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EPC-21-038 Draft Deliverables

Additional submitted attachment is included below.

EPC-21-038

Subtask 3.1 - Next Generation Web API

- https://r0e5qa3kxj.execute-api.us-west-2.amazonaws.com/docs
- https://2fxwkf3nc6.execute-api.us-west-2.amazonaws.com/docs

Subtask 3.2 - Memorandum on the Data Catalog

Data Catalog Overview

The Cal-Adapt: Data Explorer Data Catalog provides a central location for the data made available and visualized on the Cal-Adapt: Data Explorer. This data catalog contains climate information curated from the downscaled Fifth Assessment climate data (EPC-20-006) and synthesized by the Cal-Adapt: Analytics Engine (EPC-20-007). This catalog is then utilized to provide access to users who wish to download it (Data Download Tool) or utilize the initial two visualizations on the next generation of Cal-Adapt (Renewables Drought Visualizer, Climate and Wildfire Visualization)

Catalog Access

The CalAdapt-STAC web API provides interactive documentation showcasing all the available catalog endpoints for direct access, plus features for listing and searching the collections. Programmatic access is possible from any language capable of making an HTTP request and from the variety of solutions across the STAC ecosystem.

Structure

Leveraging the STAC specification allows for a well defined information hierarchy built from API endpoints with expressive search capabilities designed to refine large collections.

1. **Root Endpoint**
   - **URL:** `/`
   - **Method:** GET
   - **Description:** Returns a JSON object with links to the available API endpoints.
2. **Collections Endpoint**
   - **URL:** `/collections`
   - **Method:** GET
   - **Description:** Retrieves a list of all collections available in the STAC catalog.
3. **Collection Details Endpoint**
   - **URL:** `/collections/{collection_id}`
   - **Method:** GET
   - **Description:** Retrieves detailed information about a specific collection by its ID.
4. **Items Endpoint**

    - **URL:** `/items`
    - **Method:** GET
    - **Description:** Retrieves a list of all items in the STAC catalog.
5. **Item Details Endpoint**
    - **URL:** `/items/{item_id}`
    - **Method:** GET
    - **Description:** Retrieves detailed information about a specific item by its ID.
6. **Search Endpoint**
    - **URL:** `/search`
    - **Method:** POST
    - **Description:** Allows for searching items based on various parameters (e.g., bounding box, time range).

Current Data

Currently, the catalog has the following data

- LOCA2 data
    - *Downscaling method*: LOCA2
    - *Spatial subset*: County
    - *Temporal subset*:
        - Daily
        - Monthly average
    - *SSPs*:
        - Historical
        - 2.45
        - 3.70
        - 5.85
    - *GCMs*:
        - CESM2-LENS
        - CNRM-ESM2-1
        - EC-Earth3
        - EC-Earth3-Veg
        - FGOALS-g3
        - GFDL-ESM4
        - HadGEM3-GC31-LL
        - INM-CM5-0
        - IPSL-CM6A-LR
        - KACE-1-0-G
        - MIROC6
        - MPI-ESM1-2-HR
        - MRI-ESM2-0
        - TaiESM1
- Visualization foundational data
    - Solar data availability dataset (EPC-21-037)

        - A specific subset of the following data focused on solar drought information
    - and Wildfire datasets (EPC-20-007)
        - Cal-Adapt - Climate and Wildfire - Metrics - Crosswalk Memo

Appendix

The Recipient shall:

- Develop a new connected *Data Catalog*, to be documented in a *Memorandum on the Data Catalog*, which:
    - Connects new tools and visualizations developed in Task 4 with the data developed for California's Fifth Climate Change Assessment, Group 2 and stored in AWS S3 storage via the Cal-Adapt Analytics Engine (EPC-20-007).
    - Utilizes cloud-based data formatting of data products stored on AWS S3 storage (by EPC-20-007), which is less costly than current data storage usages, but will be faster to access than current data storage formatting, allowing tools to continue to be interactive and responsive.
    - Allows for incorporation of data that supported California's Fourth Climate Change Assessment, based on stakeholder requirements (Subtask 2.1).

Cal-Adapt - Climate and Wildfire - Metrics - Crosswalk Memo

Change in median annual # of days with FFWI value > 50

Calculation

- Use climakitae index; calculate the number of hours per day above threshold, sum per year. Take delta signal between 2degC WL and historical period (1981-2010).

Support stakeholder-requested metrics

- Fire season; Fire; Historic; Fire weather indices beyond KBDI

What is lacking

- Any level of precision regarding frequency, likelihood, or details of fire weather, fire generation potential, or nuance.
- Cannot show the likelihood of or uncertainty of this prediction.

Why this was chosen

- Provides a high-level understanding of the changes in the likelihood of fire in future scenarios compared to the past and present.
- Equation and code are available via climakitae.

Scientific rationale for choice

- FFWI is an operational fire weather index used by the National Weather Service and can be computed using 3 weather variables available to Cal-Adapt, whereas other fire indices require inputs that are not presently available via data catalog (either by variable or derived variable computation).

What's next

- Prioritize more specific fire-related indices, variables, and measures to provide a more nuanced view or better understanding of frequency, uncertainty, etc.

Mean annual change in extreme heat days

Calculation

- Calculate number of days in historical period at 98th percentile between April and October. Calculate the number of days in 2degC WL using the historical 98th percentile and take delta signal from the historical period (1981-2010).

Support stakeholder-requested metrics

- Days above a threshold; Extreme heat events; Hot extremes; Return frequency of extreme events; Daytime temperature

What is lacking

- The ability to understand how the extremes change in terms of specific extremes, the seasonality or duration of changes, or larger impacts of heat outside of the specific threshold for the "extreme" chosen.
- Cannot show the likelihood of or uncertainty of this prediction.

Why this was chosen

- Showcase the overall change in extreme heat going forward, allowing people to understand the general shape of the changing extremes.

Scientific rationale for choice

- 98th percentile is calculated per location, rather than a single threshold, highlighting nuances in climate conditions throughout the reporting area.

What's next

- Prioritize more specific heat-related indices, variables, and measures to provide a more nuanced view or better understanding of frequency, duration, uncertainty, etc.

Absolute change in 99th percentile 1-day accumulated precipitation

Calculate

- Remove snowfall from precipitation signal to capture rain signal, and clip lowest 0.1 mm to remove trace precipitation signal. Pool across models, calculate the 99th percentile. Take delta signal between 2degC WL and historical period (1981-2010).

Support stakeholder-requested metrics

- Distribution of extreme precip events; Max ppt; Extreme ppt events in both directions (low and high); Changes in overall precip patterns

What is lacking

- Ability to showcase length, frequency, or co-variability of precipitation increase with other factors.
- Cannot show the likelihood of or uncertainty of this prediction.

Why this was chosen

- This showcases the general shape of expected extreme precipitation in future scenarios, allowing people to understand where it's going to rain more, a lot more, less, a lot less, etc., for a model mean.

Scientific rationale for choice

- Highlights changes in in-land flooding event probabilities and locations.

What's next

- Prioritize more specific precipitation-related indices, variables, and measures to provide a more nuanced view or better understanding of frequency, custom event duration (e.g., 3-hour accumulated precipitation), uncertainty, etc.