CS160 Sec 03 Team 6

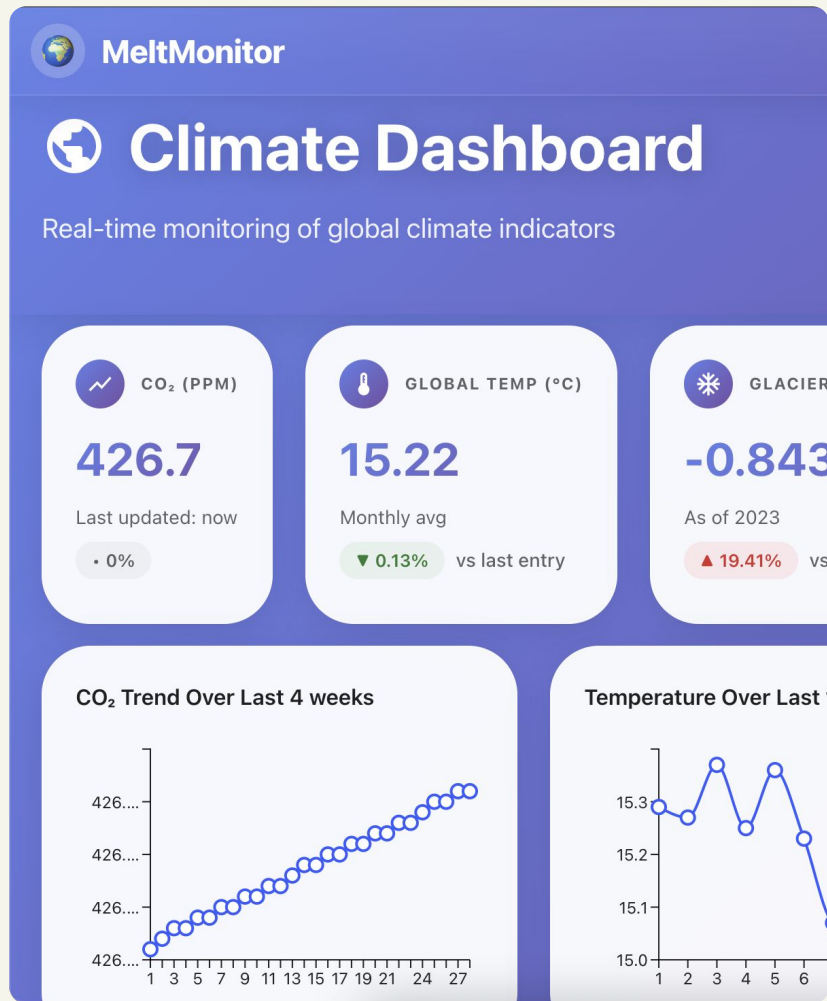# Melt Monitor

By Soham Bhowmick, Chance Kissel, Paul Lewis Marcos, Lwin Moe

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Meet the Team

Soham Bhowmick

Interactive Map Lead

Chance Kissel

Live Data Fetching Lead

Paul Lewis Marcos

Database Lead

Lwin Moe

UI/UX Lead

Objective + Target Audience

- We wanted to create a web application that would visualize the relationships between global fluctuations of **CO_2 levels**, **temperature**, and **glacier mass loss**.

- MeltMonitor is intended to be used as an educational tool for an easier understanding of how these components interact in regard to climate change.

Persona 1: Jack

Jack is an administrator for an automotive company. Jack wants to keep track of global CO_2 emissions growth for a presentation on moving the company towards green energy.

He needs an easy way to see updated daily values.

Persona 2: Laura

Laura is a school teacher who wants to have her students learn more about climate change.

She needs a place that makes it easy to understand how CO_2 and Temperature can affect Glacier health

Tech Stack

To bring this product together we used:

- Frontend
  - React 18
  - Vite 5
  - React Router 6
- UI Framework
  - Material UI 6
  - MUI X Charts
- Data Processing
  - Papa Parse
  - Custom ML algorithms
- Languages
  - JavaScript
  - HTML
  - CSS

- Maps
  - GeoJSON
  - SVG-based choropleth
- Styling
  - MUI theming
  - CSS-in-JS
  - Tailwind
- Build
  - Vite
  - ESLint
 - PostCSS

What Are Our Major Features?

- **Main dashboard**

- **Interactive global map Page**

- **Learning Center Page**

- **Profile Page**

- **Sources page**

Confidential

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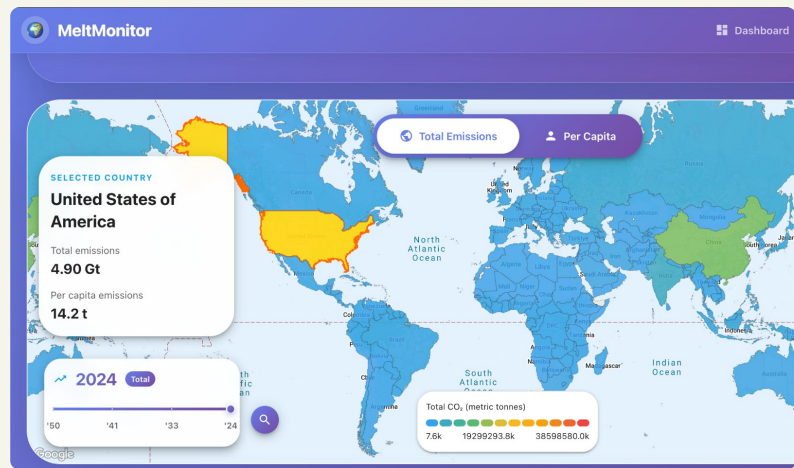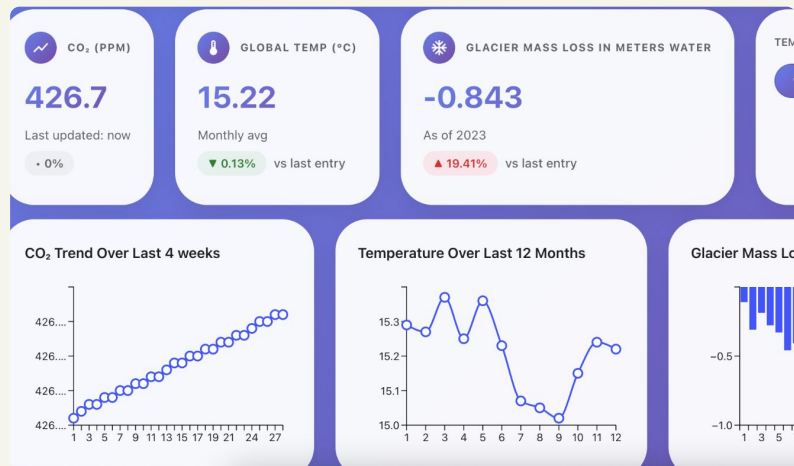
1. Main Dashboard

- **The main dashboard consists**:
  - **CO$_2$** in Parts Per Million (PPM) (Statistic + Trend Chart)
  - **Temp** in C° or F° (Statistic + Trend Chart)
  - **Glacier Mass Loss** in meters water equivalent (m.w.e) (Statistic + Trend Chart)
  - **Unit Toggle**: Convert between C° or F°
  - **Climate Fact**: Daily AI generated climate fact
  - **Quick Tips**: AI generated tips about the application
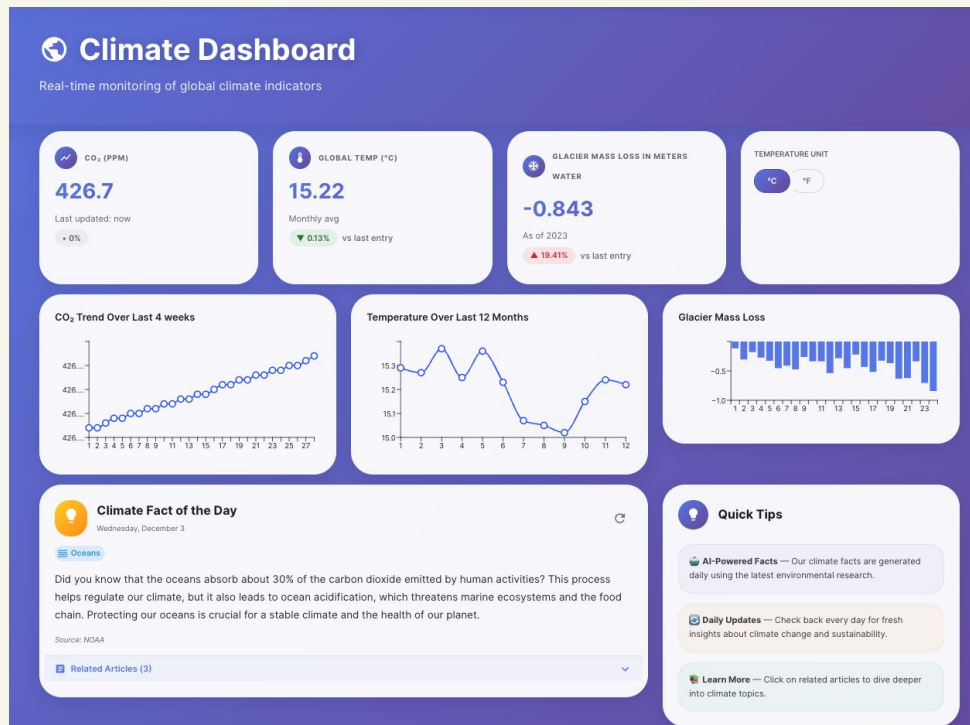
2. Interactive Global Map + ML Forecasting

- **Interactive Map**
  - **What It Does:**
    - Visualizes CO_2 emissions for 258 countries (1949-2024).
    - Two metrics: Total emissions (Gt) or per capita (t/person).
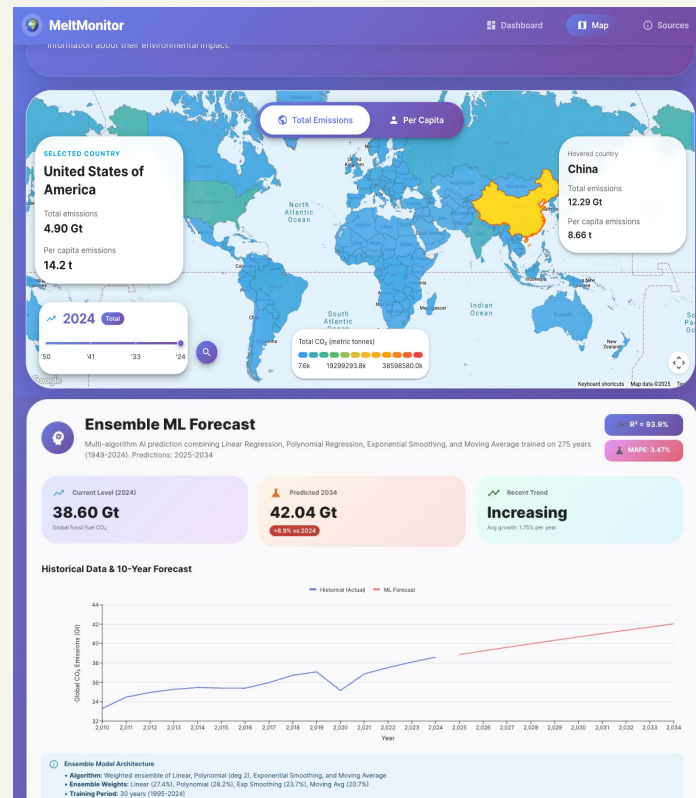- **ML Forecasting**
  - **What It Does:**
    - Predicts global CO_2 emissions for the next 10 years (2025-2034)
    - Current: 38.60 Gt → Predicted 2034: 42.04 Gt (+8.9%)
    - Uses 4 ML algorithms combined: Linear, Polynomial, Exponential Smoothing, Moving Average
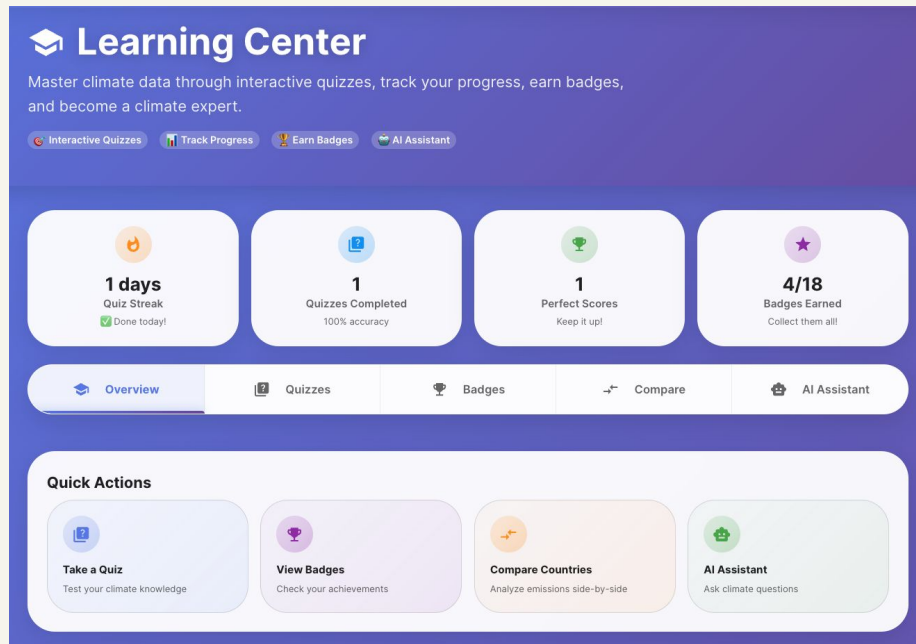
3. Learning Center

- **Personalized Components**
  - ○ **Streaks, Quizzes, Scores, Badge Progress**

- **Tabs**
  - ○ **Quizzes**
  - ○ **Compare: stats for different counties**
  - ○ **AI Assistant: to help further assist learning needs**

- **Quick Actions**
 - ○ **Faster navigation around the site**

4. User Profile

- **What User Profile consists of:**
  - Overview
  - Saved Views
  - Settings

- **Overview**
  - Streak Quiz
  - Home Country
  - Quick Climate Fact

- **Quick Actions**
  - What Does It Provide:
    - For getting around
    - Map, dashboard, sources
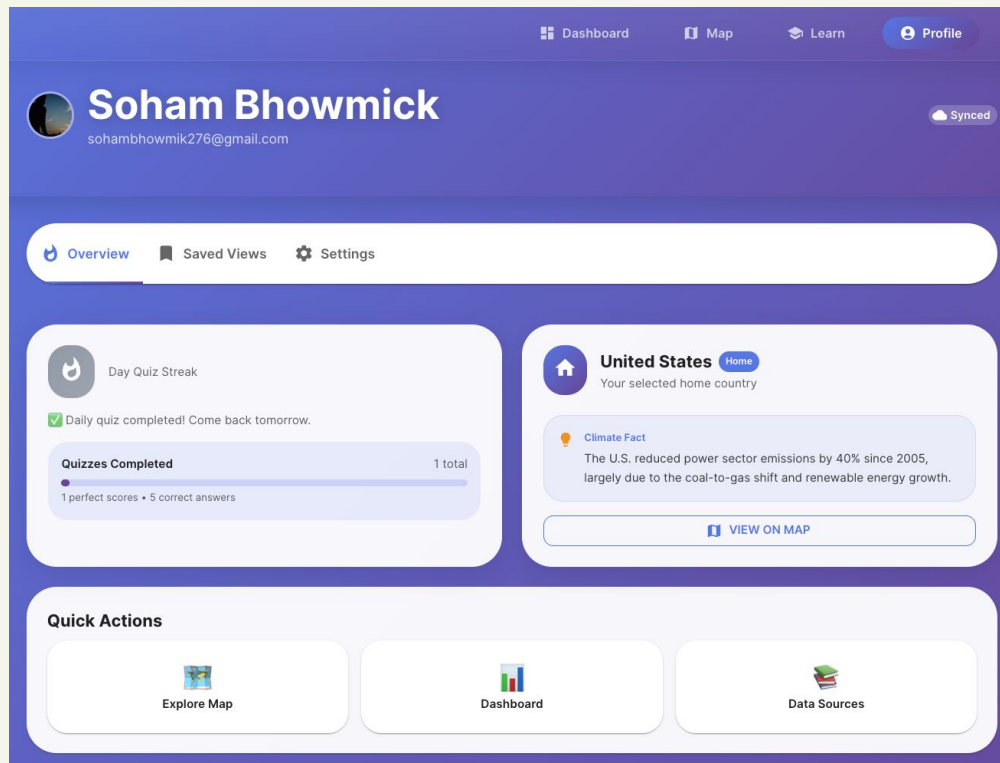
5. Sources Page

- **What Is It For**: The sources page located at the far right of the navigation bar is to give proper citation to the data sources we are pulling from.

- **What Does It Provide**: It includes embedded links to each resource, allowing users to visit each native site to learn more about individual statistics.
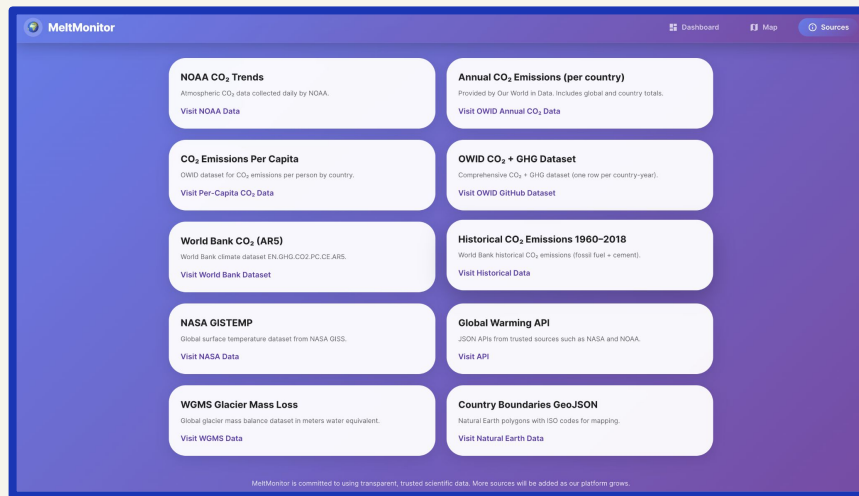
DEMO

What Problems Did We Run Into? & Future Improvements

Live Fetching for Glacier Data

We could not find any credible sources that regularly update an API for glacier mass loss. This had to be changed to reading from a periodically updated CSV.

Visualization on Data

It took us a while to settle on how our data would look and on what components we would use.

Workflow

Because of vastly different schedules, team coordination would be a little tough. Keeping a consistent design took time.

Mobile Platform

In the future we hope to move this project in the mobile space to further have a bigger impact.

Climate Statistics

In the future we could add additional data sets like sea-level rise and methane emissions.

Educational Modules

By adding explanations and more interactive lessons, we hope to strengthen Melt Monitor as a teaching tool.

Q & A