Task:

1. Generate flood extent of AOI using the GFM algorithm
2. Result from 1 as an input to task 2…. determining wetland extent

GFM algorithm  
<https://docs.openeo.cloud/usecases/gfm/#output-layers-used-in-openeo>

<https://extwiki.eodc.eu/GFM/PUM/Products>

<https://global-flood.emergency.copernicus.eu/technical-information/glofas-gfm/>

<https://github.com/eodcgmbh/openeo-examples/blob/master/UCs/UC11.ipynb>

<https://extwiki.eodc.eu/GFM/PDD/GFMoutputLayers>

<https://docs.eodc.eu/tutorials/download_gfm_python.html>

<https://docs.eodc.eu/tutorials/gfm_maximum_flood_extent_dask.html>

GFM- global flood monitoring algorithm

Issues:

1. Access to the cloud service an issue to run multiple jobs
2. If in virtual machine can use eodc stac to access ensemble data and then modularize code to reduce over time per year

To do:

1. Clean the stac code to have it load the data into a virtual machine (archive data there) and then call it to reduce it thus having flood extent. <https://mobaxterm.mobatek.net/>
2. Modularize properly code to reduce over time (check repos )

Wetland extent

To do:

1. Read the code and understand it
2. Download necessary data
   1. NDVI – standard deviation and oscillation to get variables for random forest

July 1-2 2025

Tasks

1. Understand teh GFM alorithm
2. Try to implement the algorithm
3. Automate the process esp for a long-time range i.e. 2015/2018 to 2025

Challenges:

1. Using openeo computing is limited (using student credentials) allows only one job at a time.
2. Found the eodc stac however requires a lot of storage for the gfm products as well as the computation of reducing over the dimension time

July 3 2025

Tasks

1. Looking over Julians work on wetland extent notebook: wetland GEE

Notes:

 **Standard deviation (SD) of NDVI** over time means:  
For each pixel, calculate how much the NDVI values vary (scatter) around the mean NDVI during the time period (e.g., 2018–2025).

* High SD = pixel with high vegetation variability (e.g., seasonal changes, crops, wetlands that dry/flood)
* Low SD = pixel with stable vegetation cover (e.g., permanent forest, urban areas)

 **Oscillation** basically refers to **temporal variability** or **periodic fluctuation** in NDVI (or any index). It means tracking how NDVI rises and falls over time, capturing seasonality.

* This could be quantified as the difference between max and min NDVI (range) or more advanced time series metrics.
* Wetlands often show strong seasonal oscillations due to wet/dry cycles.

| **Feature** | **Description** |
| --- | --- |
| NDVI\_mean | Average vegetation greenness |
| NDVI\_std | Vegetation variability |
| NDVI\_range | Vegetation oscillation |
| NDWI\_min | Water index temporal stats |
| S1\_VV\_min | SAR backscatter stats |
| S1\_VH\_min | SAR backscatter stats |
| DEM | Elevation |
| LST | Land Surface Temperature |

 **VV (Vertical transmit, Vertical receive)**: More sensitive to surface roughness and open water. Often lower backscatter in calm water bodies.

 **VH (Vertical transmit, Horizontal receive)**: More sensitive to vegetation structure and volume scattering (e.g., flooded vegetation, wetlands).

 **Together**: They help differentiate between open water, vegetated wetlands, dry land, and built-up areas more accurately.

EVI – Enhanced vegetation index

We try this sans NDVI and then with NDVI

TWI – Topographic Wetness Index

Repo readme  
# ZFL Summer Internship Projects - [Your Name]

This repository serves as a comprehensive collection of projects, reports, code, outputs, and relevant data (where permissible) undertaken during my summer internship at \*\*[ZFL](https://www.zfl.uni-bonn.de/)\*\*.

\*\*Internship Period:\*\* July 2025 – August 2025

## Supervisors

\* \*\*[Michael Schmidt](https://www.zfl.uni-bonn.de/about/team)\*\*

\* \*\*[Victor Korir](https://www.zfl.uni-bonn.de/about/team)\*\*

## Project Overview

During my internship, I had the opportunity to contribute to the [WetlandHealth4UNgolas](https://www.zfl.uni-bonn.de/research/projects/wetlandhealth) project where

various initiatives, focusing primarily on [mention 1-2 key areas or technologies, e.g., "data analysis and machine learning applications," "software development for logistics optimization," "sensor data processing"]. This repository aims to document my contributions, learning, and outcomes from these projects.

## Projects

Below is a list of the projects I worked on, with links to their dedicated directories and brief descriptions. Each project directory will contain specific details such as:

\* \*\*`README.md`\*\*: Project-specific details, objectives, methodologies, and key findings.

\* \*\*`code/`\*\*: All source code, scripts, and notebooks.

\* \*\*`reports/`\*\*: Detailed project reports, technical documentation, and presentations.

\* \*\*`outputs/`\*\*: Generated results, visualizations, models, or processed files.

\* \*\*`data/`\*\*: Datasets used (if allowed and sanitized/anonymized as necessary).

### 1. [Wetland delineation]

\* \*\*Description:\*\* [Classify the wetland boundary?]

\* \*\*Key Technologies/Skills Used:\*\* [e.g., Python, Random Forest]

\* \*\*Status:\*\* [e.g., Completed, In Progress, Discontinued]

\* \*\*[Link to Project 1 Directory](project-1-directory-name/)\*\*

### 2. [Project Title 2]

\* \*\*Description:\*\* [Brief, one-sentence summary of the project's goal or main task.]

\* \*\*Key Technologies/Skills Used:\*\* [e.g., Python, Pandas, TensorFlow, SQL, Git, specific ZFL tools]

\* \*\*Status:\*\* [e.g., Completed, In Progress, Discontinued]

\* \*\*[Link to Project 2 Directory](project-2-directory-name/)\*\*

### 3. [Project Title 3]

\* \*\*Description:\*\* [Brief, one-sentence summary of the project's goal or main task.]

\* \*\*Key Technologies/Skills Used:\*\* [e.g., Python, Pandas, TensorFlow, SQL, Git, specific ZFL tools]

\* \*\*Status:\*\* [e.g., Completed, In Progress, Discontinued]

\* \*\*[Link to Project 3 Directory](project-3-directory-name/)\*\*

## Learning & Key Takeaways

This internship provided valuable experience in [mention 1-2 broad areas, e.g., "applying theoretical knowledge to real-world industrial problems," "collaborating within a professional R&D environment]. I specifically enhanced my skills in [mention 2-3 specific skills, e.g., "data cleaning and preprocessing," "model evaluation," "version control best practices," "effective technical communication"].

## Disclaimer

Please note that some project data or outputs may be anonymized or generalized to comply with ZFL's data privacy and confidentiality policies. This repository is intended for personal portfolio and reference purposes.