Summer 2026

SIParCS Project 4 –

Data Pathfinders: A GDEX UX/UI Intern Quest. Redesigning the Scientific Data Journey.

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Project Background

About Project

The GDEX Data Pathfinders project aims to improve the scientific discovery of GDEX data and services by identifying user friction points and translating them into evidence-based design improvements.

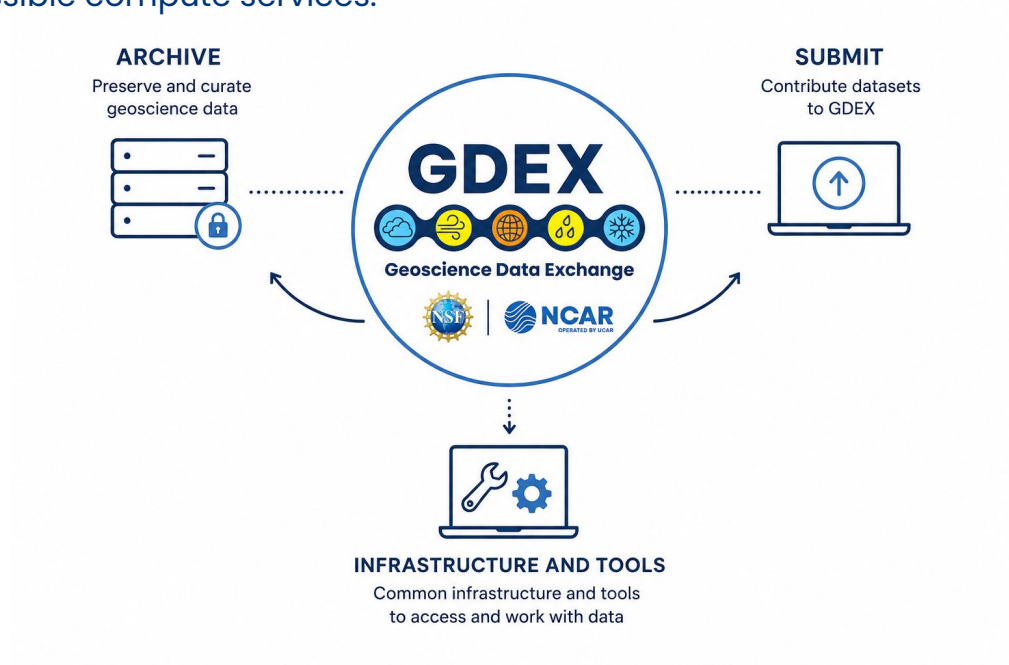
GDEX
Geoscience Data Exchange

NSF NCAR
OPERATED BY UCAR

GDEX Overview

What is GDEX?

GDEX (Geoscience Data Exchange) is a web data portal that supports atmospheric, ocean and related Earth System Science **Research** at NSF NCAR and US Universities with community reference datasets co-located with community accessible compute services.



gdex.ucar.edu

Problem Context

Have you ever been frustrated navigating the GDEX Webpage or any website?

- The objective of this project is to investigate potential UI/UX problems with the GDEX site and make improvements based on testing feedback
- The Project focused on home page and search page

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Usability Testing

GDEX Usability Testing

Purpose

The primary goal of this effort is to evaluate GDEX usability to identify user behaviors and specific interface friction points and develop actionable milestones to improve the GDEX user experience.

Method

Moderated usability testing using a task completion method with **10 NSF CISL SIParCS Interns**

Intended Observations

- Starting points and navigation choices
- Confusion, hesitation, and backtracking
- Ability to locate relevant information

User Analysis and Ranking

The user analysis is to get insights into the user's friction points and transform the interview findings into a structured, evidence-based prioritization roadmap for the GDEX redesign

Prioritization Framework

Priority Score =

(Severity × 30%) + (Frequency × 25%) + (Task Criticality × 20%) + (Persistence × 15%) + (FAIR Relevance × 10%)

Reference Frameworks

Standards used to define, rate, and prioritize the usability findings

ISO / NIST Usability Definition

Can users **efficiently** and **effectively** achieve specific goals.

Nielsen Norman Group Severity Rating

Frequency, **severity/impact**, and **persistence** of the usability problem.

Nielsen's Usability Heuristics

System visibility, **user control**, **real-world language matching**, and **access to help**.

FAIR Scientific Data Principles

Issues affecting the ability to **discover**, **access**, and **reuse** scientific datasets and formats (like Zarr and NetCDF).

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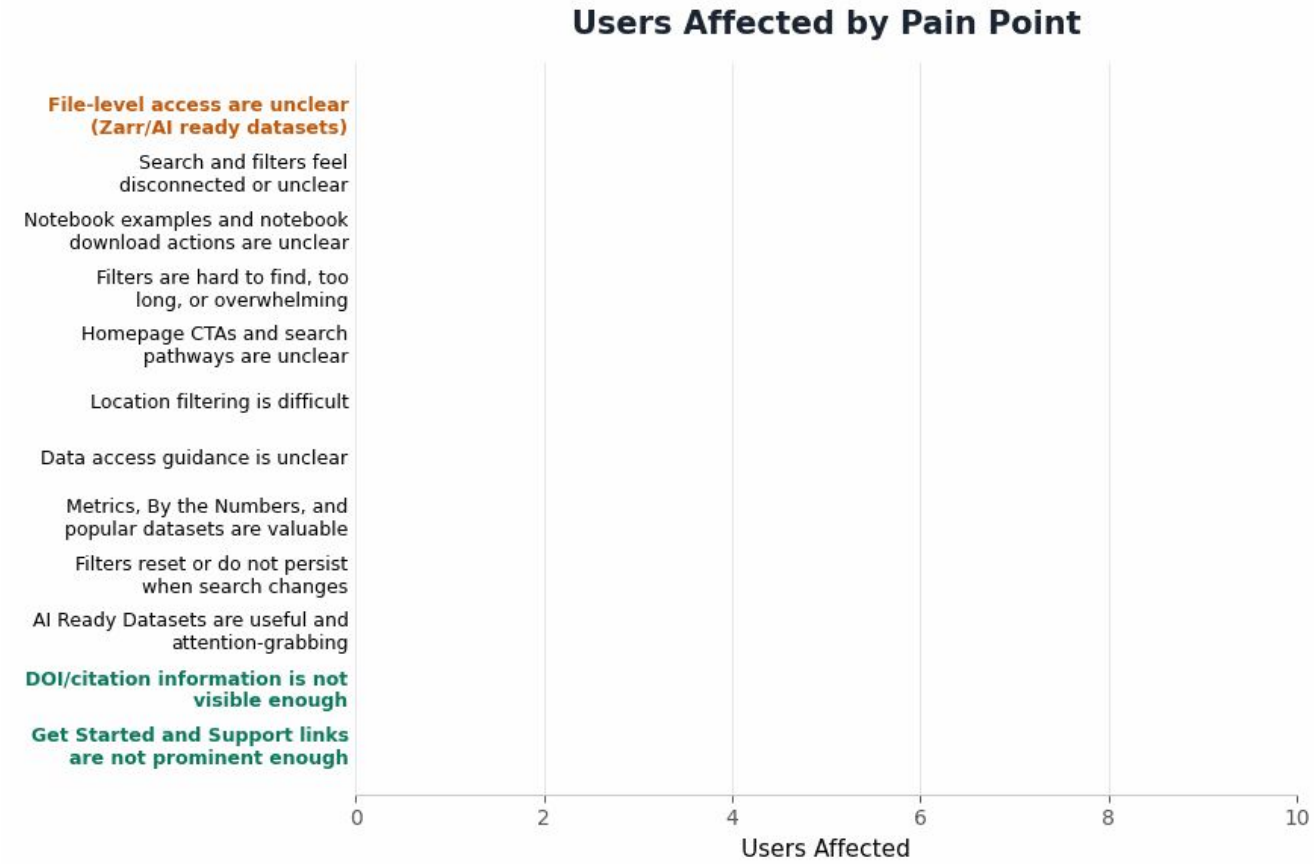
Findings From Usability Testing

Usability Findings



Findings to Design Decision

Top 5 Critical Findings	Design Decision
1 AI-ready and Zarr datasets were difficult to discover, limiting access to analysis-ready data formats.	Make formats and AI-ready data more visible
2 Usage metrics and 3 popular datasets were buried in a separate metrics page, reducing visibility of useful, high-value resources.	Surface high-value dataset signals earlier
4 Search filters were overcrowded and hard to navigate, making it difficult for users to narrow results efficiently.	Simplify and organize filters
4 Location search filtering was unclear, making it challenging to find datasets for regions, states, or other geographic areas.	Improve location based search by cascading filters
5 Important dataset information was difficult to locate, including DOI, formats, and access options	Create standardized dataset information cards

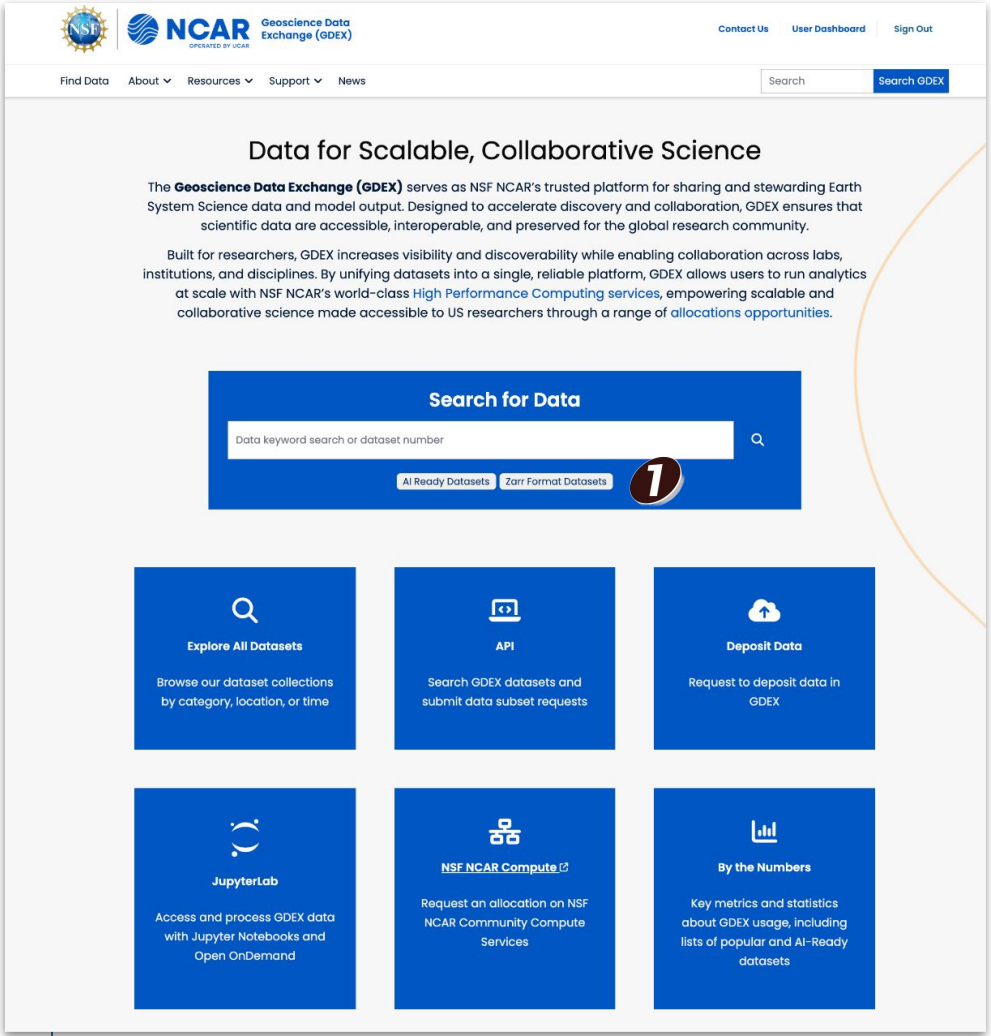
GDEX REDESIGN AND CODE DEVELOPMENT

Code Development and Web Design

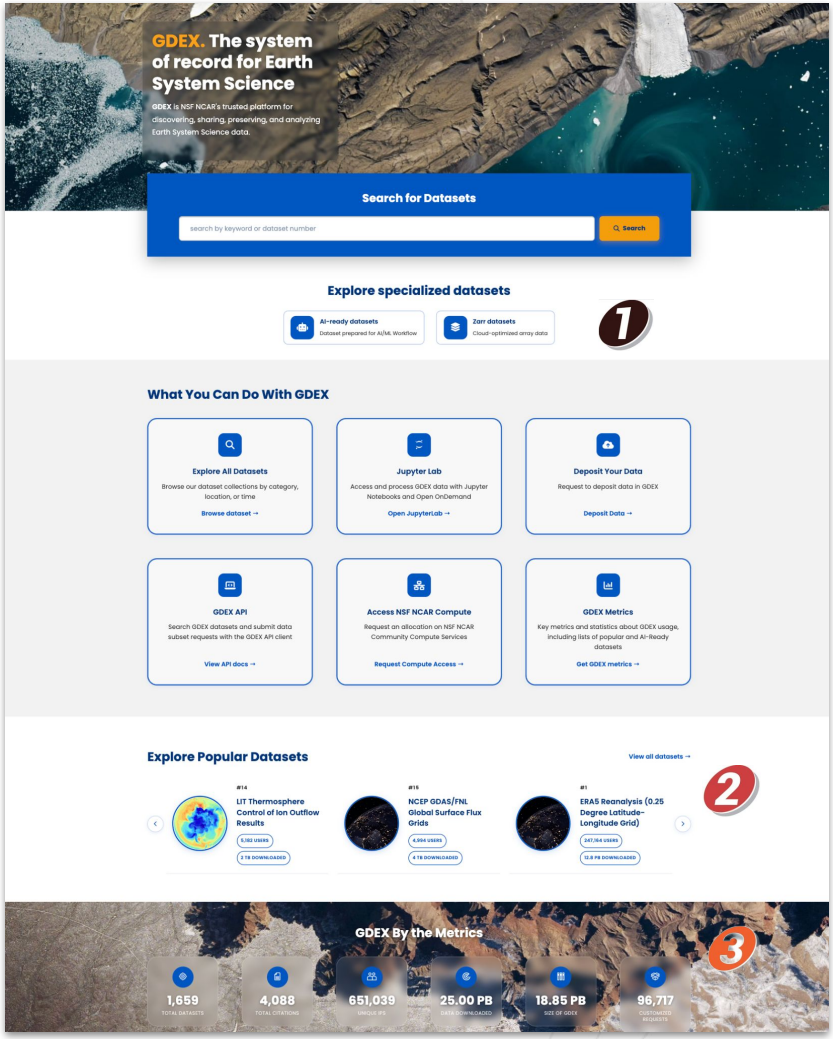
Design-to-development work

- Designed New UI prototype in Figma based on findings
- Structured redesigns around the existing GDEX Django and Bootstrap environment.
- Developed responsive layouts for homepage and search experiences.

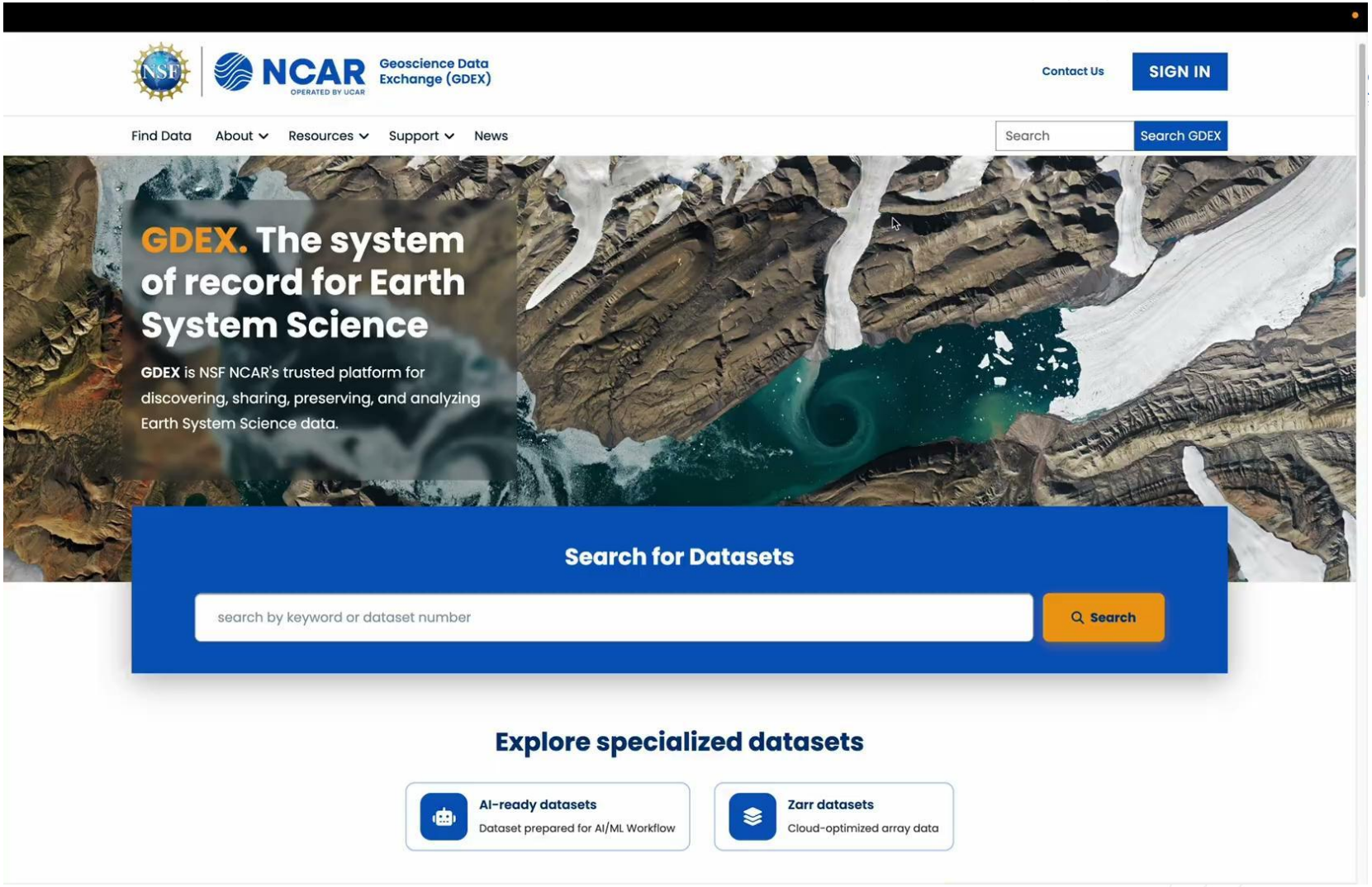
Technologies Used

Original HomePage



New HomePage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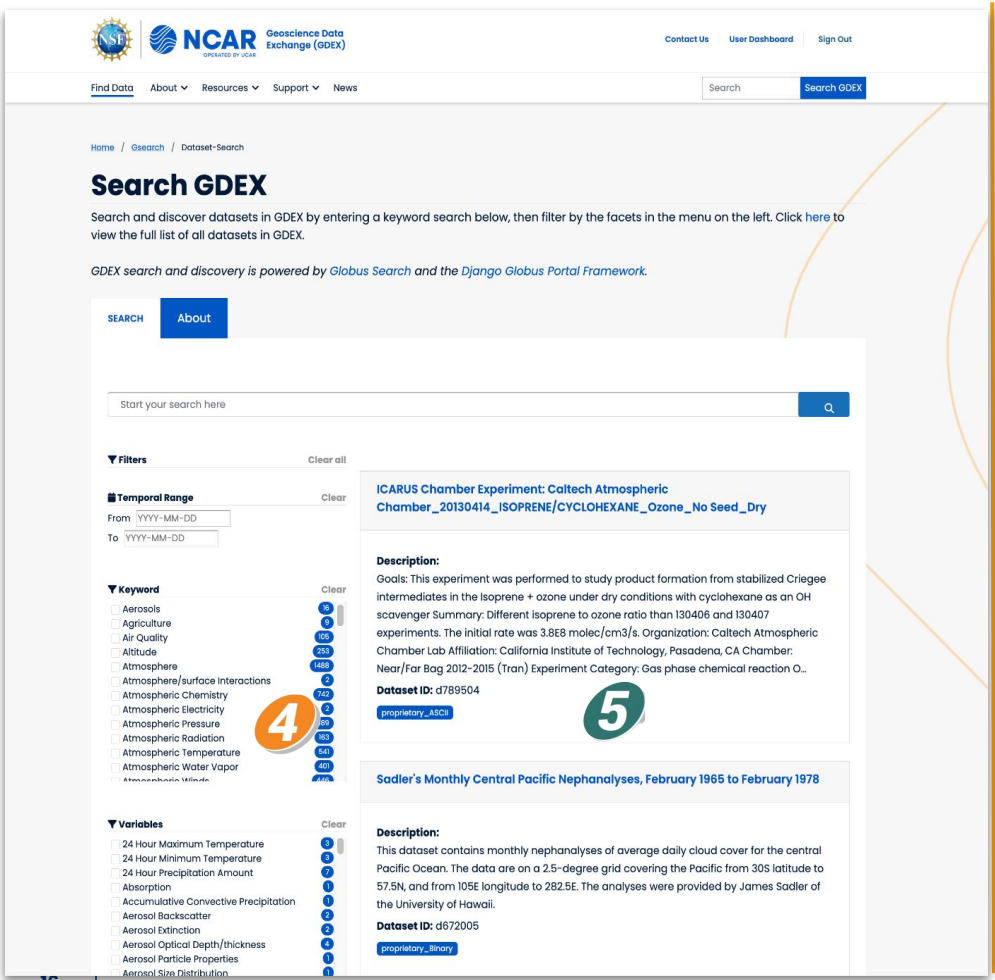
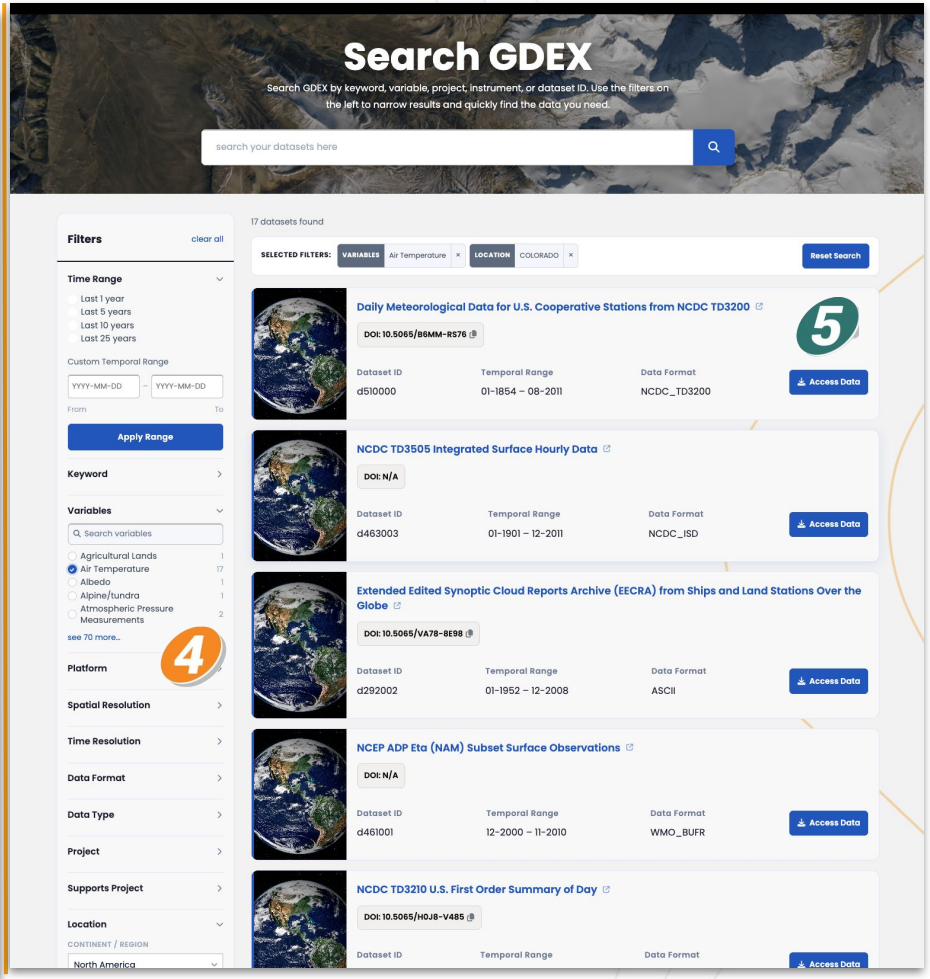
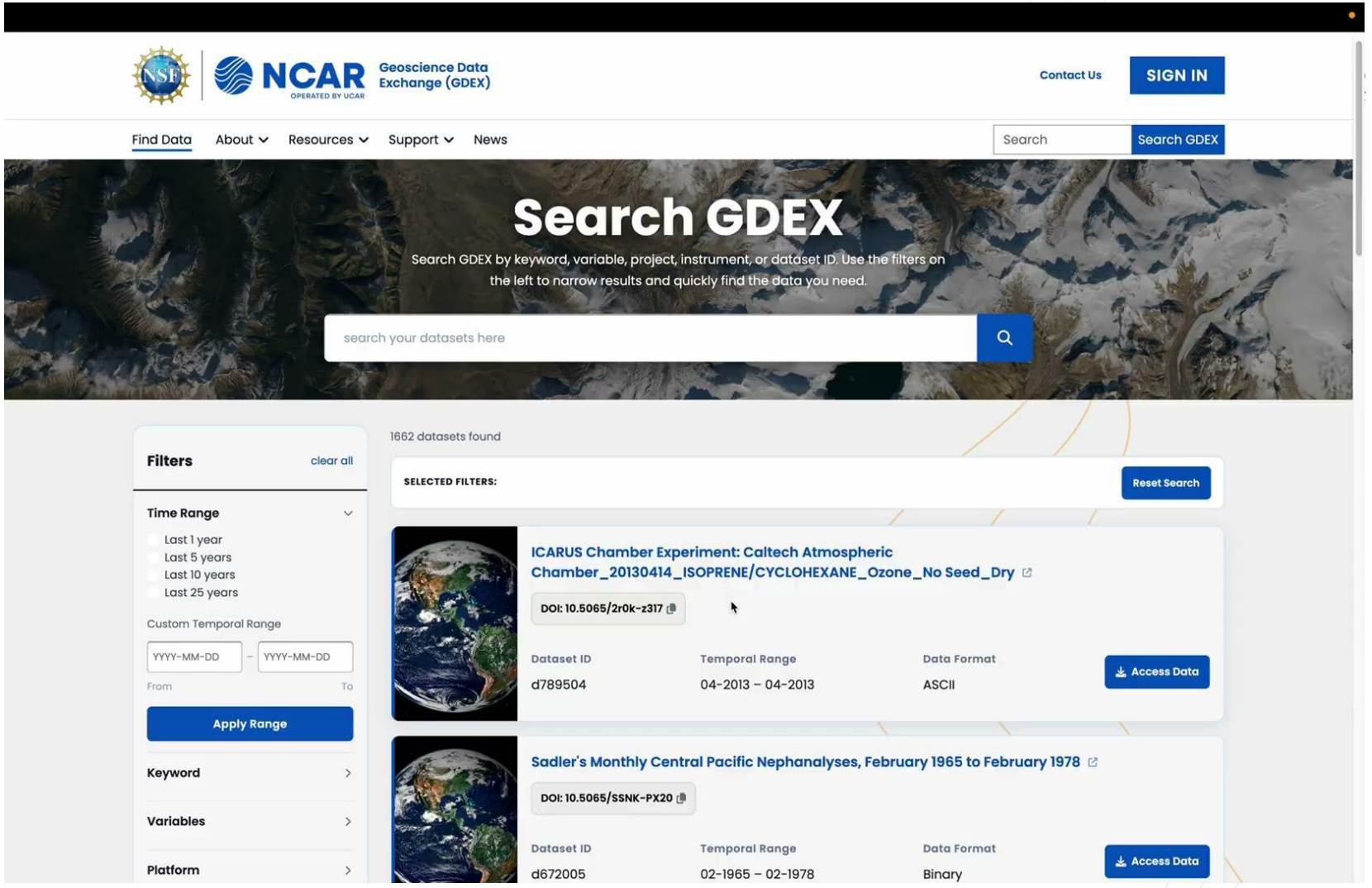
AI-ready datasets
Dataset prepared for AI/ML Workflow
Zarr datasets
Cloud-optimized array data



Original Search Page



New HomePage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Filters
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Last 1 year
Last 5 years
Last 10 years
Last 25 years
Custom Temporal Range
YYYY-MM-DD
YYYY-MM-DD
From
To
Apply Range
Keyword
Variables
Platform
1662 datasets found
SELECTED FILTERS:
Reset Search
ICARUS Chamber Experiment: Caltech Atmospheric Chamber_20130414_ISOPRENE/CYCLOHEXANE_Ozone_No Seed_Dry
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Dataset ID
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Temporal Range
04-2013 – 04-2013
Data Format
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Access Data
Sadler's Monthly Central Pacific Nephanalyses, February 1965 to February 1978
DOI: 10.5065/SSNK-PX20
Dataset ID
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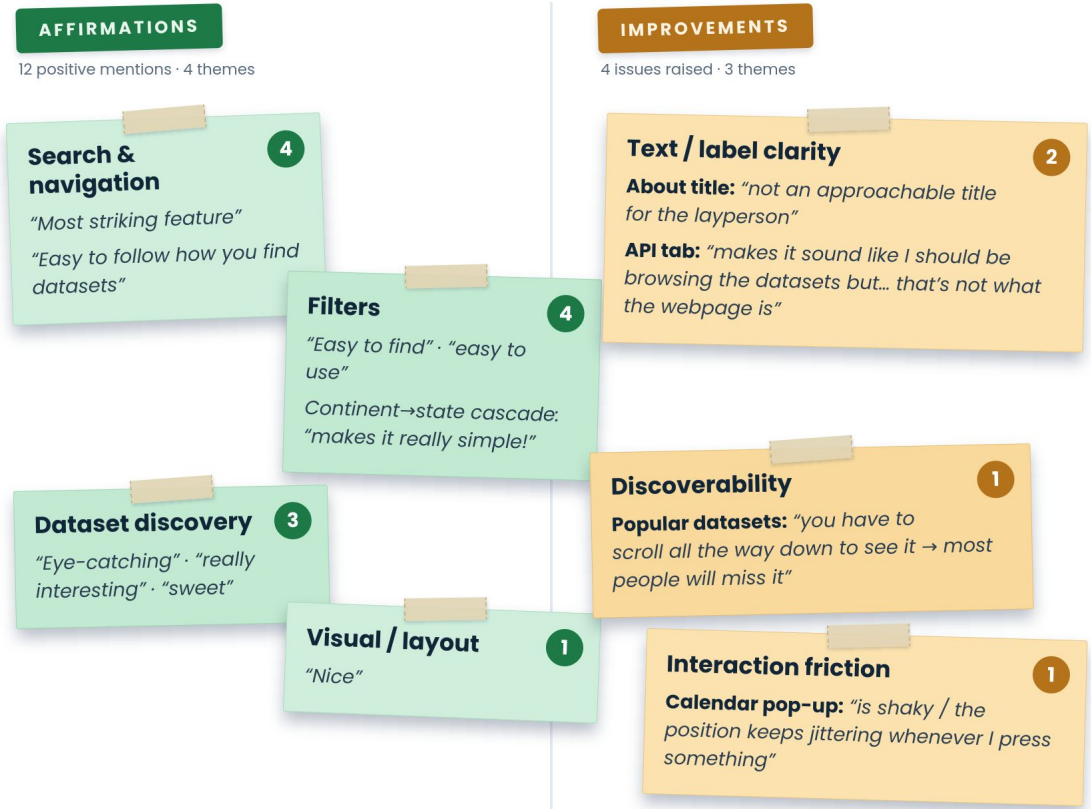
Temporal Range
02-1965 – 02-1978
Data Format
Binary
Access Data

Web Testing

Testing of New UX

What was evaluated?
Representative user tasks were performed on the redesigned homepage and search page to assess clarity, discoverability, and navigation confidence

- Participants reaction clustered by theme - In their own words



Disclaimer: this image was generated with Claude AI

Conclusion

Conclusion

This project traced where users struggle in GDEX and turned that evidence into targeted redesigns of the homepage and search experience.

Key Outcomes

- **Found:** Recurring friction in filters, dataset formats, metadata visibility, and location search
- **Fixed:** Clearer search, usable filters, confident navigation
- **Validated:** Strong positive feedback on the redesigned search, filters, and popular datasets
- **Next:** Surface popular datasets higher; smooth interactions like the calendar picker

Final Takeaway

- Users are able to navigate easily from homepage to Search Page to find their information

Summer Lessons and Acknowledgement

Lessons Learned

- Built and deployed web pages using the Django/Wagtail Python framework
- Applied usability testing methods to turn user feedback into concrete product improvements
- Strengthened collaboration skills by working closely with my mentors and fellow SIParCS interns
- Relating with people from diverse backgrounds and perspectives

Acknowledgements

- I thank God for the gift of life to be here
- SIParCS Program and CISL, for the tremendous opportunity to here and work on problems that affect real users
- My mentors — Tom, Leigh, Calie, Riley, and Nick — for their unwavering guidance and support
- The entire SIParCS cohort, and Virginia for their support and for participating in the usability testing
- And thank you all for listening

Thank You