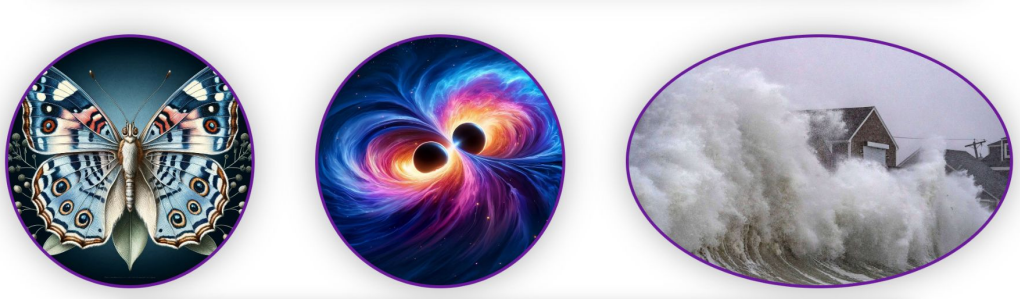
UW A3D3 ML Hackathon



NSF HDR ML Challenge

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Agenda

1. Introduction to three challenges
   a. Butterfly Hybrid Detection
   b. iHARP HDR Anomaly Challenge (Sea level anomaly detection)
   c. Detecting Anomalous Gravitational Wave

2. Submission Platform

3. Example submission with Detecting Anomalous Gravitational Wave

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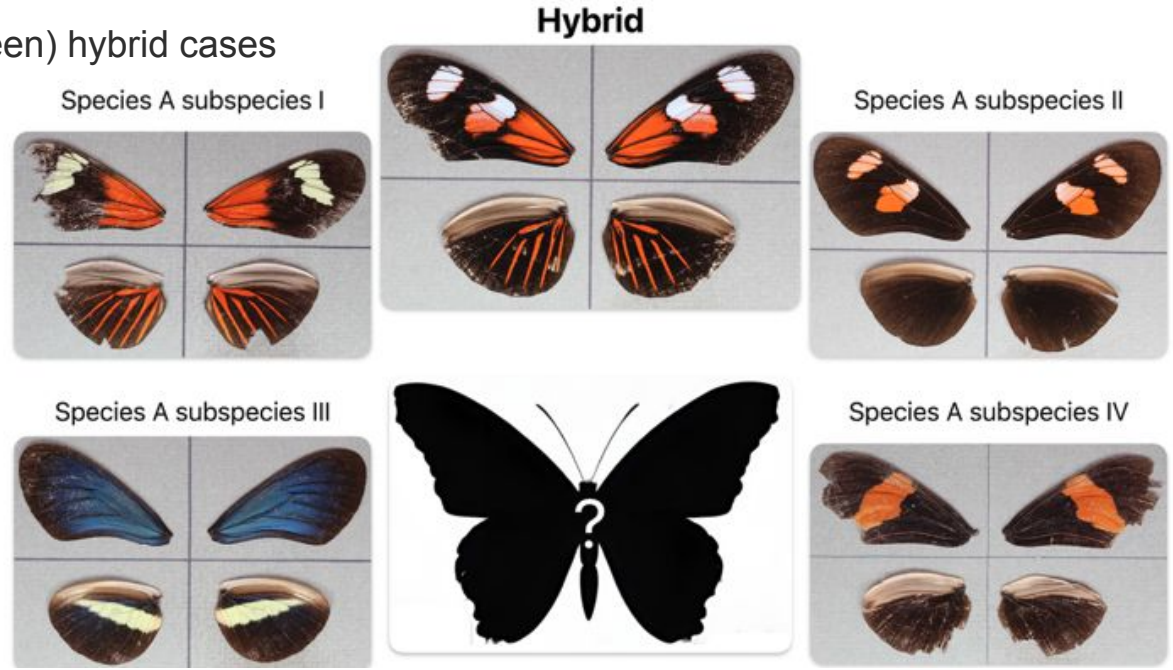
Butterfly Hybrid Detection

Automatically identify (unseen) hybrid cases



Adapted from slides: Elizabeth G. Campolongo and The Imageomics ML Challenge Team

Training Data

~2200 images of Species A:

- Multiple subspecies.
- Selected signal hybrids of two subspecies.

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Dev & Test Data Description

Includes:
- All Species A subspecies.
- Signal hybrids from training data.

Further introduces:
- Other Species A hybrids (non-signal).
- Species B: Mimics of Species A signal hybrid parents (& their hybrids).

The numbers:
- Validation Data (Dev): ~1100 images
- Test Data: ~2200 images

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Butterfly Hybrid Detection

Among Species A & B, can your algorithm find…

- Species A signal hybrids?
- Species A non signal hybrids?
- Species B hybrids (mimics of Species A signal hybrids)?

Competition Page: https://www.codabench.org/competitions/3764/
Git Repo: https://github.com/Imageomics/HDR-anomaly-challenge/tree/main?tab=readme-ov-file
More dataset description:
https://github.com/Imageomics/HDR-anomaly-challenge/blob/main/pages/overview.md
Start kit: https://github.com/Imageomics/HDR-anomaly-challenge/blob/main/pages/starting_kit.md

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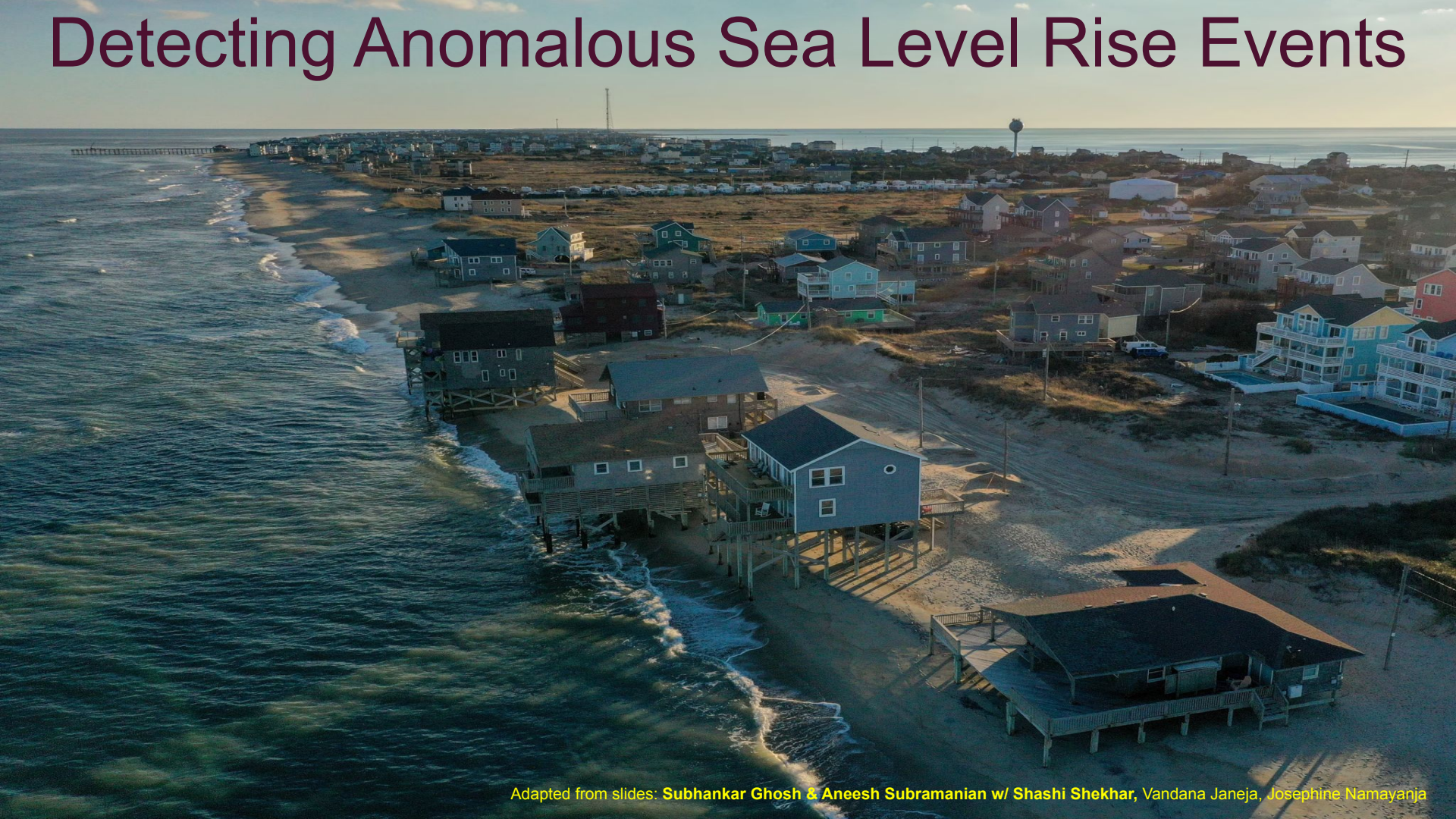
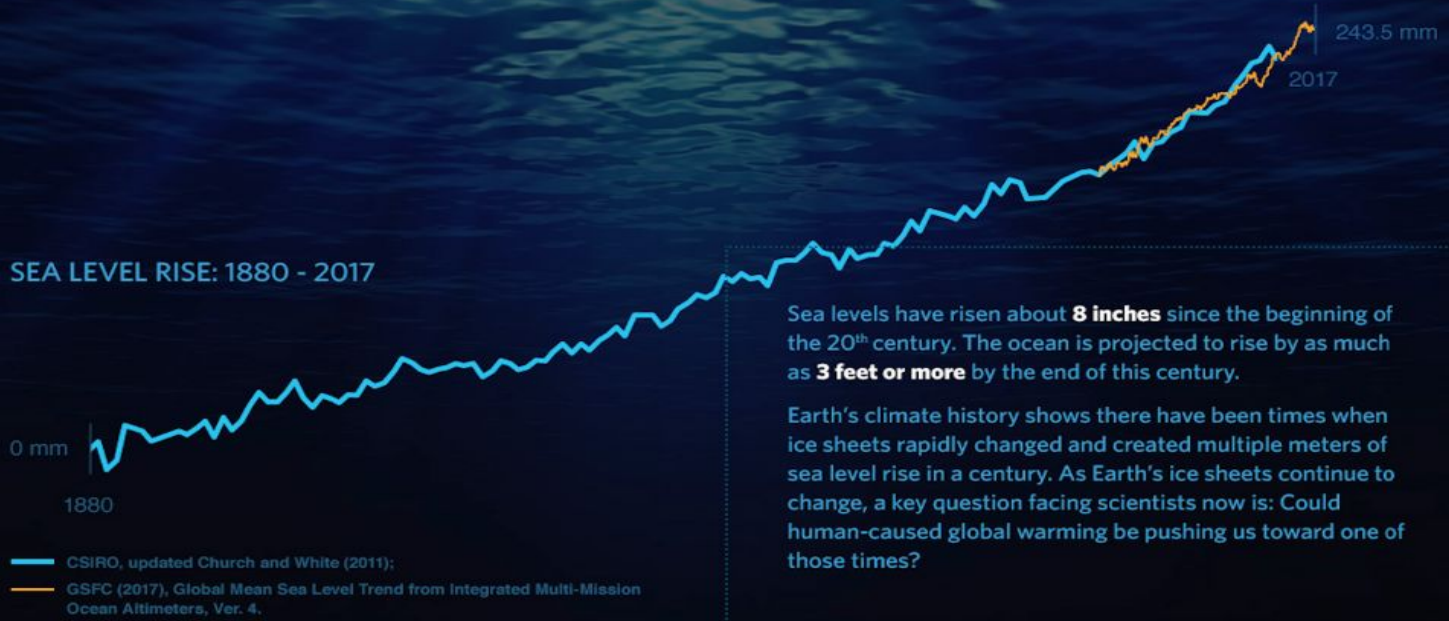
Detecting Anomalous Sea Level Rise Events



Adapted from slides: **Subhankar Ghosh & Aneesh Subramanian w/ Shashi Shekhar,** Vandana Janeja, Josephine Namayanja

AS OUR OCEAN WARMS, SEA LEVEL RISES

We know seas are rising and we know why. The urgent questions are by how much and how quickly.

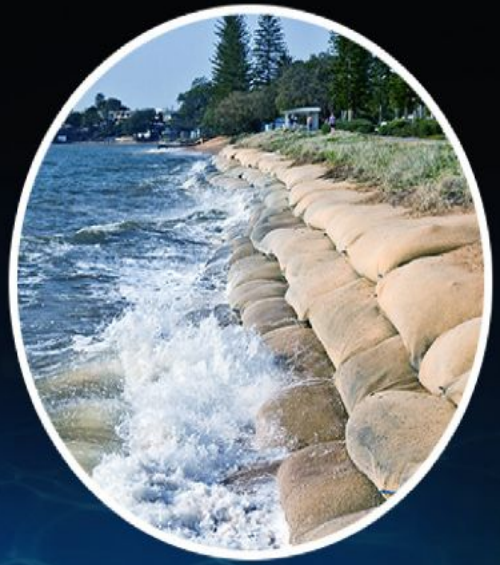


Sea levels have risen about **8 inches** since the beginning of the 20th century. The ocean is projected to rise by as much as **3 feet or more** by the end of this century.

Earth's climate history shows there have been times when ice sheets rapidly changed and created multiple meters of sea level rise in a century. As Earth's ice sheets continue to change, a key question facing scientists now is: Could human-caused global warming be pushing us toward one of those times?

SEA LEVEL RISE AFFECTS US ALL

More than **160 million people** live along coasts in the U.S., about half the nation's population. **Eleven of the world's 15 largest cities** lie along shores, including New York City. Sea level rise means the ocean will gradually inundate low-lying areas, and storms like hurricanes, bolstered by even higher seas, will extend their reach inland. All of society bears the burden for storm damage and those costs are expected to rise: Annual losses from flooding in the world's biggest coastal cities could rise from about **$6 billion a year** today to **$1 trillion a year** by 2050.

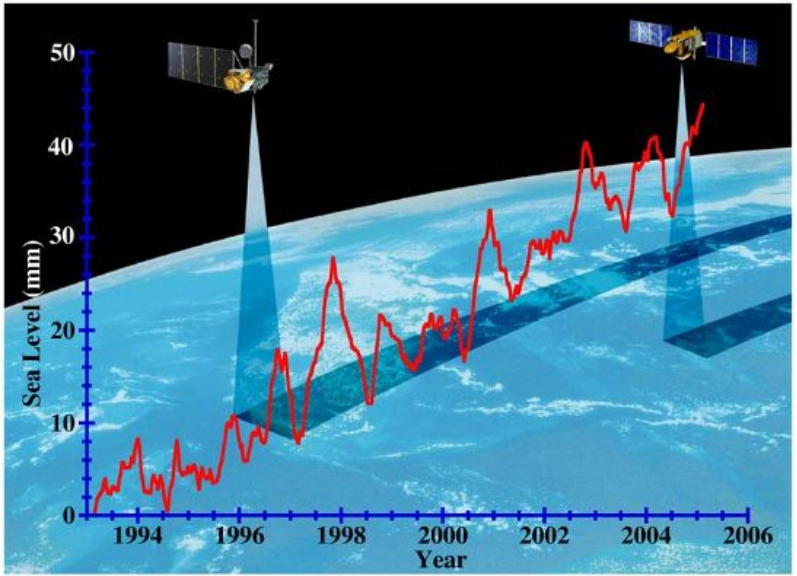


Sea Level Rise Prediction

Continual Tracking

- Motivation: understand **how** and **why** sea level is changing – > plans for adaptation

- Tools: Monitor and understand individual factors contributing to sea level rise
  - Satellites to track global ocean level and ice sheet thickness



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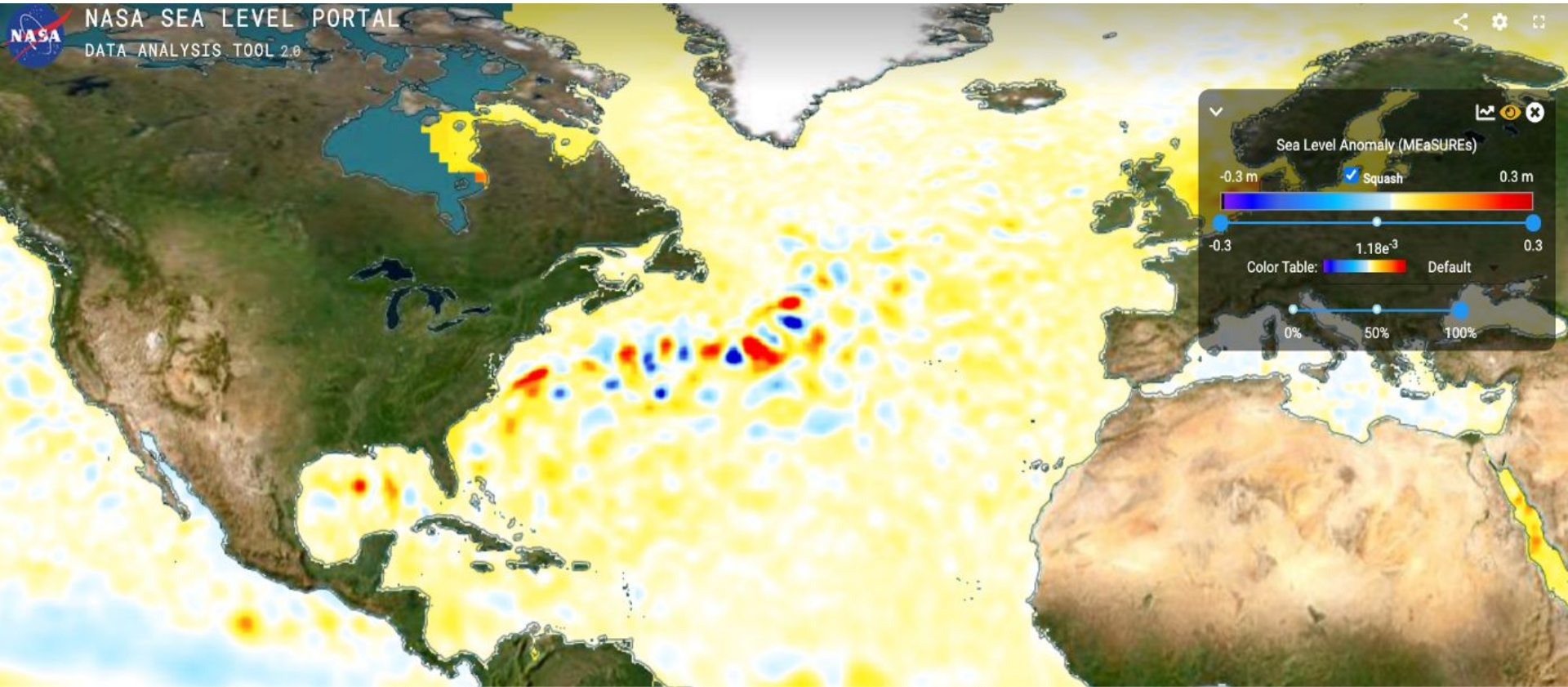
Detect anomalous flooding events from satellite sea level maps



Challenge

Goal: Detect **anomalous flooding events** along the US East Coast with the **maps of sea level** over the North Atlantic.

Training data

Maps of Sea Level: Satellite sea level anomaly data over the North Atlantic for the past 30 years.

Labeled Anomalous Flood: Dates of anomalous flooding along the US East Coast stations for the past 30 years.

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Agenda

1. Introduction to three challenges
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   c. Detecting Anomalous Gravitational Wave

2. **Submission Platform**

3. **Example submission with Detecting Anomalous Gravitational Wave**

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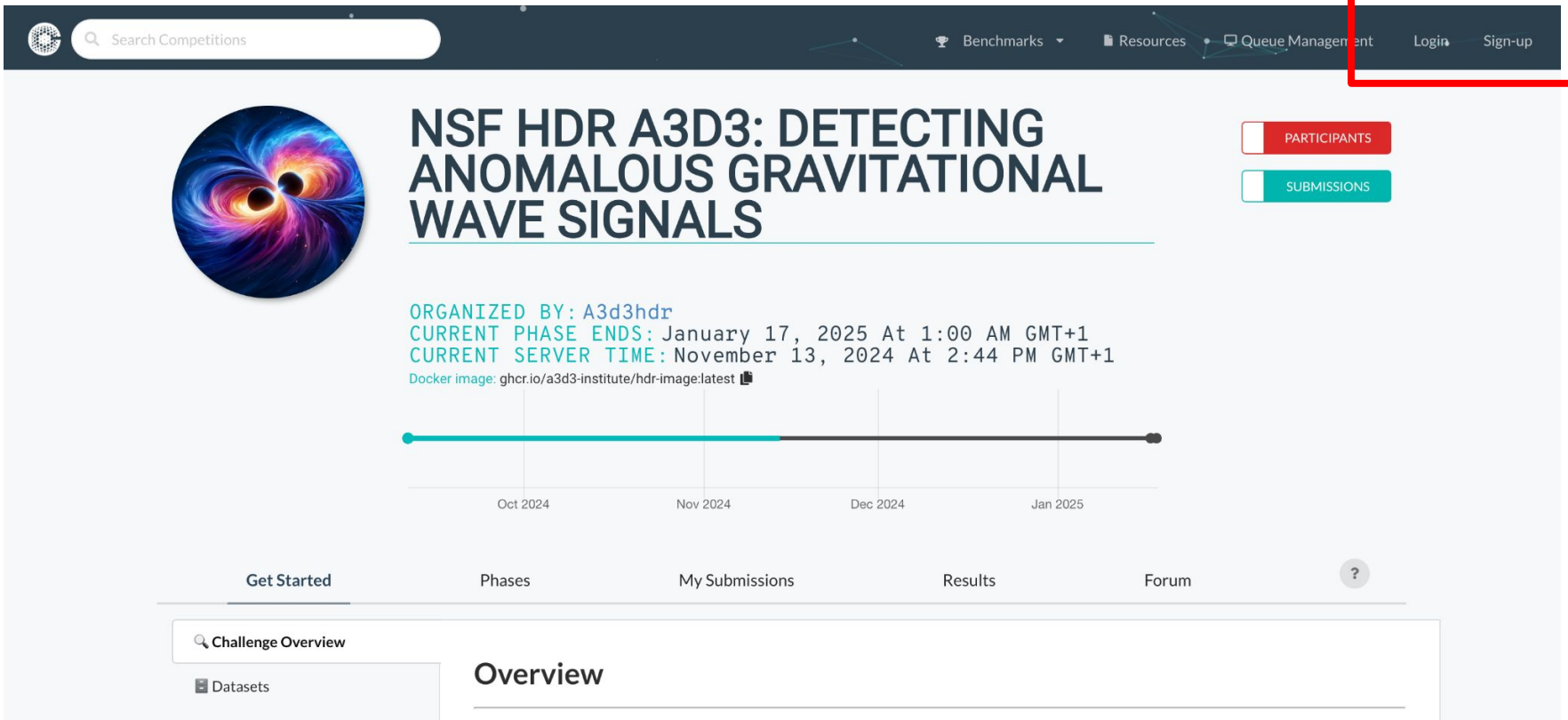
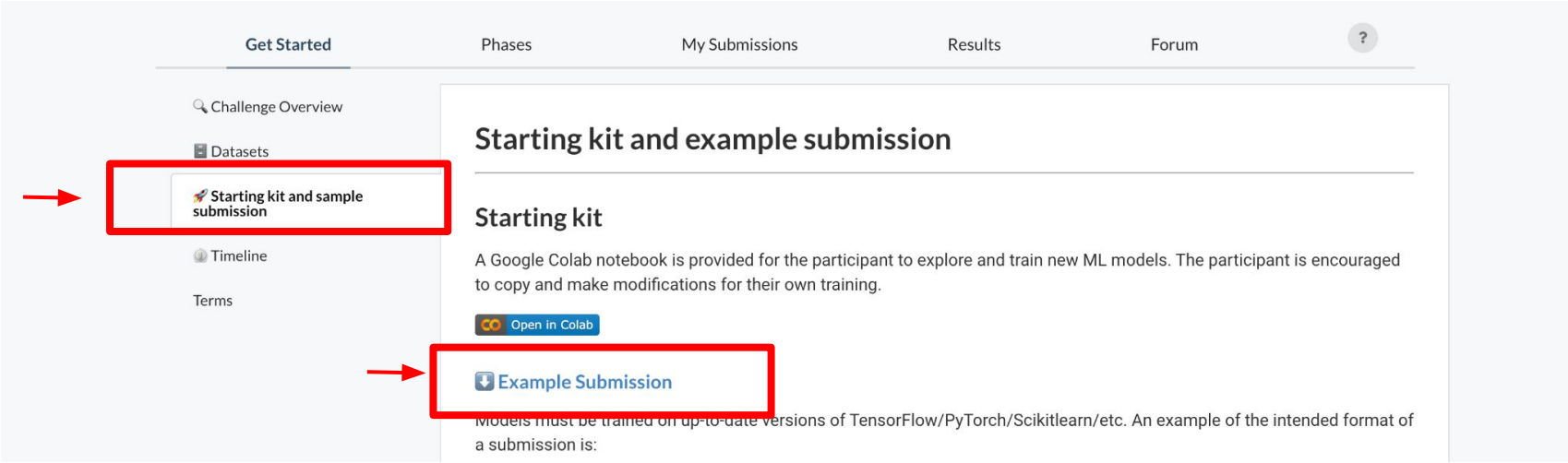
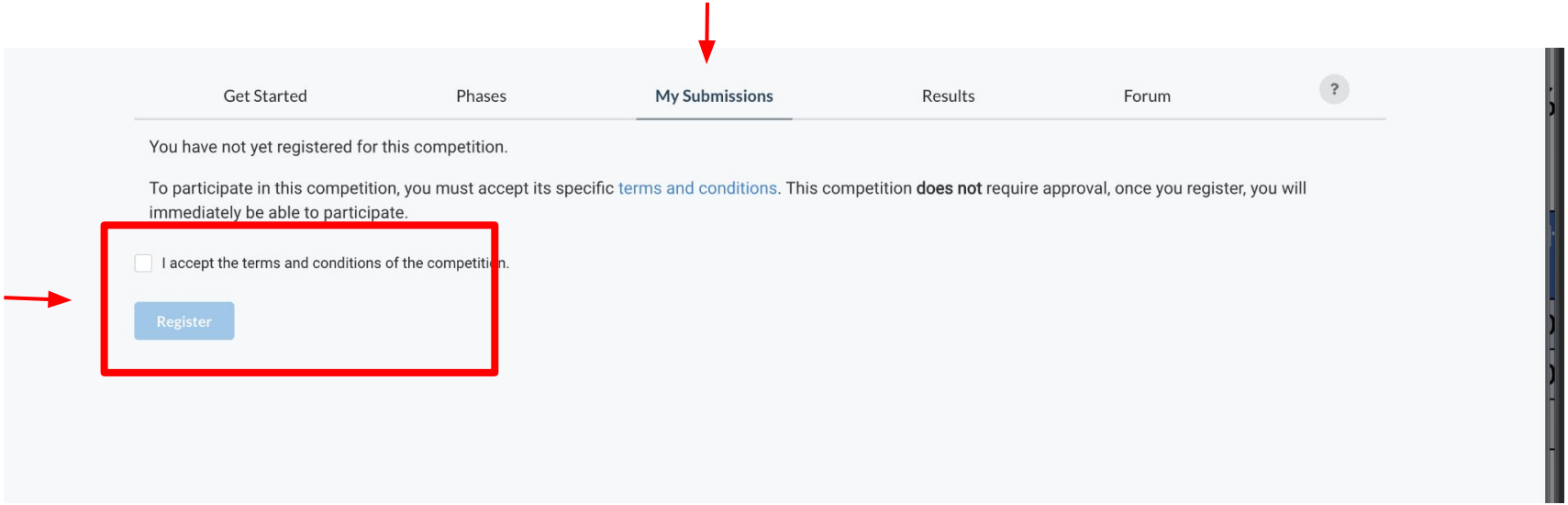
1. Login or Create Account on Codabench



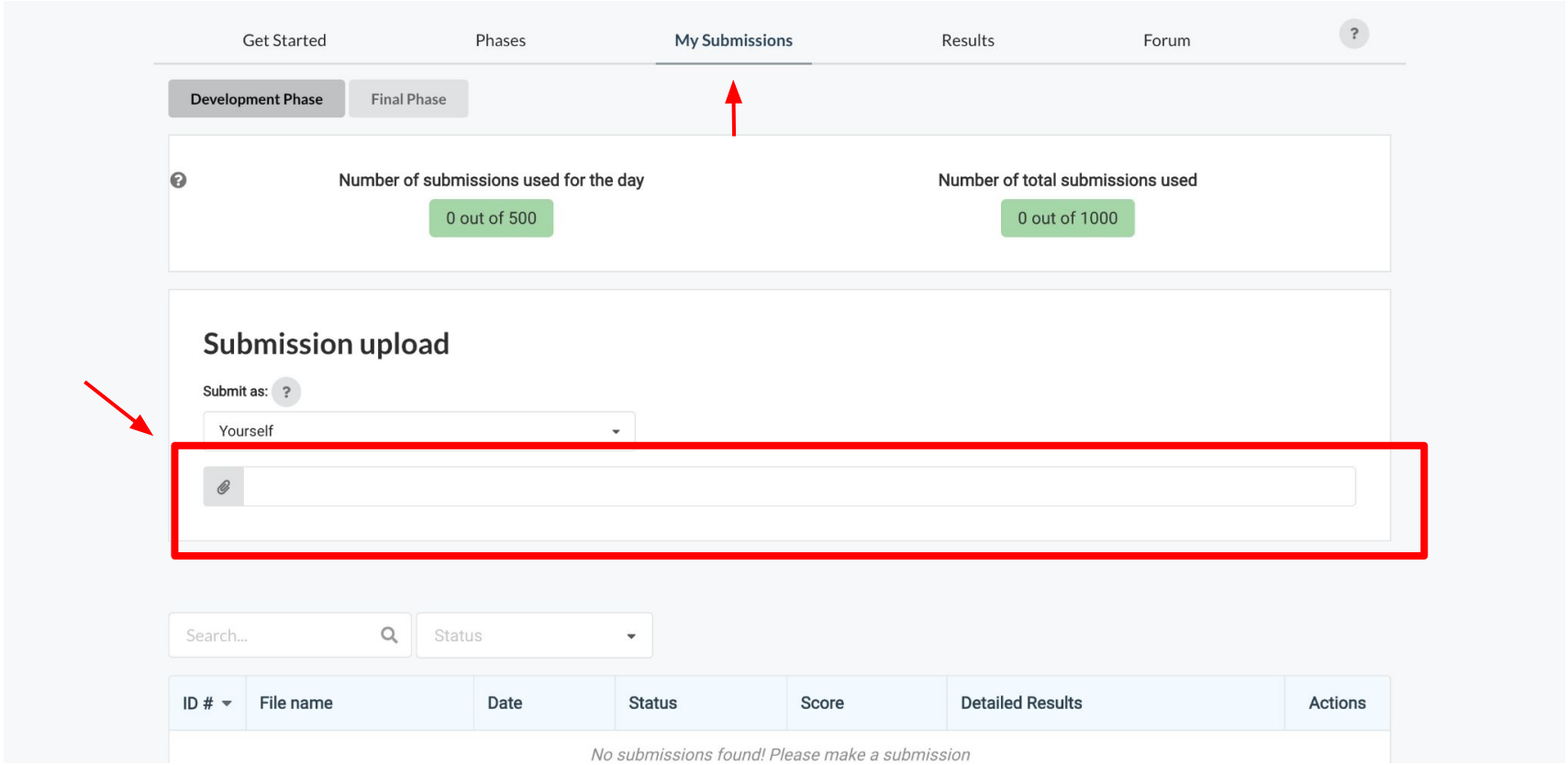
2. Download Dummy Submission



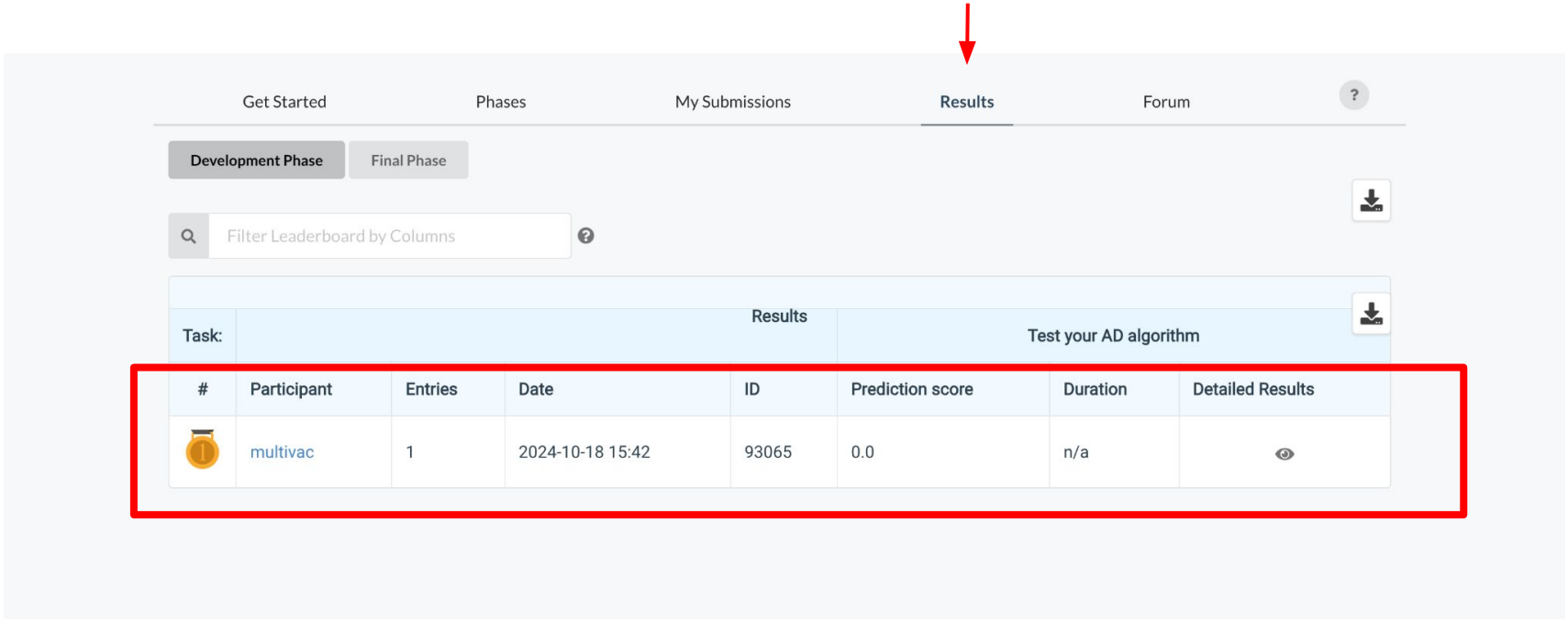
3. Register in the Competition



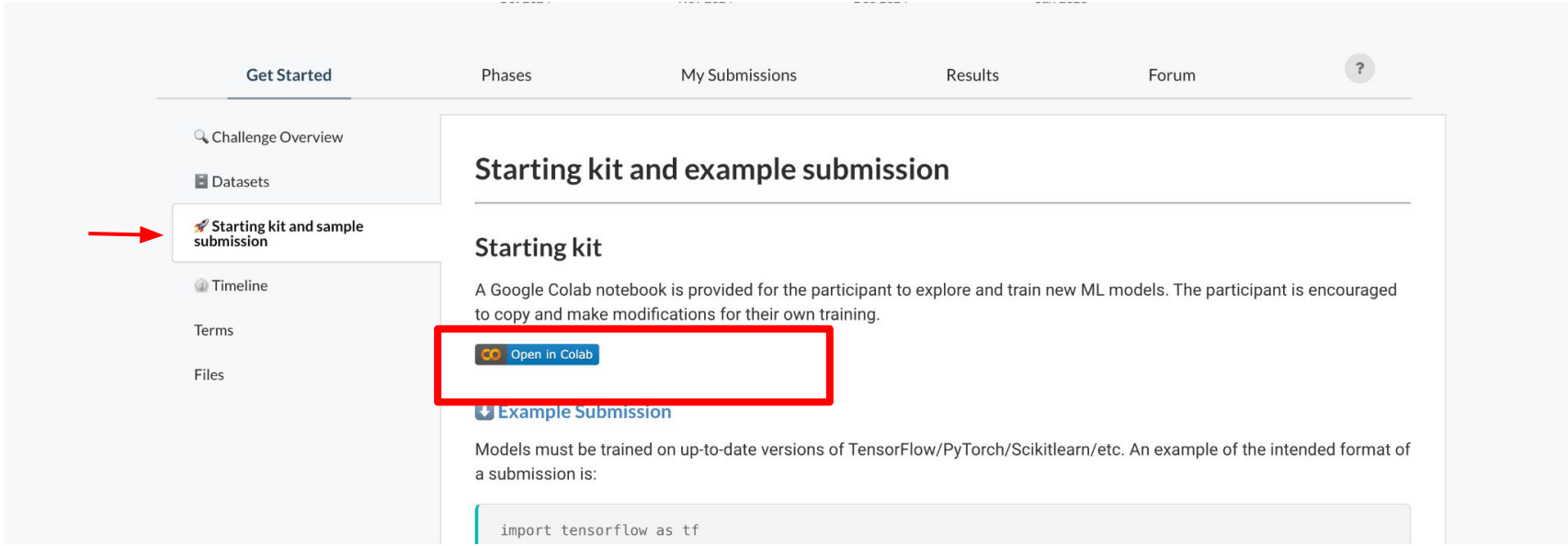
4. Submit Dummy Submission



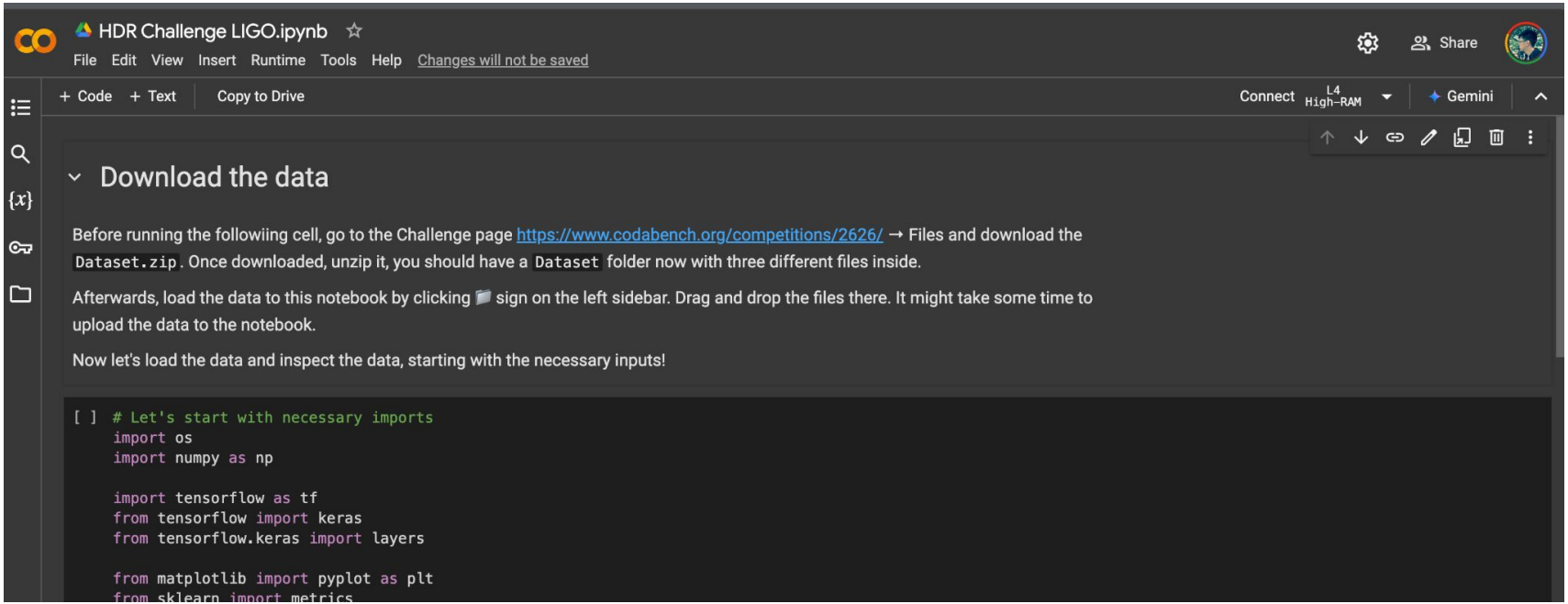
5. Check results in the leaderboard



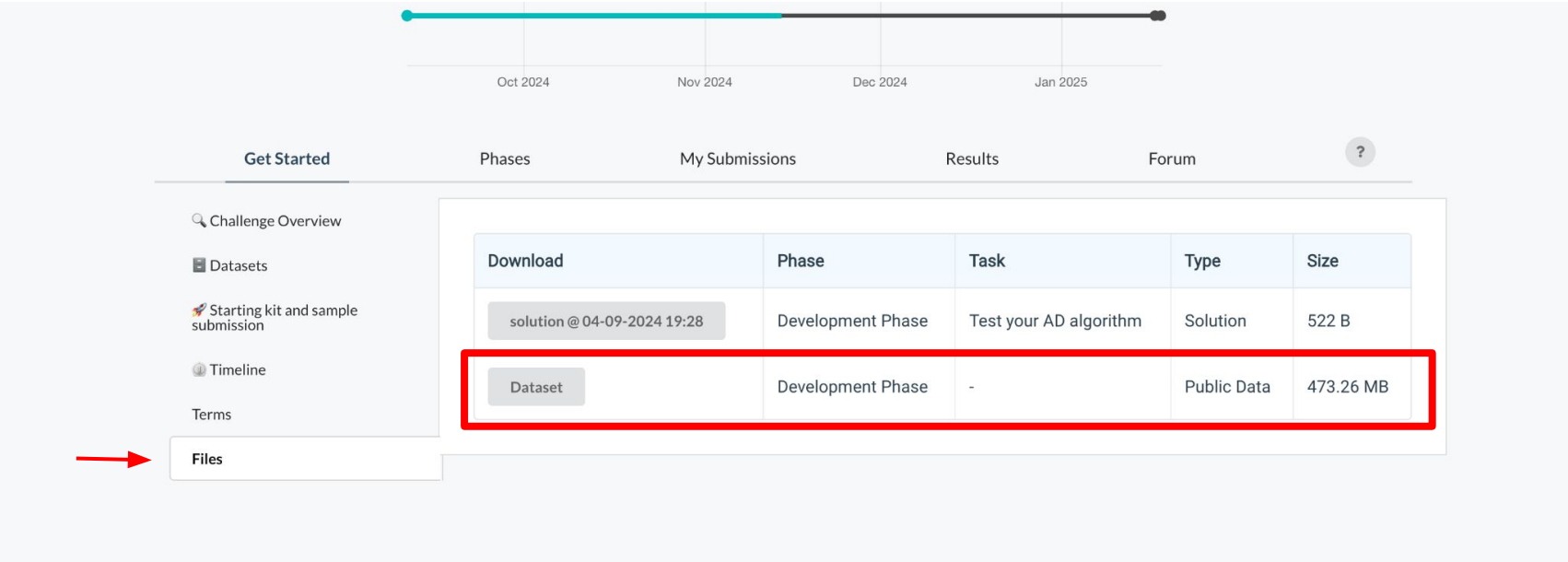
6. Check out the starting kit



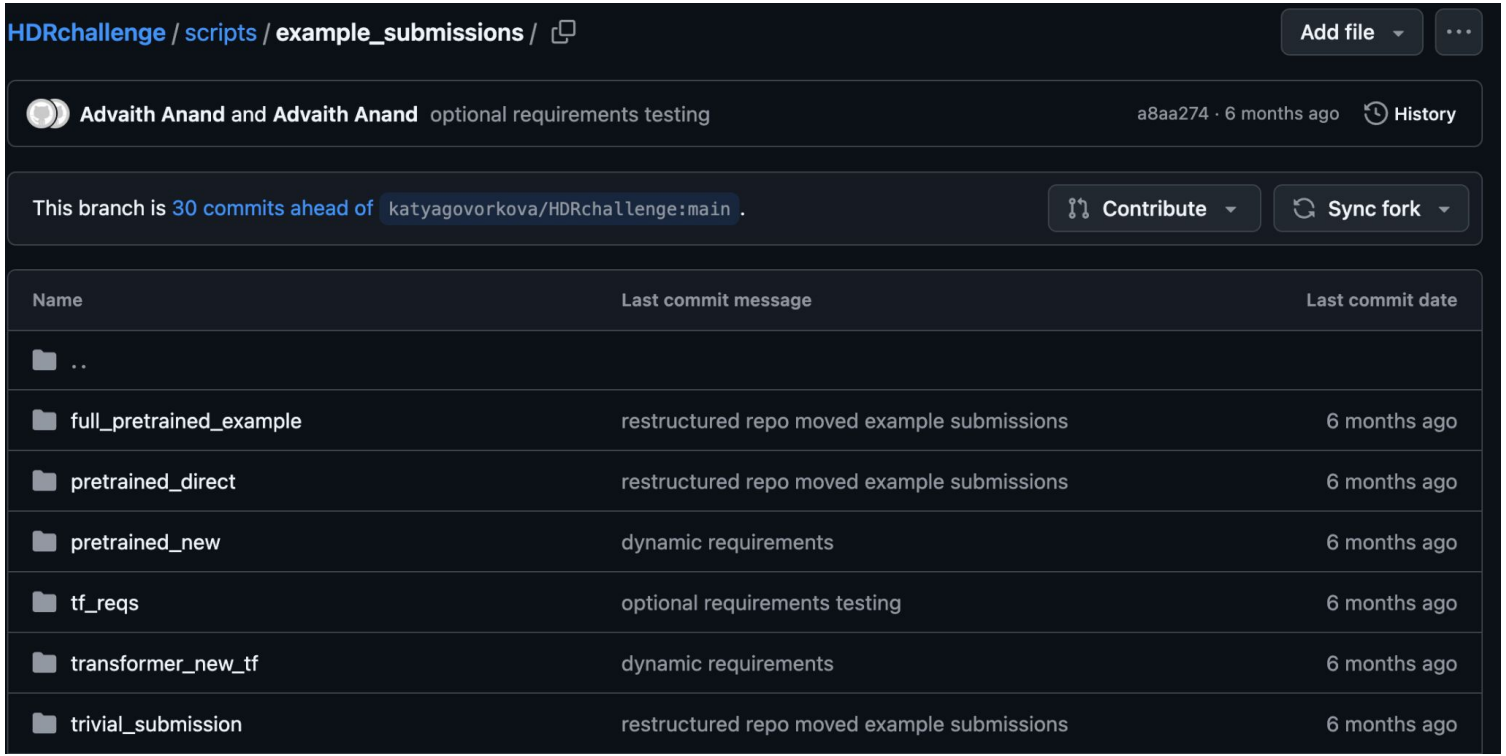
7. Starting kit as a Google Colab Notebook



8. Get Public Data



9. Checkout example submissions



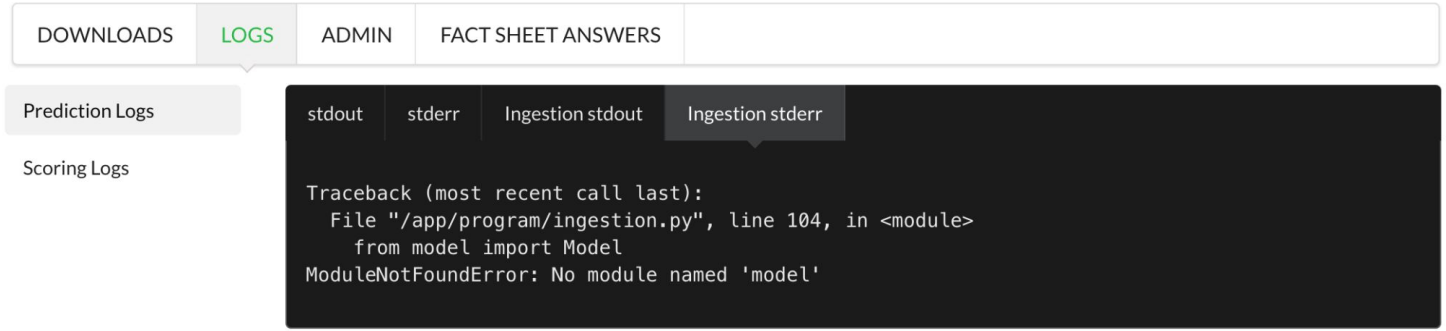
11. Code submission structure [Example]

```python
import tensorflow as tf
import json
import os

class Model:
    def __init__(self):
        # You could include a constructor to initialize your model here, but all calls will be made to the load meth
        self.clf = None

    def predict(self, X):
        # This method should accept an input of any size (of the given input format) and return predictions appropri
        preds = self.clf.predict(X)
        print(preds)
        return preds

    def load(self):
        # This method should load your pretrained model from wherever you have it saved

        with open(os.path.join(os.path.dirname(__file__), 'config.json'), 'r') as file:
            for line in file:
                self.clf = tf.keras.models.model_from_json(line)
        self.clf.load_weights(os.path.join(os.path.dirname(__file__), 'model.weights.h5'))
```

[*] Follow the example to load your model. Avoid hard-coded path to model weight

Common issue

[!!] Do not zip the whole folder. ONLY select the model.py and relevant weight files to make the tarball



If you see the above error, mostly likely you zip the whole folder when making the tarball

Submission Links

Butterfly: https://www.codabench.org/competitions/3764/
Gravitational Wave: https://www.codabench.org/competitions/2626/
Sea Level: https://www.codabench.org/competitions/3223/

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