



Expanding the Institutional Repository Mission: Innovating with Linked Data for NASA Digital Curation

Matt Pearson, Adrienne Hieb, & Mitchell Shelton
NASA Goddard Library

Dublin Core Metadata Initiative 2017
Washington, DC





Goddard Space Flight Center Institutional Repository (GSFCIR)





Search Authors Collection

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Authors Home Submissions Ask a Librarian Collections

Mcfadden, Lucy Ann Adams

1. De Sanctis M, Raponi A, Ammannito E, Ciarniello M, Toplis M, McSween H, Castillo-Rogez J, Ehlmann B, Carrozzo F, [show more](#)
BRIGHT CARBONATE DEPOSITS AS EVIDENCE OF AQUEOUS ALTERATION ON (1) CERES. Nature. 2016; 536 (7614): 54-+.
[Publication Details](#)

2. Ruesch O, Platz T, Schenk P, McFadden L, Castillo-Rogez J, Quick L, Byrne S, Preusker F, O'Brien D, [show more](#)
CRYOVOLCANISM ON CERES. Science. 2016; 353 (6303): 1005-+.
[Publication Details](#)

3. Russell C, Raymond C, Ammannito E, Buczkowski D, De Sanctis M, Hiesinger H, Jaumann R, Konopliv A, McSween H, [show more](#)
DAWN ARRIVES AT CERES: EXPLORATION OF A SMALL, VOLATILE-RICH WORLD. Science. 2016; 353 (6303): 1008-1010.
[Publication Details](#)

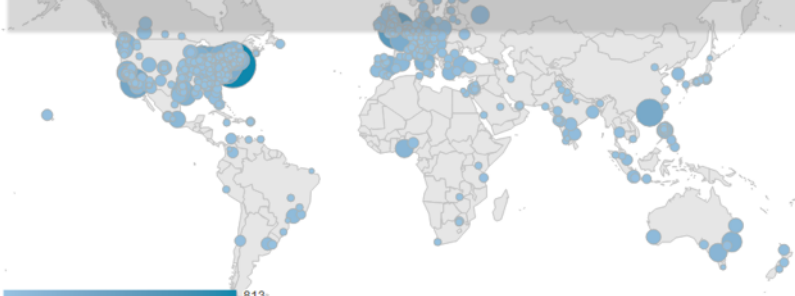
4. Ammannito E, DeSanctis M, Ciarniello M, Frigeri A, Carrozzo F, Combe J, Ehlmann B, Marchi S, McSween H, [show more](#)

About Author

- Planetary Systems Lab
- Code 693.0
- NASA Employee
- RESEARCH AST, PLANETARY STUDIES
- [View ResearcherID Page](#)

Related Goddard Authors

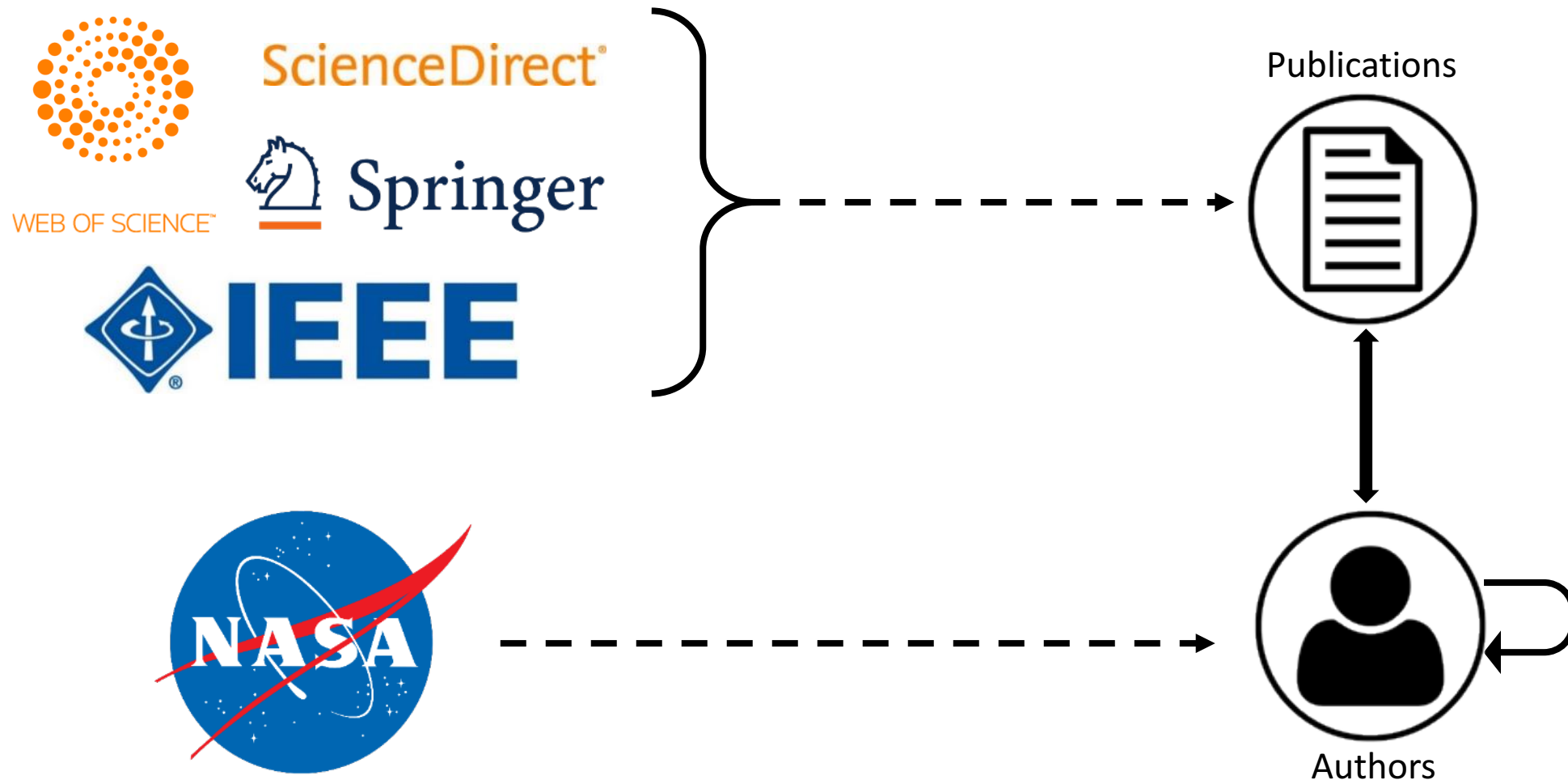
- [Barry, Richard K., Jr.](#)
- [Burke, Jacob C.](#)
- [Carter, Lynn Marie](#)
- [Chambers, Victor J.](#)
- [Daming, Leo Drake](#)
- [Garry, William Brent](#)
- [Hearty, Thomas J.](#)
- [Herrmann, Stefanie Maria](#)
- [Hewagama, Tilak](#)
- [Kim, Min-jeong](#)
- [Landsman, Wayne B.](#)
- [Lauer, Tod R.](#)
- [Lim, Lucy E.](#)
- [Manduca, Robert](#)



813



Harvesting metadata





Repository Collections & Connections

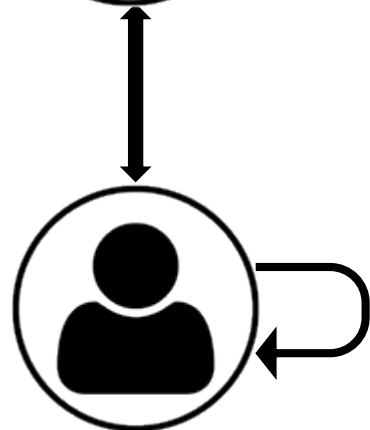
Publications



Colloquia



Case Studies



Authors



Goddard News



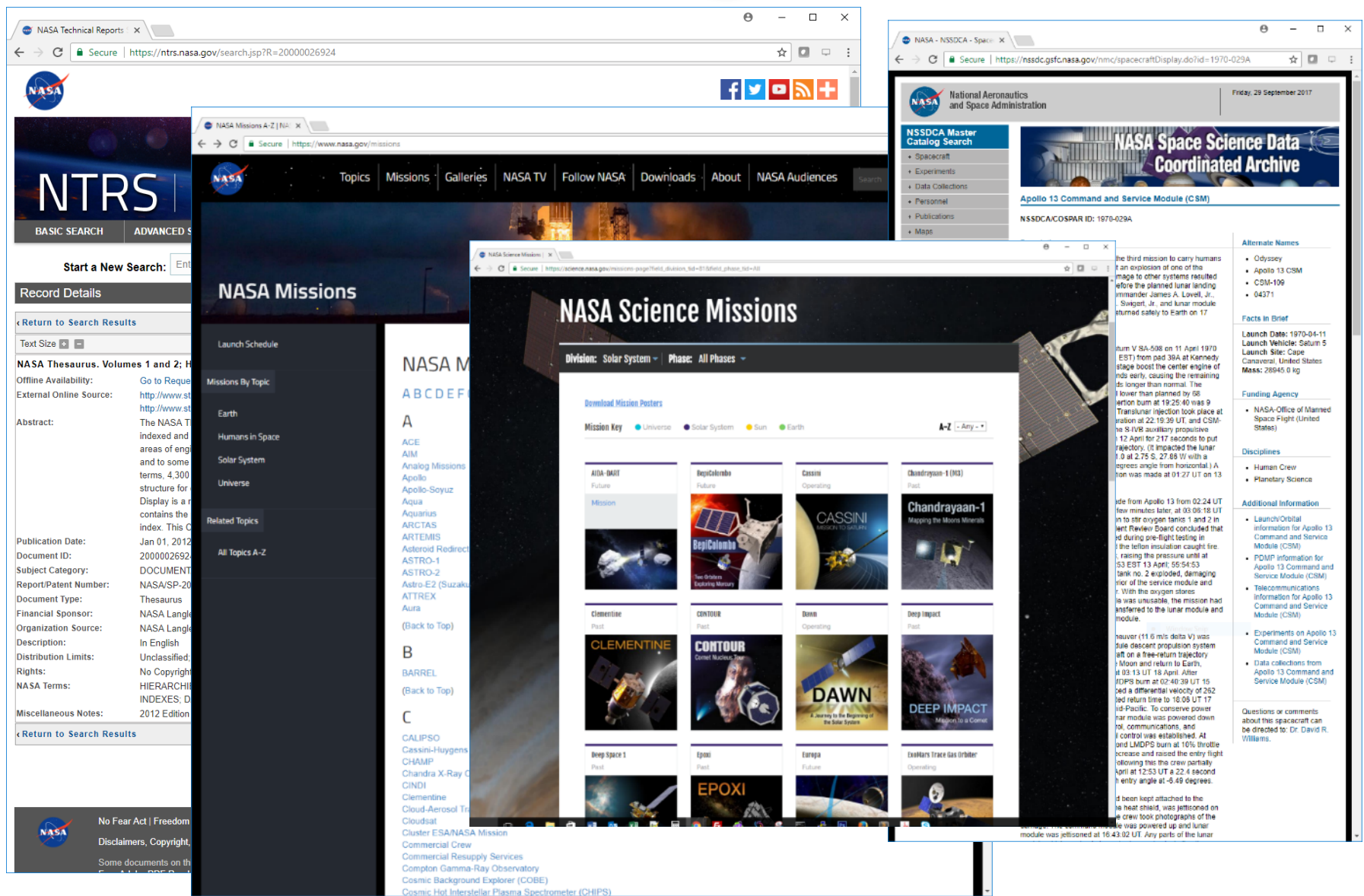
Balloon Technology



Goddard Knowledge Exchange (GKE)

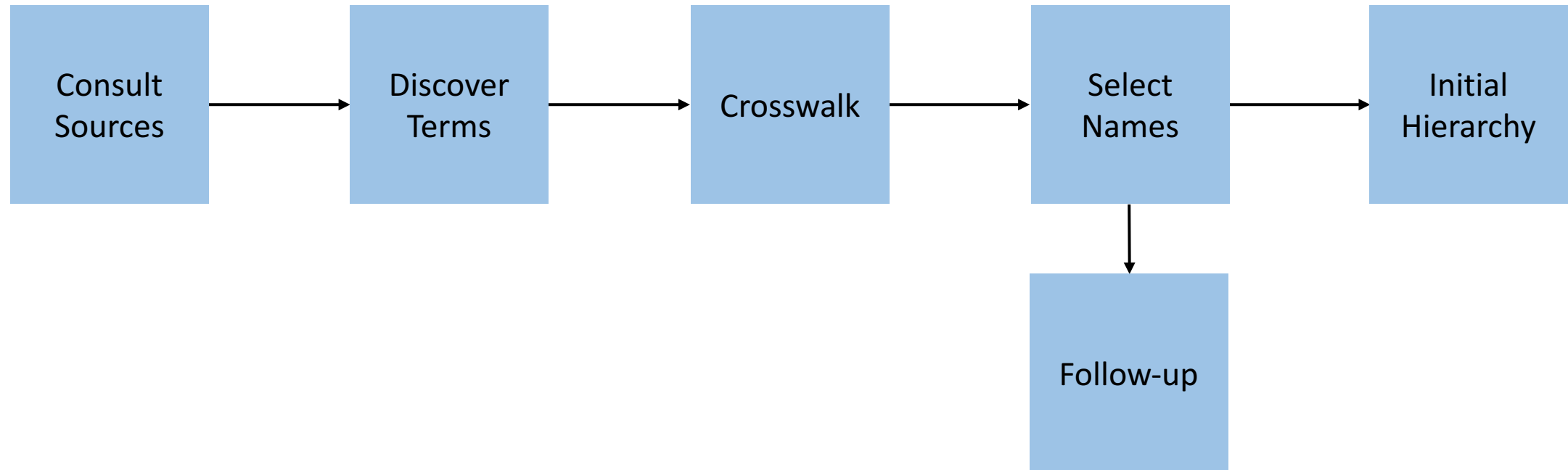
- Lessons learned
- faceted narrowing
- business intelligence analytics

The screenshot shows the Goddard Knowledge Exchange (GKE) website. At the top, there is a NASA logo and a search bar with the text "Search journals, books, proceedings, colloquia, and more." Below the search bar, there is a dropdown menu for "GKE" and a search button. The main content area is divided into two columns. The left column contains a list of categories and their counts: Communication (2), Financial management (1), Budget (1), Ground systems (0), Hardware (4), Heritage (2), Instrument (3), Launch (1), Project management (18), Contracts (2), Decision making (6), Documentation (1), Organizing and Staffing (3), Planning and Schedule (4), Requirements (2), Risk management (18), Review (9), Safety (6), Testing (3), Mission, Maven (49), Center, GSFC (46), JSC (2), other (1), Date (event), 2014 (10), 2013 (19), 2012 (14), 2009 (3), Date (added), 2016 (20), 2015 (18), 2014 (12). The right column contains several links and descriptions for the MAVEN mission, including "MAVEN - Official Site", "MAVEN - mars.nasa.gov", "MAVEN - NASA Mars rover", "MAVEN Image Gallery - NASA", "MAVEN Mission Overview | NASA", and "The MAVEN Spacecraft | NASA". At the bottom of the page, there is a footer with the NASA logo, contact information for the NASA Goddard Space Flight Center, and a "Summer hours" notice.





Getting Organized





Getting Organized

NSSDCA (spacecraft)	nasa-missions	science-mission
		LunaH-Map
Lunar Orbiter (1-5)		
Lunar Prospector		Lunar Prospector
Lunar Reconnaissance Orbiter (LRO)	LRO (Lunar Reconnaissance Orbiter)	Lunar Reconnaissance Orbiter
Magellan	Magellan	Magellan
Magnetospheric Multiscale (1-4)	Magnetospheric Multiscale (MMS)	MMS
Magsat		
		MARCO
Mariner (1-7; 9-10); Mariner-H (8)	Mariner	Mariner Missions
	Mars 2020 Rover	Mars 2020
Mars Climate Orbiter		Mars Climate Orbiter
Mars Express	Mars Express	Mars Express (ASPERA-3)
Opportunity; Spirit	Mars Exploration Rovers (Spirit and Opportunity)	Mars Rover: Opportunity; Mars R
Mars Global Surveyor	Mars Global Surveyor	Mars Global Surveyor
Mars Observer		Mars Observer
2001 Mars Odyssey	Mars Odyssey	Mars Odyssey
Mars Pathfinder; Mars Pathfinder Rover	Mars Pathfinder	Mars Pathfinder
Mars Polar Lander		Mars Polar Lander
Mars Reconnaissance Orbiter	Mars Reconnaissance Orbiter	Mars Reconnaissance Orbiter
Mars Science Laboratory (MSL)	Mars Science Laboratory (Curiosity)	Mars Science Laboratory; Curiosi



Exploring Name Variants

- Some names variants follow obvious formats
 - Hubble Space Telescope vs. HST
 - MESSENGER vs. Mercury Surface, Space Environment, Geochemistry and Ranging
- Others are trickier when dealing with international partners, pre- and post-launch names, and more



Exploring Name Variants

GOES-N (pre-launch)

Geostationary Operational
Environmental Satellite N (full name)

GOES-13 (post-launch)

GOES-East (post-launch)

ASTRO-H (pre-launch)

Hitomi (international; post-launch)

X-ray Astronomy Satellite ASTRO-H
(development)

New X-ray Telescope (development)

NeXT (development)

GOES-N: Long **Winding Road to Launch**

Abstract: GOES-N was built to be the first in the next generation of satellites. Getting GOES-N in orbit will be used to minimize risk of loss due to link errors and allow for user verification of data integrity. To aid user transition, an emulated GVAR (eGVAR) service will be provided via non-operational GOES-N.

Collection: NASA Case Studies

Authors & Publications Collection (publication record)

Publication: 2009 IEEE AEROSPACE CONFERENCE, VOLS 1-7

GOES-N: Long **GOES Direct Broadcast Service History and Future**

Abstract: Interactions during Substorms (THEMIS)-A (P5), Cluster 2, and Geostationary Operational Environmental Satellites (GOES) 13, 14, and 15. The electron fluxes for energies greater than 2.0 MeV observed

Collection: Authors & Publications Collection (publication record)

Publication: JOURNAL OF GEOPHYSICAL RESEARCH-SPACE PHYSICS

The Astro-H Soft X-ray Spectrometer (SXS)

The Soft-X-ray Spectrometer (SXS) is a high spectral resolution spectrometer that will fly on the Japan Aerospace Exploration Agency's (JAXA) Astro-H mission. It is composed of a 36 pixel detector.

Collection: Authors & Publications Collection (publication record)

Publication: 2016 IEEE AEROSPACE CONFERENCE, VOLS 1-7

Hitomi **Galaxy Cluster** **Hitomi** **Galaxy Cluster**

Abstract: The Perseus Cluster of Galaxies and the Future of High-Resolution Imaging X-Ray Spectroscopy

Collection: Authors & Publications Collection (publication record)

Publication: JOURNAL OF GEOPHYSICAL RESEARCH-SPACE PHYSICS



Gathering Metadata

- Initial set of ~1,000 mission terms gathered by hand
 - 2 summer interns, ~100 hours of work
- Consulted candidate sources for
 - Preferred and alternate names
 - Launch data (date, location, mass)
 - Additional relationships
- Experiments and instruments gathered through a mix of automation and manual work (~1700 additional terms)



Publishing the Thesaurus

- Open Metadata Registry
 - Ingested our final CSV file as a “vocabulary”
- Each term has its own URI (domain set by user)
 - Functions with URI lookups in tools like OpenRefine
- Supports thesaurus functions in RDF using the SKOS framework
 - Names: skos:prefLabel, skos:altLabel, skos:hiddenLabel
 - Links to other terms: skos:broader, skos:narrower, skos:related
 - Ability to add scope notes and other helpful administrative metadata
- Download to interoperable formats
 - RDF/XML
 - CSV
- Easily shareable with other communities and contributors





open metadata registry

Supporting Metadata Interoperability

adrienne.m.hieb

Vocabulary: Show detail for NASA Name Authority File

Detail

Concepts

History

Versions

Maintainers

Export

Import

Preferred Label	URI	Status	Updated	Actions
✓ A-Train	.../nasanaf/uri/1001	Published	2017-08-07 15:14	
Absolute Measurement of the Solar Constant	.../nasanaf/uri/1002	Published	2017-08-07 13:53	
AC Electric Field Measurement	.../nasanaf/uri/1003	Published	2017-08-07 13:54	
Accelerometer	.../nasanaf/uri/1004	Published	2017-08-07 13:55	
ACE	.../nasanaf/uri/1005	Published	2017-08-07 13:56	
✓ ACRIMSAT	.../nasanaf/uri/1006	Published	2017-08-07 13:57	
✓ ACT-America	.../nasanaf/uri/1007	Published	2017-08-07 13:58	
Active Cavity Radiometer Irradiance Monitor	.../nasanaf/uri/1008	Published	2017-08-07 13:59	
Active Cavity Radiometer Solar Irradiance Monitor	.../nasanaf/uri/1009	Published	2017-08-07 14:01	
Active Dosimetry of Charged Particles	.../nasanaf/uri/1010	Published	2017-08-07 14:01	
Active Rack Isolation Systems	.../nasanaf/uri/1011	Published	2017-08-07 14:02	
Active Seismic	.../nasanaf/uri/1012	Published	2017-08-07 14:02	
Active Spacecraft Potential Control	.../nasanaf/uri/1013	Published	2017-08-07 14:03	
✓ ACTS	.../nasanaf/uri/1014	Published	2017-08-07 14:08	
AD-A	.../nasanaf/uri/1015	Published	2017-08-07 14:08	
AD-B	.../nasanaf/uri/1016	Published	2017-08-07 14:09	
AD-C	.../nasanaf/uri/1017	Published	2017-08-07 14:10	
✓ ADEOS	.../nasanaf/uri/1018	Published	2017-08-07 14:11	
Advanced Atmosphere Sounder and Imaging Radiometer	.../nasanaf/uri/1019	Published	2017-08-07 14:12	
Advanced Automated Directional Solidification Furnace	.../nasanaf/uri/1020	Published	2017-08-07 14:13	

2686 results



open metadata registry

Supporting Metadata Interoperability

adrienne.m.hieb

Vocabulary: NASA Name Authority File

Concepts: Apollo 11

Detail

Properties

History

Metadata +

Detail

Preferred Label: Apollo 11

Language: English

URI: <https://gsfcir.gsfc.nasa.gov/nasanaf/uri/1095> (RDF)

Top Concept?:

Status: Published

Properties

preferred label	Apollo 11	English	Published	
has narrower	Passive Seismic Experiment		Published	
has narrower	Lunar Dust Detector		Published	
has narrower	Lunar Field Geology		Published	
has narrower	Laser Ranging Retroreflector		Published	
has narrower	Soil Mechanics		Published	
hidden label	LM-5	English	Published	
hidden label	Eagle	English	Published	
has broader	Apollo		Published	
alternative label	Apollo 11 LM/EASEP	English	Published	



Managing Name Variants

GOES-N (pre-launch)
Geostationary Operational
Environmental Satellite N (full name)
GOES-13 (post-launch)
GOES-East (post-launch)



<!-- Concept: GOES-13 -->

```
<skos:Concept rdf:about="https://gsfcir.gsfc.nasa.gov/nasaf/uri/1779" xml:lang="en">
  <skos:inScheme rdf:resource="https://gsfcir.gsfc.nasa.gov/nasaf/uri"/>
  <reg:status rdf:resource="http://metadataregistry.org/uri/RegStatus/1001"/>
  <reg:identifier rdf:resource="http://metadataregistry.org/concepts/10566"/>
  <skos:topConceptOf rdf:resource="https://gsfcir.gsfc.nasa.gov/nasaf/uri"/>
  <skos:prefLabel xml:lang="en">GOES-13</skos:prefLabel>
  <skos:altLabel xml:lang="en">Geostationary Operational Environmental Satellite N</skos:altLabel>
  <skos:hiddenLabel xml:lang="en">GOES-N</skos:hiddenLabel>
  <skos:hiddenLabel xml:lang="en">GOES-East</skos:hiddenLabel>
  <skos:broader rdf:resource="https://gsfcir.gsfc.nasa.gov/nasaf/uri/1774"/>
  <skos:narrower rdf:resource="https://gsfcir.gsfc.nasa.gov/nasaf/uri/309"/>
  <skos:narrower rdf:resource="https://gsfcir.gsfc.nasa.gov/nasaf/uri/3659"/>
</skos:Concept>
```

ASTRO-H (pre-launch)
Hitomi (international; post-launch)
X-ray Astronomy Satellite ASTRO-H
(development)
New X-ray Telescope (development)
NeXT (development)



<!-- Concept: Astro-H -->

```
<skos:Concept rdf:about="https://gsfcir.gsfc.nasa.gov/nasaf/uri/1138" xml:lang="en">
  <skos:inScheme rdf:resource="https://gsfcir.gsfc.nasa.gov/nasaf/uri"/>
  <reg:status rdf:resource="http://metadataregistry.org/uri/RegStatus/1001"/>
  <reg:identifier rdf:resource="http://metadataregistry.org/concepts/9925"/>
  <skos:topConceptOf rdf:resource="https://gsfcir.gsfc.nasa.gov/nasaf/uri"/>
  <skos:prefLabel xml:lang="en">Astro-H</skos:prefLabel>
  <skos:altLabel xml:lang="en">Hitomi</skos:altLabel>
  <skos:hiddenLabel xml:lang="en">X-ray Astronomy Satellite ASTRO-H</skos:hiddenLabel>
  <skos:hiddenLabel xml:lang="en">New X-ray Telescope</skos:hiddenLabel>
  <skos:hiddenLabel xml:lang="en">NeXT</skos:hiddenLabel>
  <skos:narrower rdf:resource="https://gsfcir.gsfc.nasa.gov/nasaf/uri/2966"/>
</skos:Concept>
```



NASA NAF Redirect API

6	4841	http://sandb	2	
7	4842	http://sandb	2	Te
8	4831	uri:/1001	2	M
9	4836	uri:/1006	2	
10	4837	uri:/1008	2	Ap

```
// Loop over the CSV file
for ($i = 0; $i <= $csv_length; $i++) {
    // Get the item in the registry id column
    $registry_id = $csv[$i][0];

    // Get the item in the URI column and strip the http://
    $uri = str_replace( search: 'uri:/', repla
```

```
// Make sure that both values are numeric
if (is_numeric($registry_id) && is_numeric($uri)) {
```

```
// The the items to the array, trimming the http://
```

```
$nasanaf_listing = $config->get( 'data.nasanaf_listing' );

// Convert the listing to an array
$nasanaf_array = json_decode($nasanaf_listing, assoc: TRUE);
$nasanaf_array_count = count($nasanaf_array);
$return_id = '';
```

```
for($i=0; $i < $nasanaf_array_count; $i++) {
    $current_item = $nasanaf_array[$i];
    $registry_id = key($current_item);
    $registry_uri_id = $current_item[key($current_item)];

    if ($uri_id == $registry_uri_id) {
        $return_id = $registry_id;
    }
}
```

CSV Parser

Redirect to Open Metadata Registry from internal URL

```
$redirect_url = 'http://metadataregistry.org/concept/show';

// Construct our response and include search term and location
```



NSSDCA Scraper

```
// Initialize our array to hold the th elements
$rows_array = array();

// Before running the process check to see if our string is empty
if ($innerHTML != '') {

    // Create a temporary dom document to pull out our HTML
    $thead_dom = new \DomDocument();

    // Load the string as HTML
    @$thead_dom->loadHTML($innerHTML);

    // Get all of the th elements
    $thead_tags = $thead_dom->getElementsByTagName( 'th' );

    // Initialize our array to hold the th elements
    $thead_array = array();
    // Loop over the th elements pulled out
    foreach ($thead_tags as $node) {
        // Add the th element to our array
        $thead_array[] = $node->nodeValue;
    }

    // Get all of the tr elements
    $table_rows = $thead_dom->getElementsByTagName( 'tr' );
    // Get the number of rows in our table
    $table_rows_length = $table_rows->length;
    // Loop over the rows
    for ($i=0; $i < $table_rows_length; $i++) {
        $cols = $table_rows->item($i)->getElementsByTagName( 'td' );
        $cols_length = $cols->length;
        // Loop over the columns
```

Other Information

- Alternate Names
 - DTREM
 - Dust, Thermal, and Radiation Engineering Measurements
- Facts in Brief
 - Mass: 0.27 kg
 - Power (avg): 0.5 W
- Funding Agency
 - National Aeronautics and Space Administration (United States)
- Discipline
 - Planetary Science: Geology and Geophysics
- Additional Information
 - Apollo 11 Lunar Module / EASEP

NSSDC Mission Details

- [Download Mission Overview as CSV](#)
- [Download Experiment Data as CSV](#)

HTML Scraper

Relies heavily on unchanging source material (very fragile)

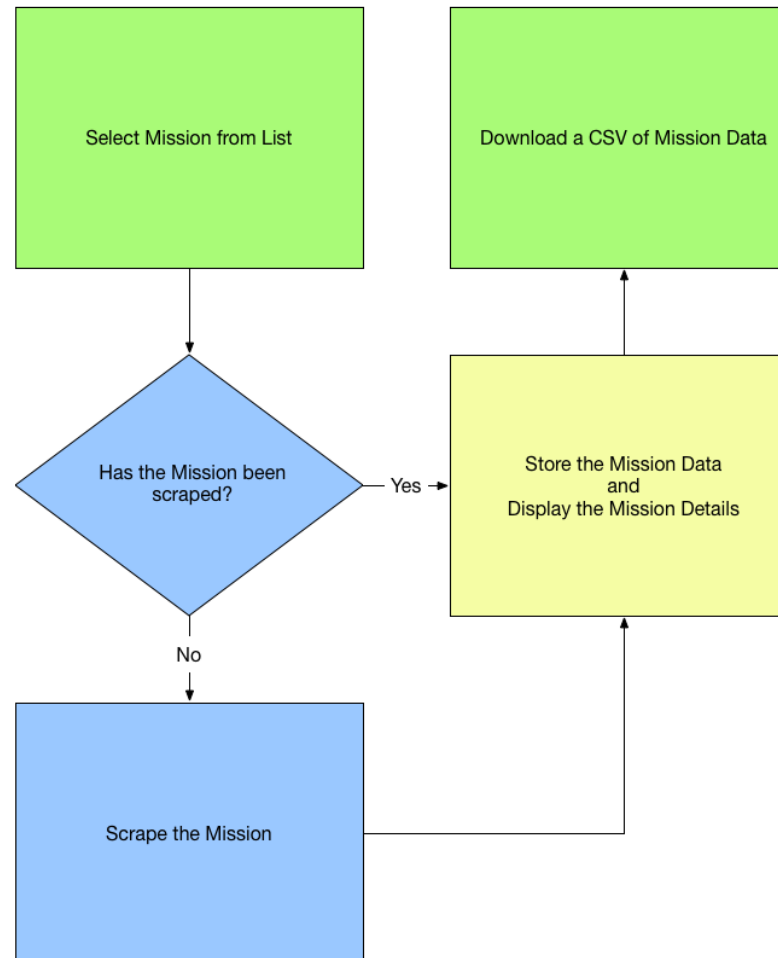
NSSDCA ID	Spacecraft Name
2016-070A	Soyuz MS-03 (NSSDC Link)
NNN6001	1960 Rho (NSSDC Link)
1962-067A	1962 Beta Tau 1 (NSSDC Link)
1962-004A	1962 Delta 1 (NSSDC Link)
1962-011A	1962 Lambda 1 (NSSDC Link)
1962-024A	1962 Omega 1 (NSSDC Link)
1962-021A	1962 Phi 1 (NSSDC Link)
1962-017A	1962 Rho 1 (NSSDC Link)
NNN6201	1962-010X (NSSDC Link)
NNN6301	1963-001X (NSSDC Link)
NNN6302	1963-003X (NSSDC Link)
NNN6303	1963-004X (NSSDC Link)
1963-005A	1963-005A (NSSDC Link)
NNN6304	1963-005X (NSSDC Link)
NNN6305	1963-007X (NSSDC Link)
NNN6306	1963-008X (NSSDC Link)
1963-021E	1963-021E (NSSDC Link)
1963-035B	1963-035B (NSSDC Link)
1963-038C	1963-038C (NSSDC Link)



JSSDC Mission Details			
Download Mission Overview as CSV Download Experiment Data as CSV			
- Alternate Names - Apollo 11 LM/EASEP - LM-5 - Eagle 04041 - Facts in Brief Launch Date: 1969-07-16 Launch Vehicle: Saturn 5 Launch Site: Cape Canaveral, United States Mass: 15103.0 kg - Funding Agency - NASA-Office of Manned Space Flight (United States) - Disciplines - Human Crew - Planetary Science - Additional Information Launch/Orbital information for Apollo 11 Lunar Module / EASEP PDMP information for Apollo 11 Lunar Module / EASEP Telecommunications information for Apollo 11 Lunar Module / EASEP Experiments on Apollo 11 Lunar Module / EASEP Data collections from Apollo 11 Lunar Module / EASEP			
Name	Role	Original Affiliation	E-mail
Mr. Floyd I. Roberson	Program Manager	NASA Headquarters	
Mr. Wilbert F. Eichelman	Project Manager	NASA Johnson Space Center	
Experiment Number	Experiment Name	Spacecraft Name	Principal Investigator(s)
1969-059C-01	Lunar Field Geology	Apollo 11 Lunar Module / EASEP	Shoemaker, Eugene
Experiment Description			
This experiment entailed the collection and documentation of geologic rock samples. The samples were collected using tongs, scoops, a hammer, and core tubes. A closeup stereoscopic surface camera, the modified 70-mm Hasselbalds, and a 16-mm camera used in experiment 69-059A-01 (photography) were also used to document the findings of the astronauts and their traverse of 100 m from the landing site. All samples were placed in vacuum tight containers, and the 21 kg of rock samples from the contingency and the bulk and documented containers were brought back to earth for use in extensive scientific investigations of the composition of the moon and its origin.			
Name	Role	Original Affiliation	E-mail
Dr. Eugene M. Shoemaker	Principal Investigator	California Institute of Technology	
Other Information			
- Discipline - Planetary Science: Geology and Geophysics - Additional Information			

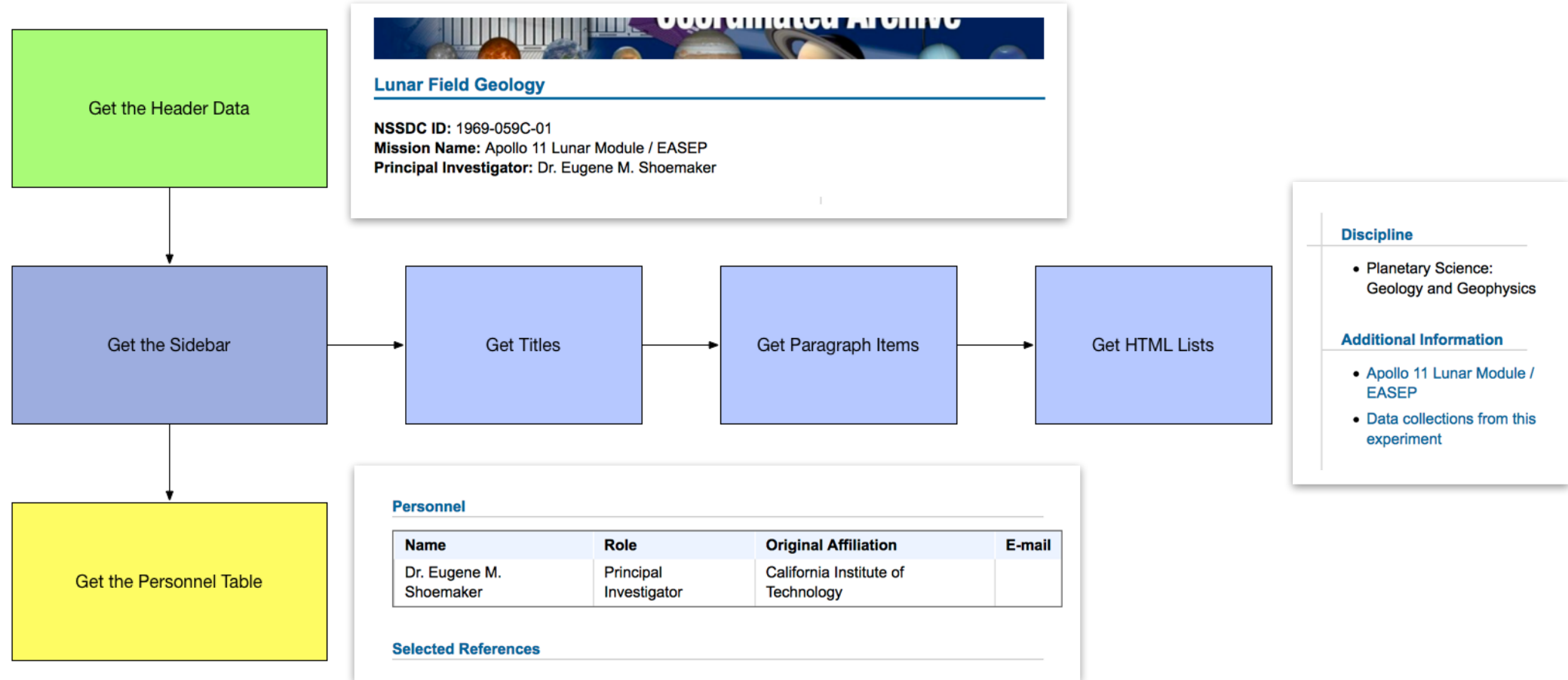


System Process Overview





Scrape Details





Implementing the NASA NAF

- Use linked data to connect repository resources to thesaurus terms
 - View resources related to a mission
 - Discover hidden/indirect connections across collections
- Utilize existing repository data to find mission connections
 - Titles
 - Abstracts
 - Keywords



OpenRefine



Add file-based reconciliation service

This will set up a new reconciliation service based on an RDF file that provides entity URIs and entity labels.

Name:

A human readable name

File details

☐ Load file from URL:

☒ Upload file:

nasanaf.rdf

File format:

Label properties

Select properties that are used to label resources in the RDF data. These properties will be used to match resources:

- ☐ rdfs:label ☒ skos:prefLabel ☐ dcterms:title ☐ dc:title
☐ foaf:name
☐ Other...

17 matching rows (14479 total)

Extensions:

Show as: **rows** records Show: 5 10 25 50 rows

☒ All	☒ id	☒ article_title	☒ keyword_uncontrolled	☒ URIs		
		1558.	10697	Radiometric Cross-Calibration of EO-1 ALI With L7 ETM+ and Terra MODIS Sensors Using Near-Simultaneous Desert Observations	Terra MODIS ☒ ☒ MODIS (0.455) ☒ ☒ Create new topic Search for match	https://gsfcir.gsfc.nasa.gov/nasanaf/uri/3390
		2742.	10507	Assessment of Spectral Band Impact on Intercalibration Over Desert Sites Using Simulation Based on EO-1 Hyperion Data	Terra and Aqua MODIS ☒ ☒ MODIS (0.25) ☒ ☒ Create new topic Search for match	https://gsfcir.gsfc.nasa.gov/nasanaf/uri/3390
		5559.	10506	Applications of Spectral Band Adjustment Factors (SBAF) for Cross-Calibration	Terra Moderate Resolution Imaging Spectroradiometer (MODIS) ☒ ☒ Shuttle Imaging Spectrometer Experiment (0.39) ☒ ☒ Visual Imaging Subsystem (0.254) ☒ ☒ MODIS (0.085) ☒ ☒ Create new topic Search for match	https://gsfcir.gsfc.nasa.gov/nasanaf/uri/3390
		5561.	10506	Applications of Spectral Band Adjustment Factors (SBAF) for Cross-Calibration	Terra MODIS ☒ ☒ MODIS (0.455) ☒ ☒ Create new topic Search for match	https://gsfcir.gsfc.nasa.gov/nasanaf/uri/3390
		9964.	10618	Terra and Aqua moderate-resolution	Terra	https://gsfcir.gsfc.nasa.gov/nasanaf/uri/3390



RDF/XML

```
<!-- Concept: Hubble Space Telescope -->
<skos:Concept rdf:about="https://gsfcir.gsfc.nasa.gov/nasana/uri/1919"
xml:lang="en">
  <skos:inScheme rdf:resource="https://gsfcir.gsfc.nasa.gov/nasana/uri"/>
  <reg:status rdf:resource="http://metadataregistry.org/uri/RegStatus/1001"/>
  <reg:identifier rdf:resource="http://metadataregistry.org/concepts/10706"/>
  <skos:prefLabel xml:lang="en">Hubble Space Telescope</skos:prefLabel>
  <skos:altLabel xml:lang="en">HST</skos:altLabel>
  <skos:hiddenLabel xml:lang="en">Hubble</skos:hiddenLabel>
  <skos:related rdf:resource="https://gsfcir.gsfc.nasa.gov/nasana/uri/3240"/>
  <skos:narrower rdf:resource="https://gsfcir.gsfc.nasa.gov/nasana/uri/3102"/>
</skos:Concept>
```



XSLT

```
<xsl:stylesheet xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
xmlns:reg="http://metadataregistry.org/uri/profile/regap/"
xmlns:skos="http://www.w3.org/2004/02/skos/core#">
  <xsl:output method="text"/>

  <xsl:template match="skos:Concept">
    <xsl-text>
      SELECT id, title, abstract FROM publications
      WHERE (title LIKE '%<xsl:value-of select="skos:prefLabel"/>%
        <xsl:for-each select="skos:altLabel">OR title LIKE '%<xsl:value-of select="."/>% ' </xsl:for-each>
        <xsl:for-each select="skos:hiddenLabel">OR title LIKE '%<xsl:value-of select="."/>% ' </xsl:for-each>
        OR abstract LIKE '%<xsl:value-of select="skos:prefLabel"/>%
        <xsl:for-each select="skos:altLabel">OR abstract LIKE '%<xsl:value-of select="."/>% ' </xsl:for-each>
        <xsl:for-each select="skos:hiddenLabel">OR abstract LIKE '%<xsl:value-of select="."/>% ' </xsl:for-
each>)
      AND status='active'
      ORDER BY id INTO OUTFILE '/tmp/Missions-<xsl:value-of select="skos:prefLabel"/>.xls' FIELDS
      TERMINATED BY '\t';
    </xsl-text>
  </xsl:template>
</xsl:stylesheet>
```

SQL



```
SELECT id, title, abstract FROM publications
WHERE (title LIKE '%Hubble Space Telescope%'
OR title LIKE '%HST%' OR title LIKE '%Hubble%'
OR abstract LIKE '%Hubble Space Telescope%'
OR abstract LIKE '%HST%' OR abstract LIKE '%Hubble%' )
AND status='active'
ORDER BY id INTO OUTFILE '/tmp/Missions-Hubble Space Telescope.xls' FIELDS TERMINATED BY '\t';
```



Goddard Information and Collaboration Center SITES

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Cassini

Filter type date range

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Fletcher L, Irwin P, Achterberg R, Orton G, Flasar F. **SEASONAL VARIABILITY OF SATURN'S TROPOSPHERIC TEMPERATURES, WINDS AND PARA-H₂ FROM CASSINI FAR-IR SPECTROSCOPY**. *Icarus*. 2016; 264:137-159. [Publication Details](#)

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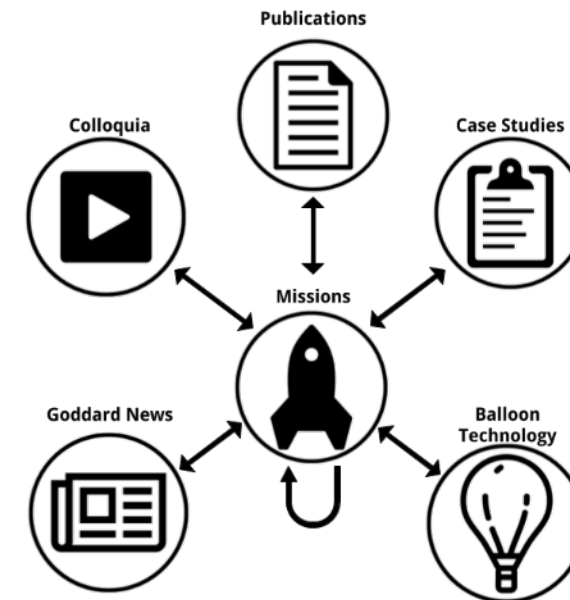
Hesman, Brigitte. **Saturn's Great Northern Storm of 2010-2011: from storm clouds to hot vortices**. *Scientific Colloquium*. 2014-04-11. [Colloquia Details](#)

Alternate Names
Cassini Orbiter

Related
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[Atmospheres of Titan and Saturn](#)
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[Titan Radar Mapper](#)
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[Visible and Infrared Mapping Spectrometer](#)
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[Radio and Plasma Waves Science](#)
[Origin and Evolution of the Saturn System](#)

Repository Integration

- Richer web of connections among existing digital collections
- Draft view of how a mission term and its linked data relationships to other resources could function





Summary - Why Create an Authority?

- No one authoritative source
 - Candidate sources often disagreed and had different scopes
- Solved an immediate problem for us, and could help others in the future
 - Possibility for future stages (i.e. individuals, locations)
- Needed traditional thesaurus functions
 - Express relationships between missions (hierarchical and associative)
 - Link all variant names together (equivalence)
 - Key when dealing with uncontrolled data sources



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Resources

- The NASA Name Authority File. <https://gsfcir.gsfc.nasa.gov/nasanaaf>
- The NASA Goddard Institutional Repository. <https://gsfcir.gsfc.nasa.gov>
- NASA Space Science Data Coordinated Archive (NSSDCA). <https://nssdc.gsfc.nasa.gov/>
- NASA Science Missions. <https://science.nasa.gov/missions>
- NASA Missions A-Z. <https://www.nasa.gov/missions>
- Open Metadata Registry. <http://metadataregistry.org/>
- OpenRefine. <http://openrefine.org/>
- RDF Refine extension. <http://refine.deri.ie/>
- XSLT. https://www.w3schools.com/xml/xsl_intro.asp



Questions?





Thank you!

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