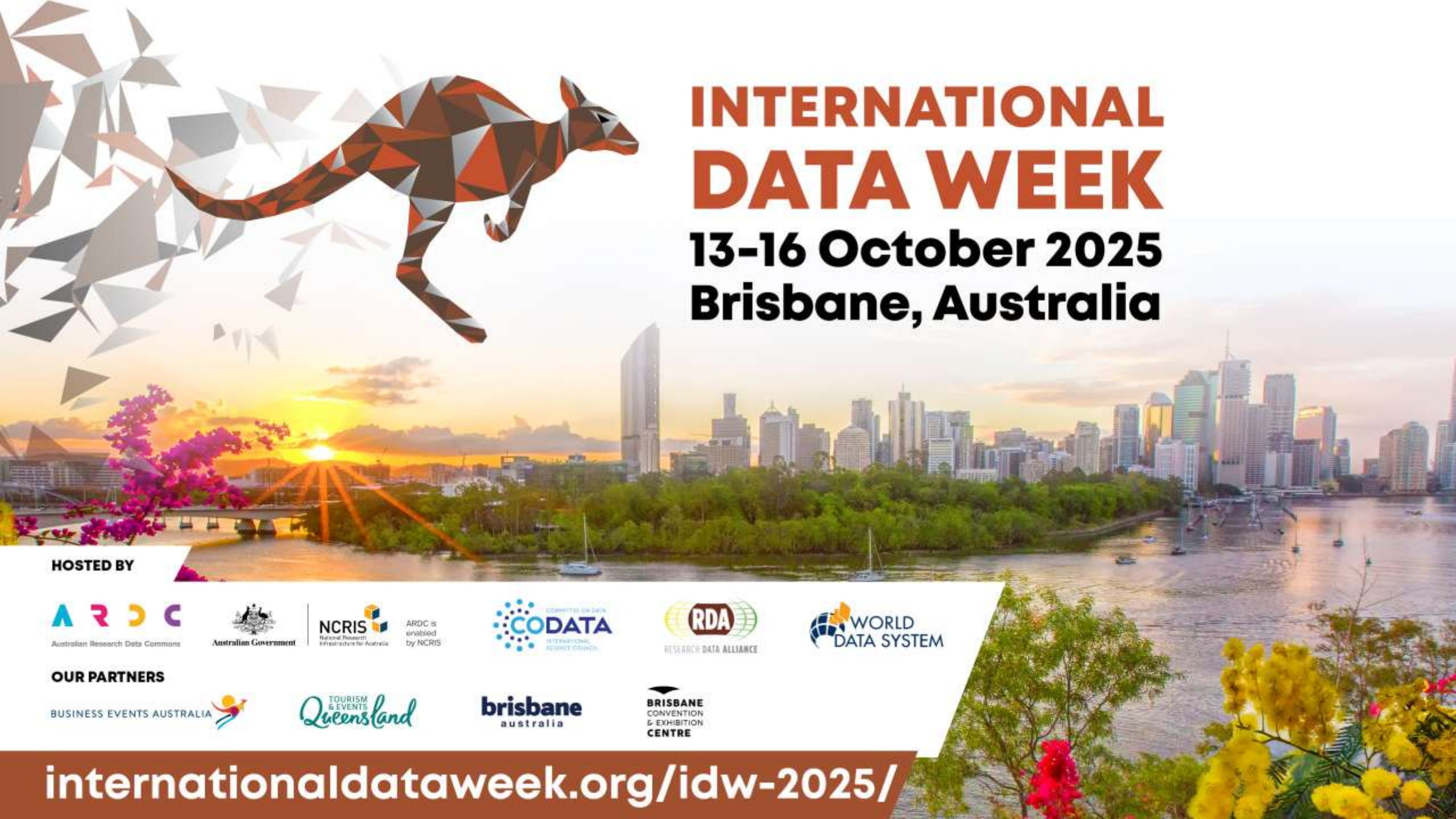
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Use case of PIDs: NSSDC's practice

Qi XU, Ziming ZOU, Xiaoyan HU,

National Space Science Center, Chinese Academy of Sciences

National Space Science Data Center

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Outline

- About NSSDC
- Current data curation practice with PIDs
- Towards AI-READY

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国家空间科学数据中心
National Space Science Data Center

The nation-level space science data center recognized by the Ministry of Science & Technology and the Ministry of Finance of China

Domain Scope

Space Physics & Space Weather	Space Astronomy	Planetary	Space Earth Science	Space Engineering & Space Application
				

Mission Statement

- Facilitating standardized governance, high-quality construction and open sharing of space science data,
- Developing an ecosystem for the innovative application of space science data,
- Exploring data-driven paradigm changes in scientific research and improve the utilization of space science data.

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国家空间科学数据中心
National Space Science Data Center

- Competent authority: **Chinese Academy of Sciences(CAS)**
- Host institution: **National Space Science Center, CAS**
- Co-construction institutions:
  - National Astronomical Observatories, CAS,
  - University of Science and Technology of China,
  - National Time Service Center, CAS
  - Computer Network Information Center, CAS

NSSC 中国科学院国家空间科学中心 National Space Science Center, CAS

NAOC

1958 University of Science and Technology of China

NTS

CNIC 中国科学院 计算机网络信息中心 Computer Network Information Center, Chinese Academy of Sciences

1988年 World Data Center (ICSU-WDC)
WDC-D FOR SPACE SCIENCES, CHINA
(The predecessor of NSSDC)

2003年 National Scientific and Technological Infrastructure
Earth System Science Data Infrastructure
disciplinary subcenter for space science

2013年 Regular Member of ICSU-WDS

2019年 National Space Science Data Center
One of 20 National Science Data Centers in China

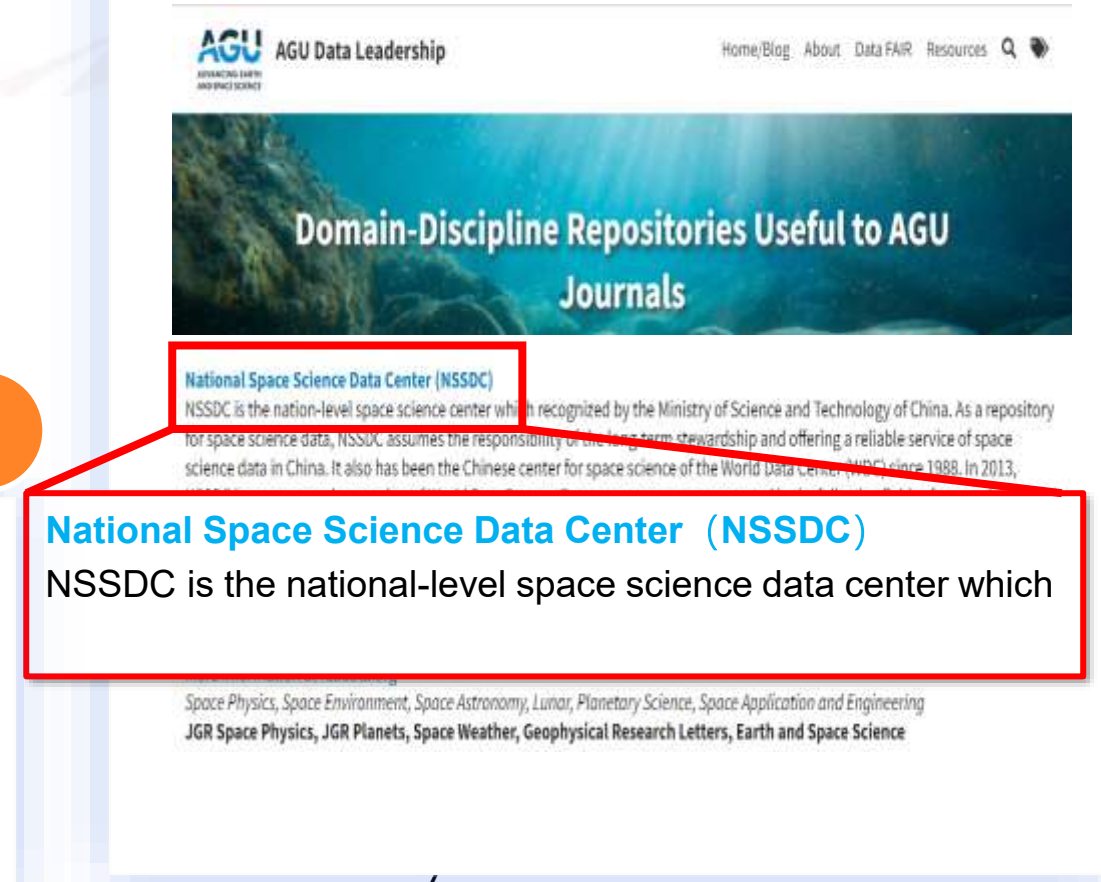
International Engagement

- ✓ Regular Member of ICSU-WDS
- ✓ Certified by CoreTrustSeal

Recommended by academic groups

- ☐ Recommended by AGU、Elsevier、Springer Nature、Wiley
- ☐ Indexed by data index libraries, such as DataCite, Mendeley Data, and Google Dataset Search.

Be on the recommended list of Domain-Discipline repositories useful to AGU Journals



National Space Science Data Center（NSSDC）

NSSDC is the national-level space science data center which

National major projects involved

Space science satellites projects

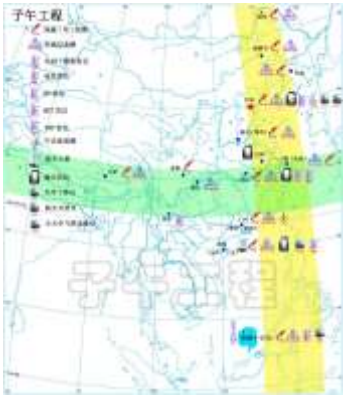
- **Phase I:** DAMPE, Shijian-10, QUESS, HXMT
- **Phase II:** Taiji-1, GECAM, ASO-S, EP, SVOM, SMILE
- **New Project:** DSL、SPO、ET、eXTP、KX-12

Lunar and deep space exploration projects

- **Lunar missions:** ChangE-1, ChangE-2, ChangE-3, ChangE-4, ChangE-5.....
- **Deep space exploration missions:** Tianwen-1, Tianwen-2...

National Major Scientific and Technological Infrastructure

- **The Meridian Project (Phase I and Phase II)**

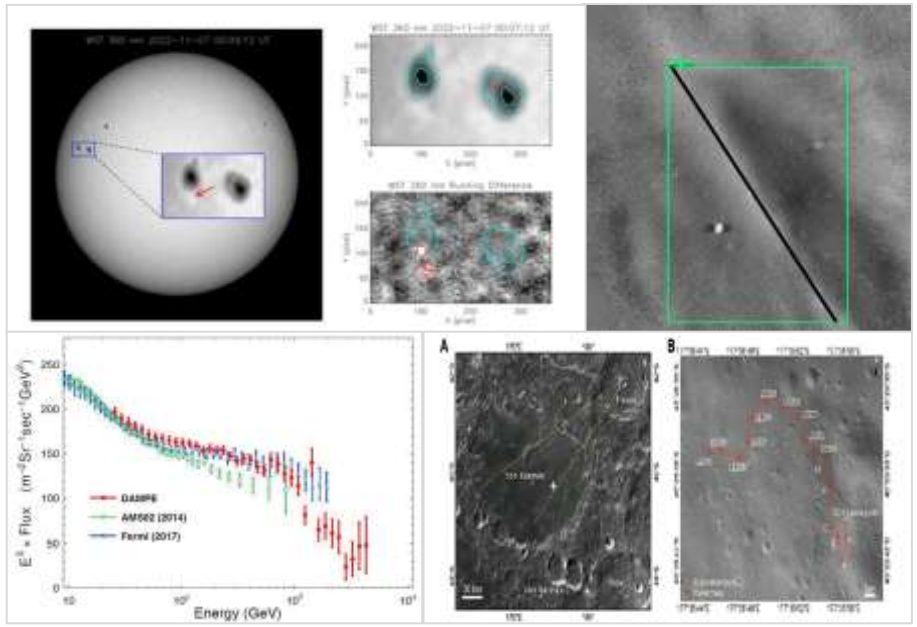


International Major Science Programs

- **International Meridian Circle Project (IMCP)**

The system of data resource

- *3306* scientific datasets
- *37* domain databases
- Data volume exceeds 3.3PB



Space Physics & Space Weather	CMP Database
	Double Star Observation Database
	ASO-S Observation Database
	China-Brazil Joint Space Weather Observation Database
	Huairou Solar Observation Database
	SuperDARN China
	……
Planetary	Chang'E-4 Observation Database
	Chang'E-5 Lunar Sample Database
	Tianwen-1 Observation Database
	……
Space Astronomy	HXMT Observation Database
	DAMPE Gamma-ray Database
	GECAM Observation Database
	……
Space Engineering & Space Application	iGMAS Database
	CFD Verification and Validation Database
	Space Radiation Effect Database
	……

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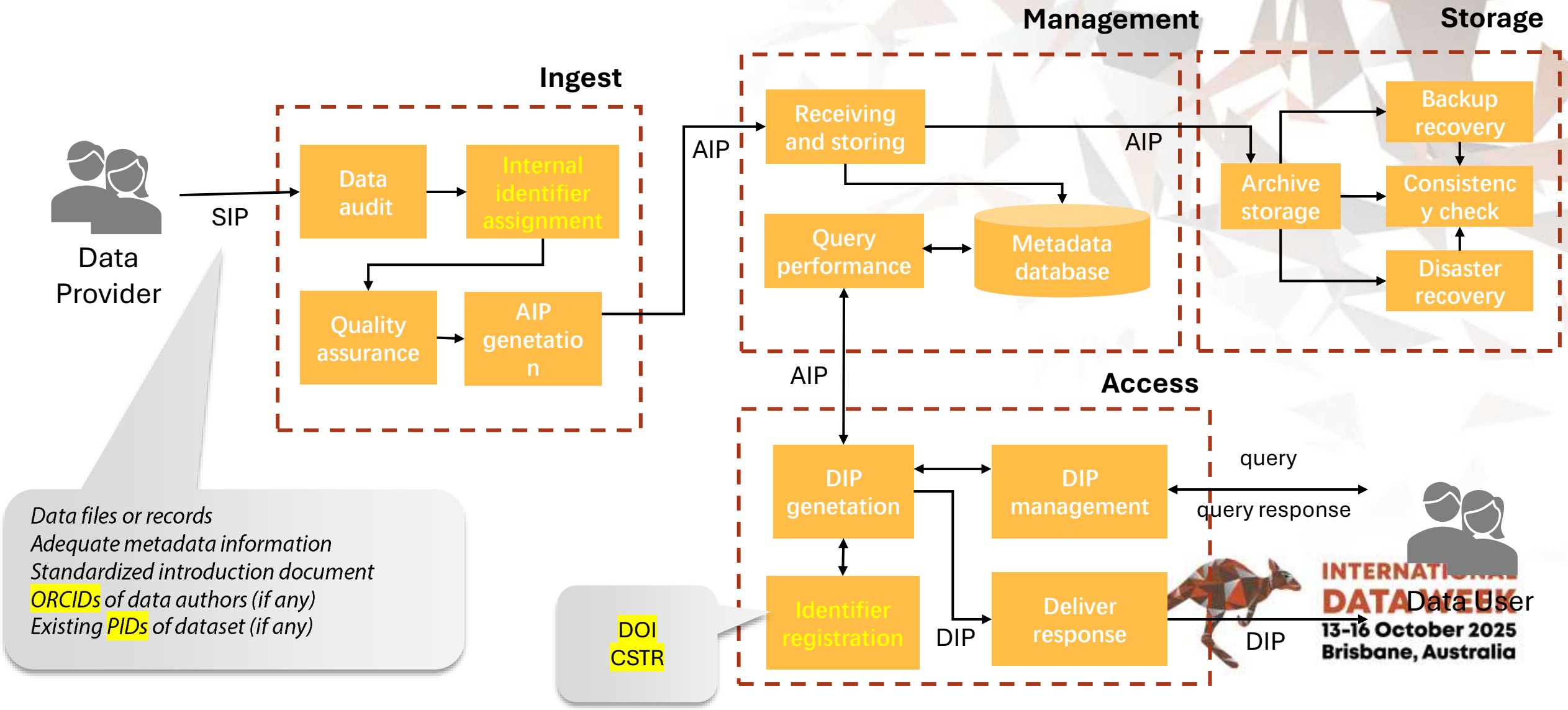
PIDs embedded in data curation workflows



PIDs used by NSSDC

A well-known digital identifier for objects of any type.

CNKI

ISTIC & Wanfang Data

DataCite

Common Science and Technology Resource

CSTR

Chinese National standard
GB/T 32843-2016

CSTR is proposed by the Ministry of Science and Technology (MOST) of China for the identification, cataloguing, registration, publication, maintenance and management of scientific and technological resources in China.

A persistent digital identifier that distinguishes one researcher from other researchers and a record that supports automatic links among all his professional activities.

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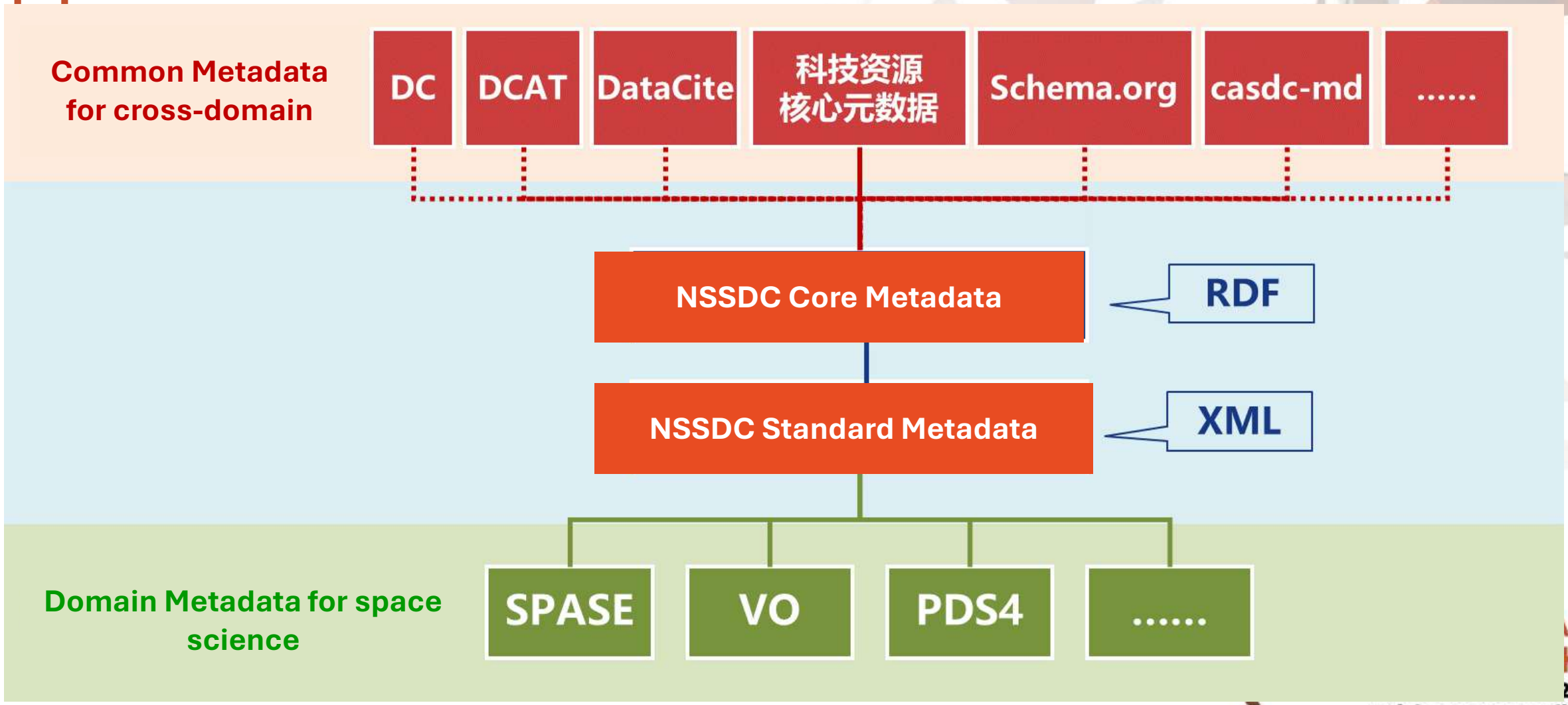
Metadata Management in NSSDC



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NSSDC Core Metadata

28 Elements in NSSDC Core Metadata

- **DOI number**
- **CSTR number**
- Dataset name(in Chinese)
- Dataset name(in English)
- Discipline classification
- Subject classification
- Keywords(in Chinese)
- Keywords(in English)
- Description(in Chinese)
- Description(in English)
- Resource generation date
- Duration of data
- Service organization name
- Service organization mailing address
- Service agency postal code
- Service organization contact number
- Service organization email
- Data source project
- Observation
- Instrument
- Share Plan
- Share Scope
- Application Procedure
- URL
- License
- Data producer name
- **Data producer ORCID**
- Data producer email
- Data producer contact number
- Extension
- Extension
- Extension

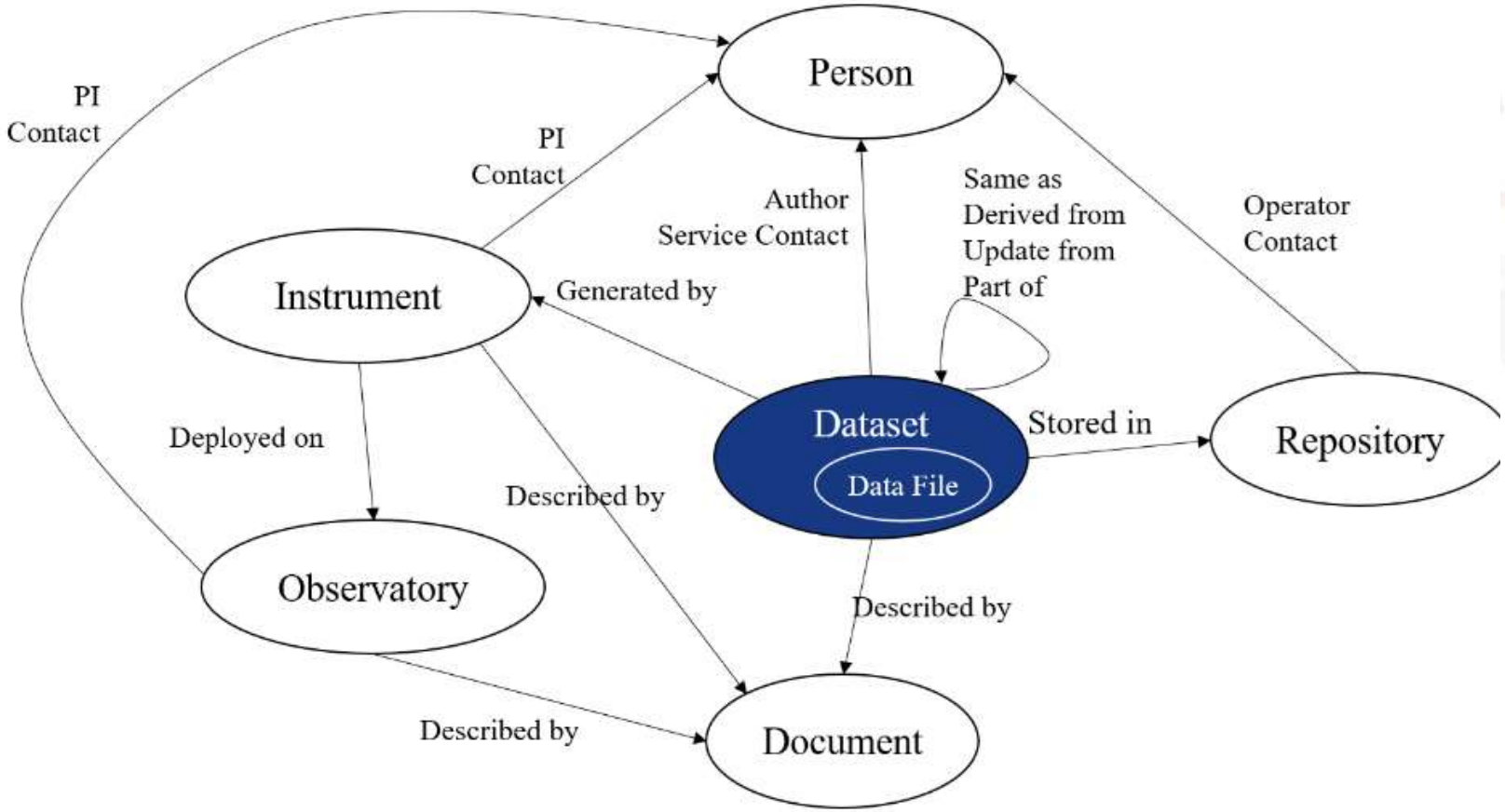
PIDs be assigned → DOI, CSTR, ORCID

→ China S&T Sharing Network, Data Cloud of CAS

publish data catalogs

NSSDC Domain Metadata

Connect entities through identifiers



NSSDC Domain Metadata Model

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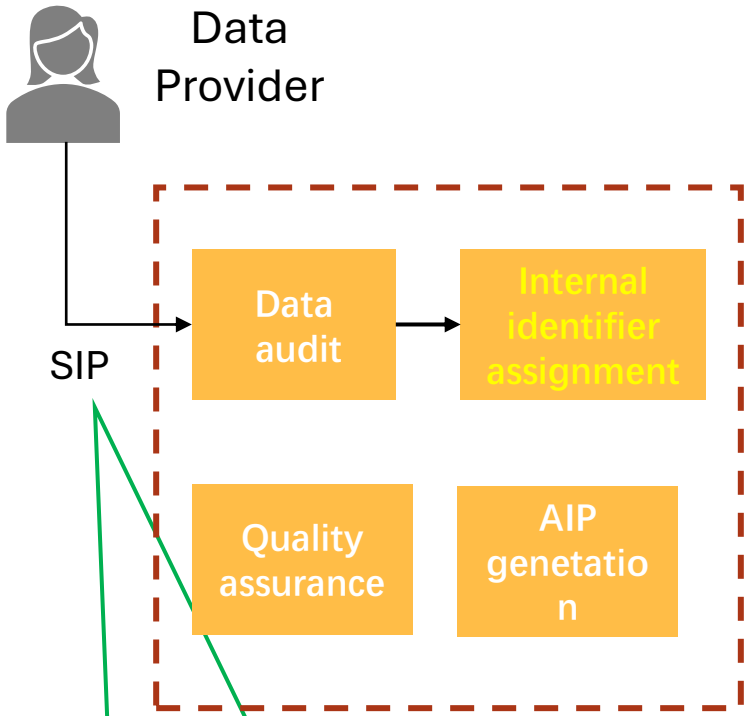
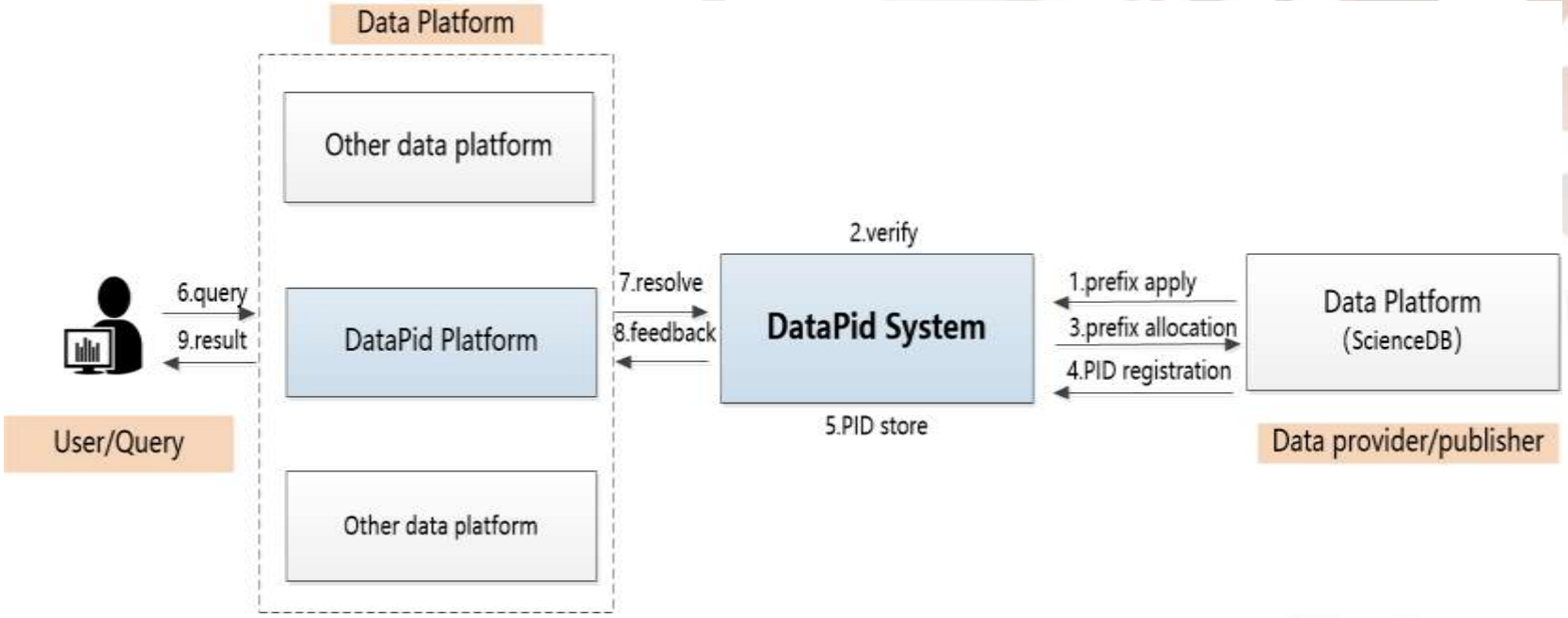
Data provenance with PIDs





The data collection process involves conducting data traceability based on pre-assigned **PIDs**.

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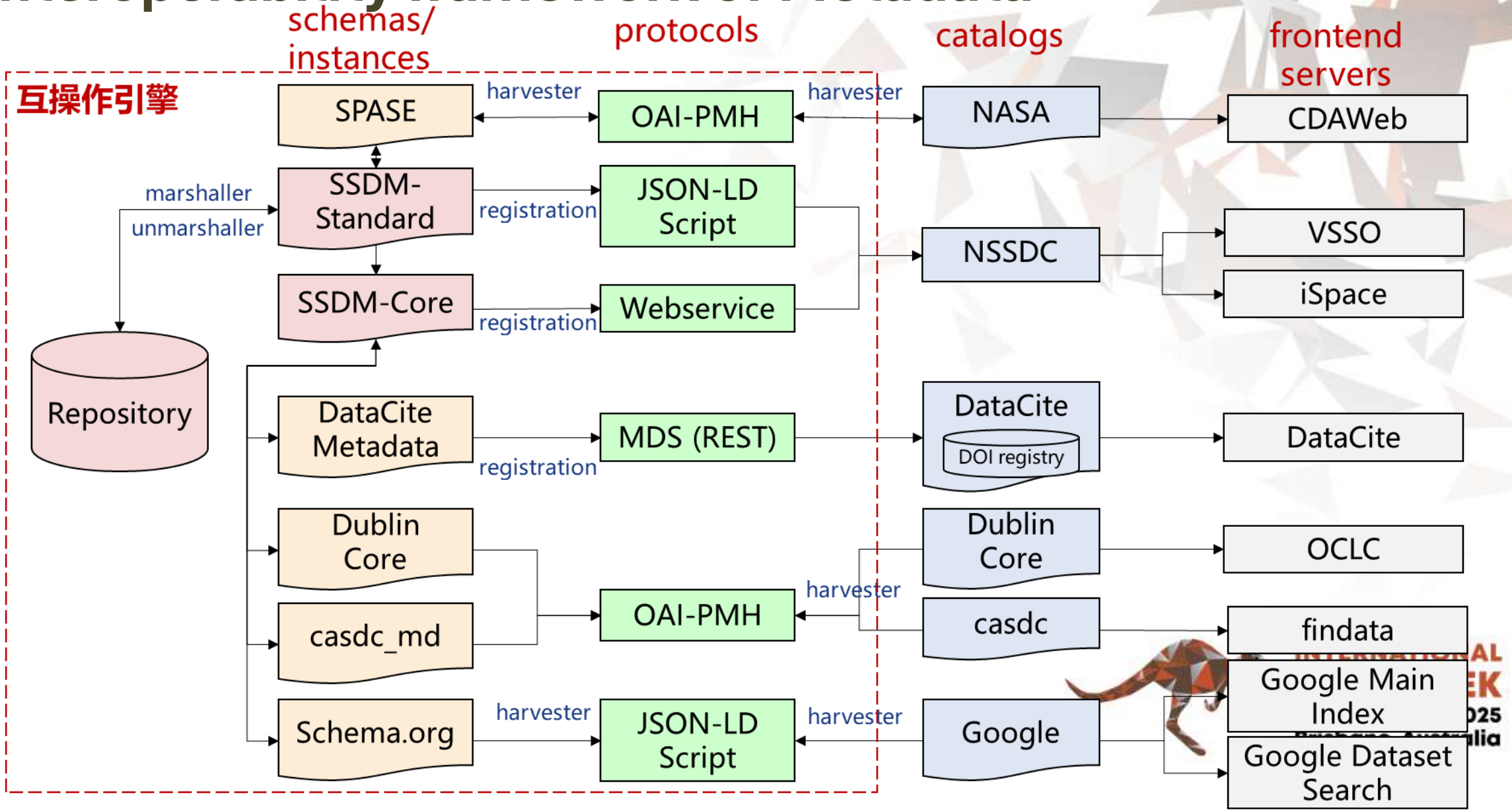
Interoperability framework of Metadata



Data publishing

Persistent identifiers

CSTR 科技资源标识

http://cstr.cn/14804.11.01.06.001

DOI 数字对象标识符

http://www.dx.doi.org/10.12176.01.99.00001

Licenses: Creative Commons

Data Citation

引用本数据集

选择引用格式

China National Standard GB/T 7714-2015 (note)

Jinzhu Ji, Dijun Guo, Jianzhong Liu, et al. The 1:2,500,000-Scale Geologic Map of the Global Moon[DS/OL]. sadr, 2022[2022-12-07]. https://cstr.cn/14804.11.03.99.02797. CSTR:14804.11.03.99.02797.

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Jinzhu Ji, Dijun Guo, Jianzhong Liu, et al. The 1:2,500,000-Scale Geologic Map of the Global Moon[DS/OL]. sadr, 2022[2022-12-07]. https://doi.org/10.12176/03.99.02797. DOI:10.12176/03.99.02797.

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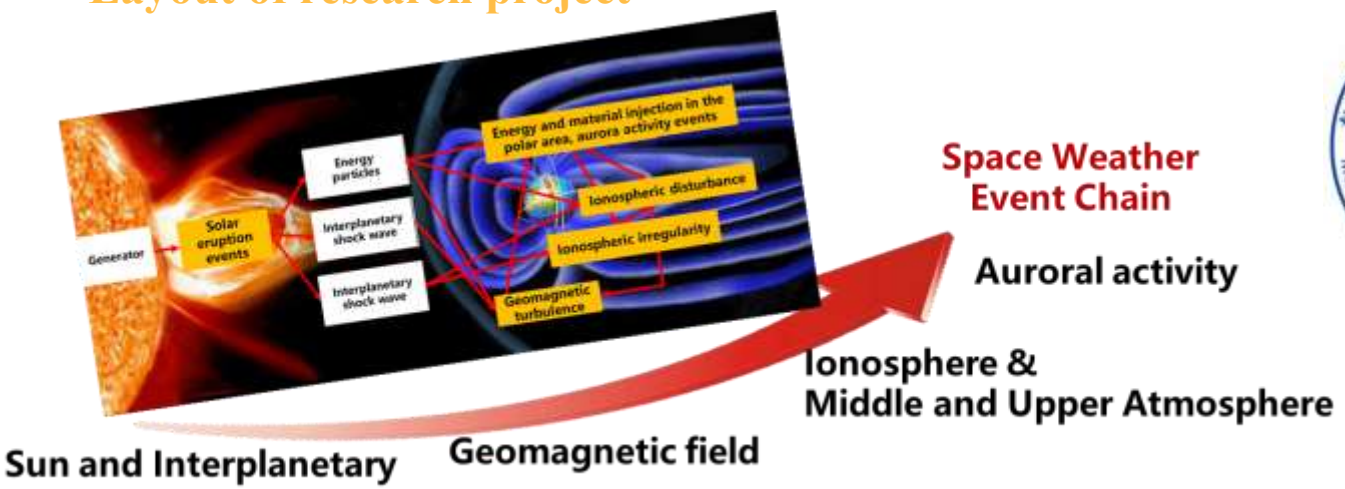
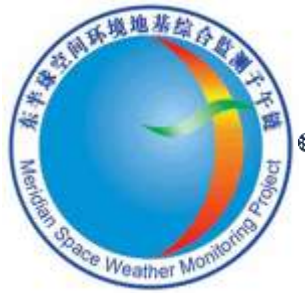
AI-ready data and application tools development

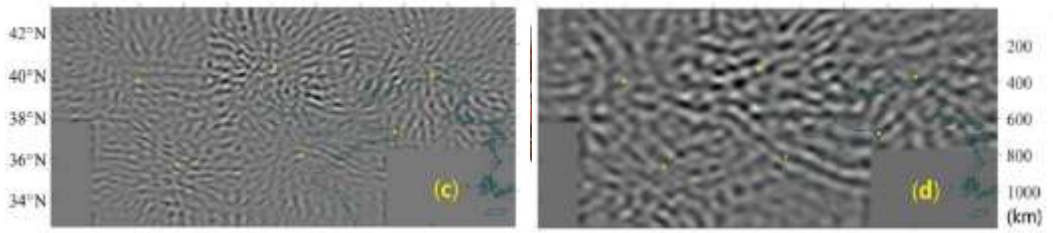
Collaborated with the domain community from Key Laboratory of Solar Activity and Space Weather, CAS, Key Laboratory of Geo-space Environment, Peking, Center for planetary sciences, Shandong university, etc.

We use **AI technologies** to achieve **event recognition**, **feature extraction**, **knowledge discovery** and **evolutionary modeling**, as well as analyze the **association and causality** between different events with observation data from China's space science missions.

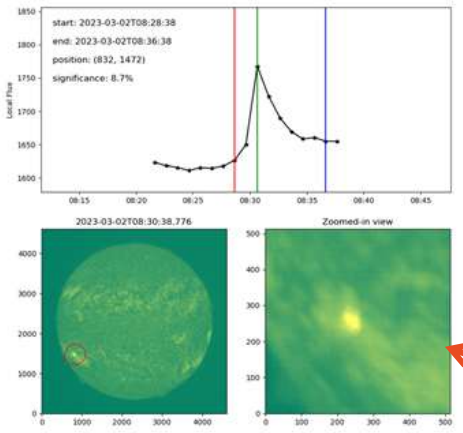
Layout of research project



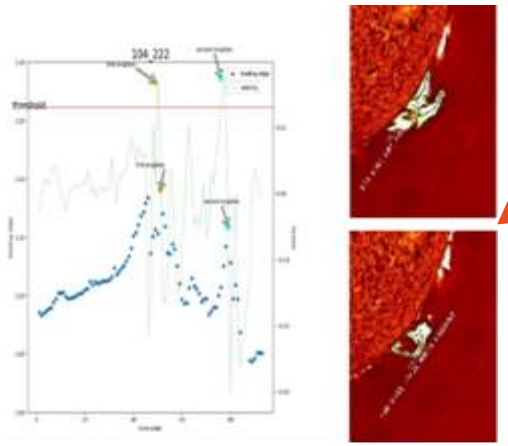




PIDs are not used for data, but can be used for knowledge

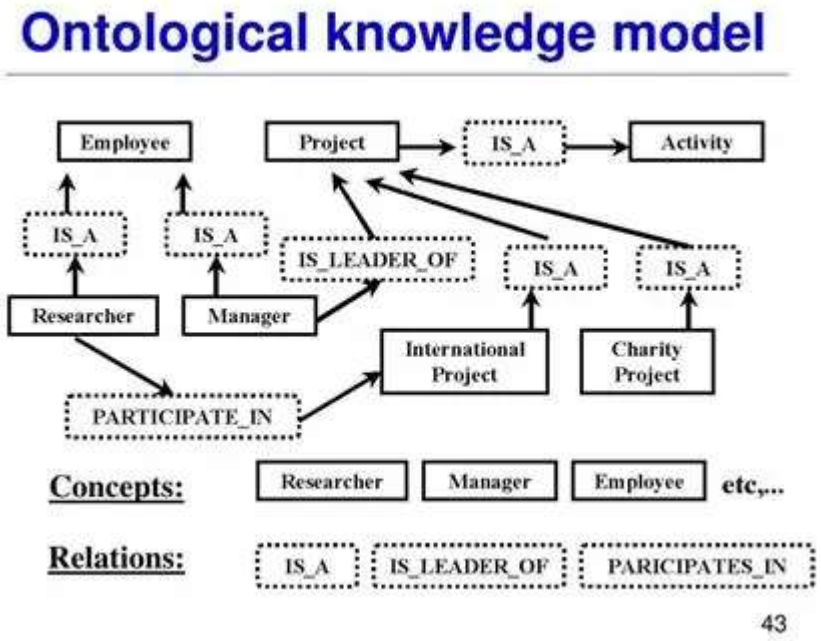


Datasets of Solar Active Regions



Solar Prominence Dataset

PIDs →



Use PIDs to associate the labeled physical events with the ontological knowledge in the knowledge base.

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Thank you

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