

Managing spatial data at scale

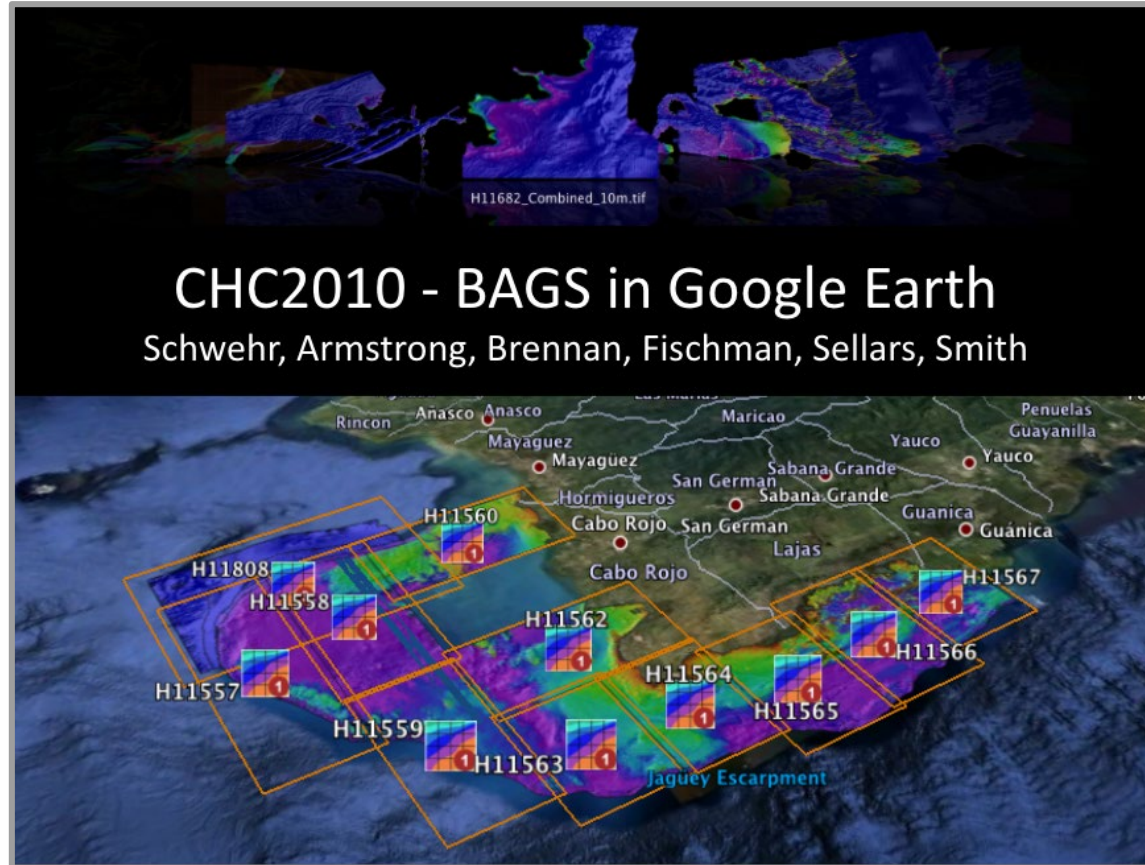
A perspective from Google Earth Engine

March 9, 2022
Kurt Schwehr



Who am I?

Affiliate Faculty member at UNH Center for Coastal and Ocean Mapping

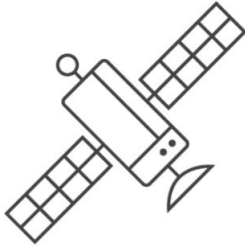


Software Engineer for



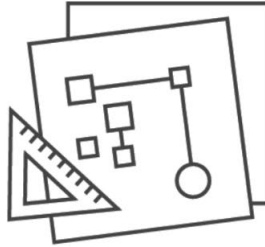
Google's **cloud platform** for easy **petabyte-scale analysis**

of **satellite imagery** and other **geospatial data**.



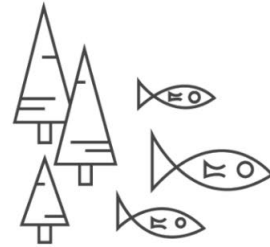
SATELLITE IMAGERY

+



YOUR ALGORITHMS

+



REAL WORLD APPLICATIONS

Public Data Catalog of >600 datasets (>50 Petabytes)

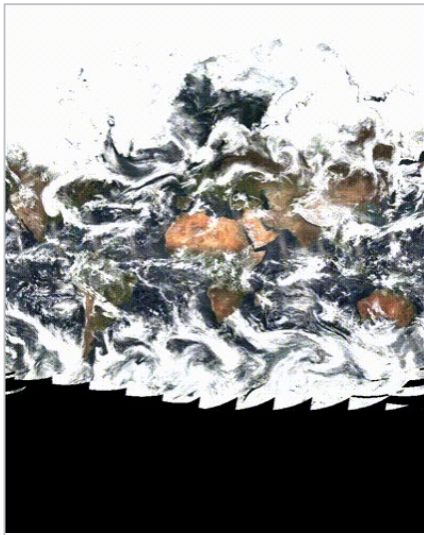
Landsat and Sentinel

40+ year archive of the entire planet

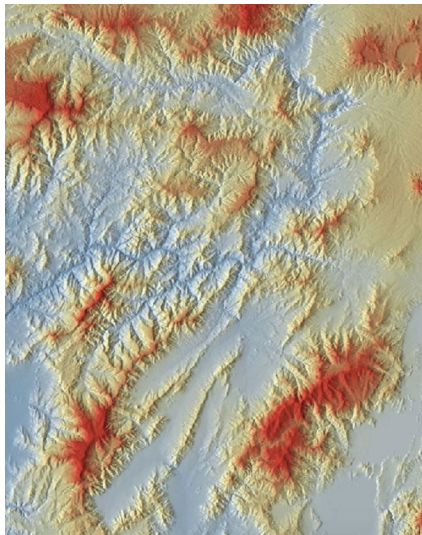


MODIS

2 global images every day.



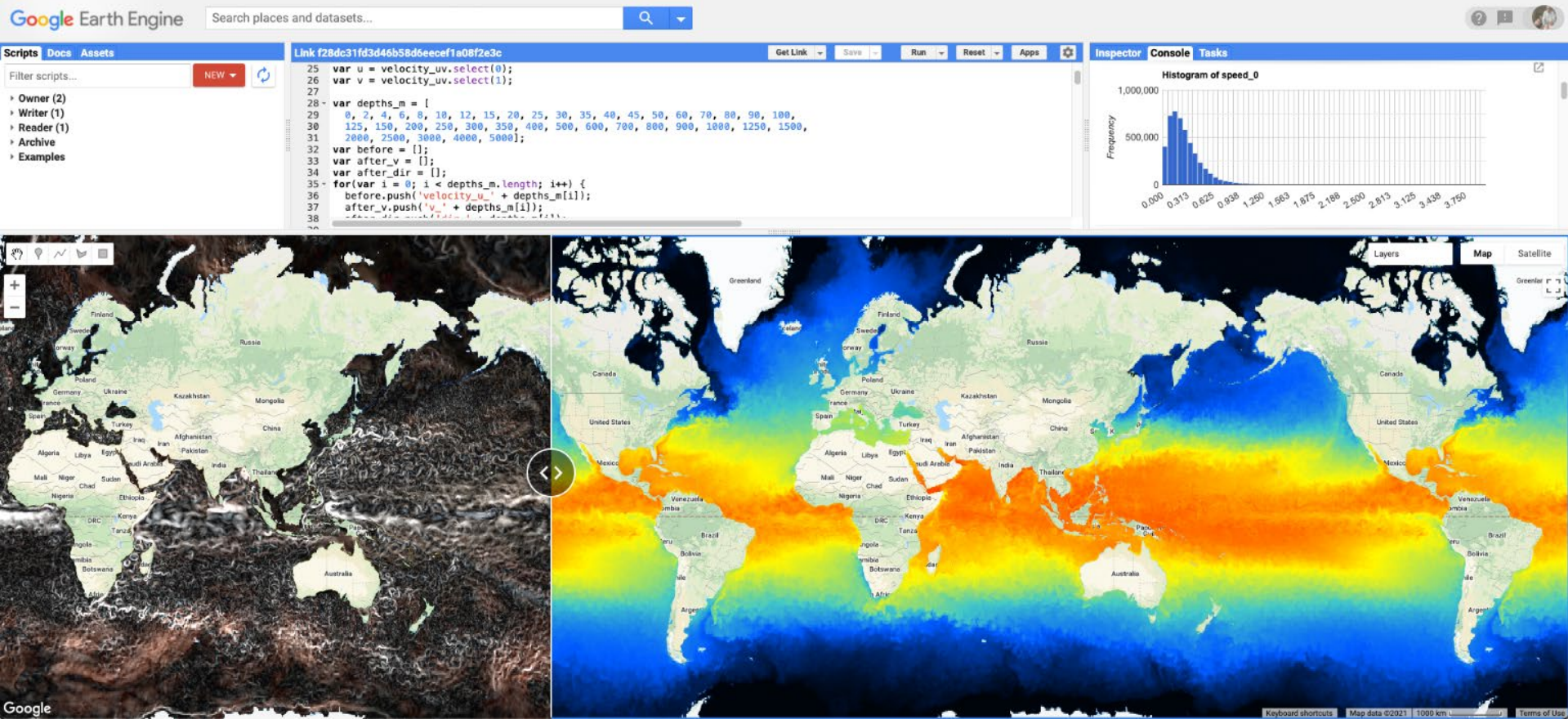
Terrain and Landcover



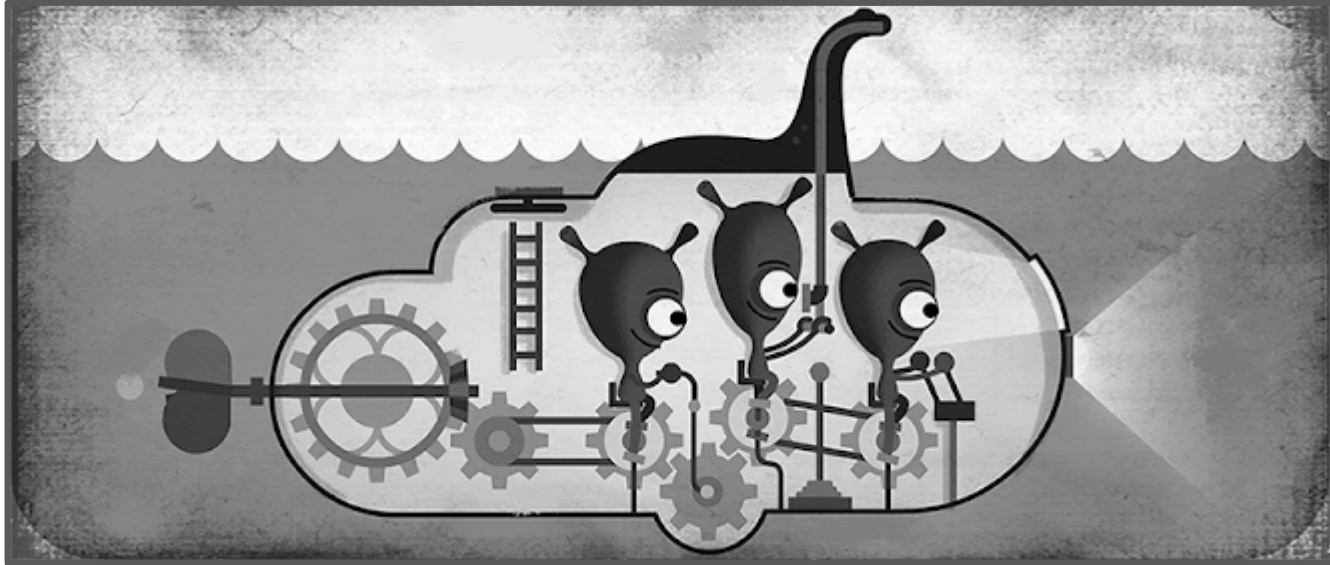
Weather and Climate




HYCOM - 40 layers of temperature, salinity, and velocity 1993-present



Let's talk about getting work done with data



Can we use the CCOM Law of the Sea data?




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Joint Hydrographic Center

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AUVs







Chart of the Future




Coastal Processes




Data Processing




Data Visualization




Law of the Sea



Lidar



Seafloor Characterization

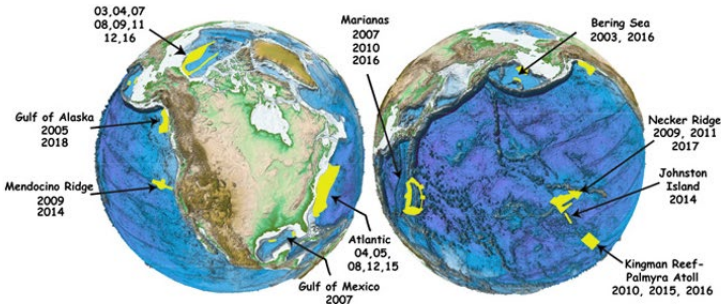


Sonar Capabilities

Law of the Sea

U.S. UNCLOS Bathymetry Project

CCOM/JHC is collecting multibeam bathymetry and acoustic backscatter data that can be used to support an extended continental shelf under Article 76 of the United Nations Convention of the Law of the Sea (UNCLOS). The extensive seafloor mapping project grew out of an exhaustive desktop study of the U.S. bathymetry data holdings and identified several regions where new bathymetric surveys are needed (Mayer, et al., 2002). The report emphasized that multibeam echosounder data are needed to rigorously define (1) the foot of the slope (FoS), a parameter of both UNCLOS formula lines, and (2) the 2500-m isobath, a parameter of a UNCLOS cutoff line. Both of these features, the former a geomorphic feature and the latter a geodetic position, can be used to define an extended continental shelf claim.



1 of 2 next >



▼ Law of the Sea

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Escarpment](#)[Johnston Atoll, Pacific Ocean](#)[Line Islands, Kingman Palmyra,
Pacific Ocean](#)[Mariana Trench and West](#)

Law of the Sea Data - Arctic

Data Type

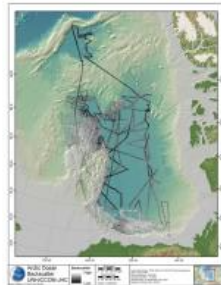
[Select All](#)

- ☐ **Acoustic Backscatter**
- ☐ **Bathymetry**
- ☐ **Other**
- ☐ **Sub-bottom**

Sort by

Order

Arctic Backscatter



Dataset

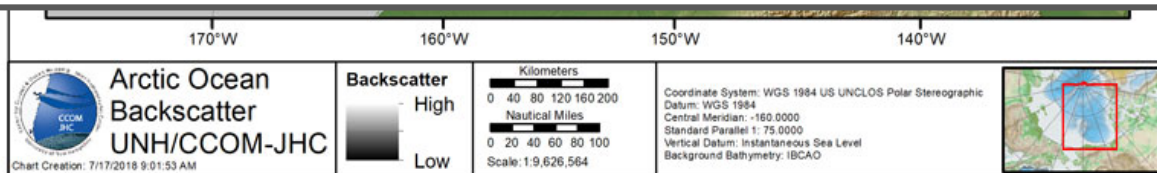
- [Arctic_ECSbackscatter_100m_201807_USA_ESRI.zip](#) 26.37 MB
- [Arctic_ECSbackscatter_100m_201807_USA_QPS.zip](#) 109.15 MB

Metadata

- [Arctic_ECSbackscatter_100m_201807_USA_ESRI.xml](#) 14.37 KB
- [Arctic_ECSbackscatter_100m_201807_USA_QPS.xml](#) 14.38 KB

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Metadata

[Arctic_ECSbackscatter_100m_201807_USA_ESRI.xml](#)

[Arctic_ECSbackscatter_100m_201807_USA_QPS.xml](#)

Dataset

Attachment

Size

[Arctic_ECSbackscatter_100m_201807_USA_ESRI.zip](#) 26.37 MB

[Arctic_ECSbackscatter_100m_201807_USA_QPS.zip](#) 109.15 MB

Data type

Bathymetry

Data format

ArcGIS Grid

SD

Acquisition Date

Tuesday, July 17, 2018

Publication Date

Tuesday, July 17, 2018

Research Area

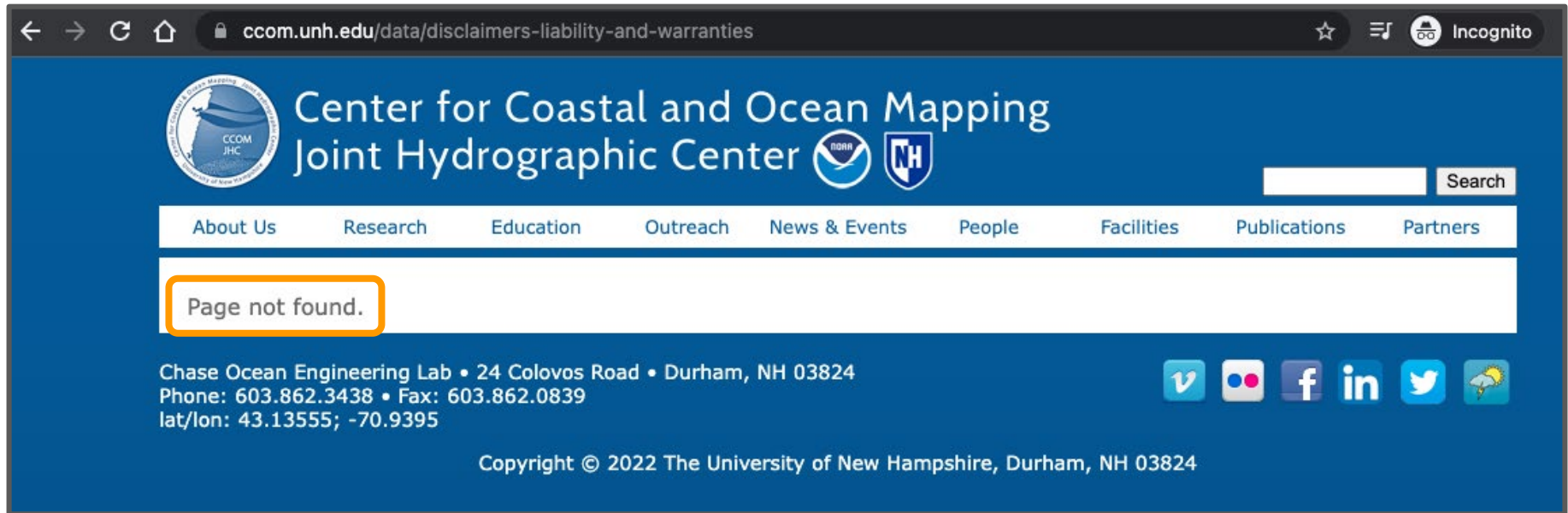
[Law of the Sea](#)

Region

[Arctic](#)

“Page not found” - Now what do I do?

<https://ccom.unh.edu/data/disclaimers-liability-and-warranties>



There are better ways: SPDX and STAC

Licensing

Information about the license(s) of the data, which is not necessarily the same license that applies to the metadata. **Licensing information should be defined at the [Collection](#) level if possible.**

- [JSON Schema](#)

Field Name	Type	Description
license	string	Item's license(s), either a SPDX License identifier , <code>various</code> if multiple licenses apply or <code>proprietary</code> for all other cases. Should be defined at the Collection level if possible.

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What if I could programmatically check & filter by license?

License	Number of collections	Can I use these datasets for work as Kurt, Inc.?
“proprietary”	617	This is going to take a while... need to read each terms.
PDDL-1.0	179	Yes!
CC-BY-4.0	41	Yes, but I need to keep track.
CC-BY-SA-4.0	14	Maybe. I have to make the product be CC-BY-SA-4.0
OGL-Canada-2.0	2	Maybe. Off to consult my legal team
CC-PDDC	1	Probably. Off to consult my legal team
CC0-1.0	1	Yes
CC-BY-NC-4.0	1	Definitely NO! I'm doing commercial work.

Software Package Data Exchange (SPDX)

“[A]n open standard for software bill of materials (SBOM).”

“The first version of the SPDX specification was intended to make compliance with software licenses easier”

“SPDX 2.2.1 was submitted to the International Organization for Standardization (ISO) in October, 2020, and was published as ISO/IEC 5962:2021 Information technology — SPDX® Specification V2.2.1 in August, 2021.”



SPDX

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Version: 3.16 2022-02-06

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Academic Free License v1.2	AFL-1.2	Y	Y
Academic Free License v2.0	AFL-2.0	Y	Y
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And many more...

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SpatioTemporal Asset Catalogs

“STAC is supported by an active community of developers, with involvement from a large range of organizations.”

<https://stacspec.org/>



STAC is JSON - Even if you don't know JSON, find the license

```
 collection.json
```

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1  {
2    "id": "xyzzz-bathymetry",
3    "type": "Collection",
4    "stac_version": "1.0.0",
5    "license": "CC-BY-4.0"
6    "description": "A free to use bathymetry grid from XYZZY Surveys.",
7    "title": "Collection of Extension Items",
8    "keywords": ["examples", "bathymetry", "projection"],
9    "providers": [
10     {
11       "name": "XYZZY Surveys, Inc.",
12       "roles": ["producer", "licensor"],
13       "url": "https://example.com"
14     },
15     "extent": {
16       "spatial": {"bbox": [[-180,-56,180,83]]},
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18       "links": [
19         ...
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