at edge, matrix apparently corroding dust
Piece: n/a
Size: x10
Roll #: 6
Slide #: 21
Other:
Date: 03/01/1971
Originator: Wilshire

Original Raw Scan (50MB)



SUMMARY

- The Lunaserv platform enables seamless integration of km-scale imagery and mm-scale Apollo sample data
- This proof-of-concept built on existing technology framework is functioning *right now*
- JSC Astromaterials Research and Exploration Science is interested in using this tool to provide access to extraterrestrial sample data (e.g., in the Apollo Sample Compendium)
- PDART MoonDB project (K. Lehnert, Columbia Univ.) is working with ARES to provide access to sample compositional data from laboratory PIs
- This effort links sample compositional information with surface & subsurface geospatial information
- With addition of PDS data formatting, labels and documentation, access to the Apollo sample data will be *significantly enhanced and more usable*



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