Ecosystem Classifier

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- Stakeholder Presentation #2-
11/04/2024

Connection between species extinction and climate change?

...

Department for analyses and visualizations

UNITED NATIONS

Department for analyses and visualizations

Goals

- *Easy understandable climate/species extinction related informations*

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Department for analyses and visualizations

Goals

- *Open and easy access source for organizations and public*

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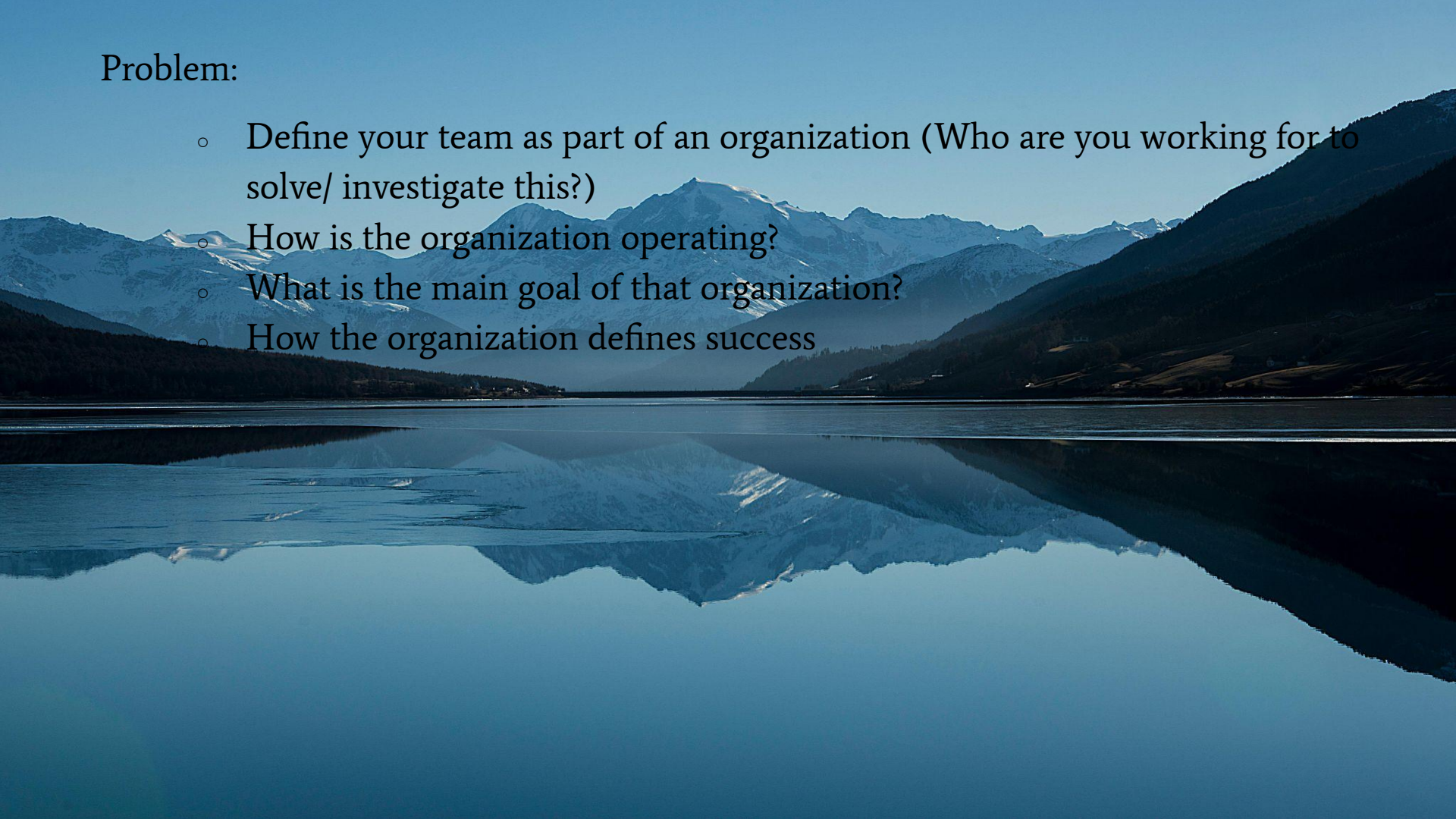
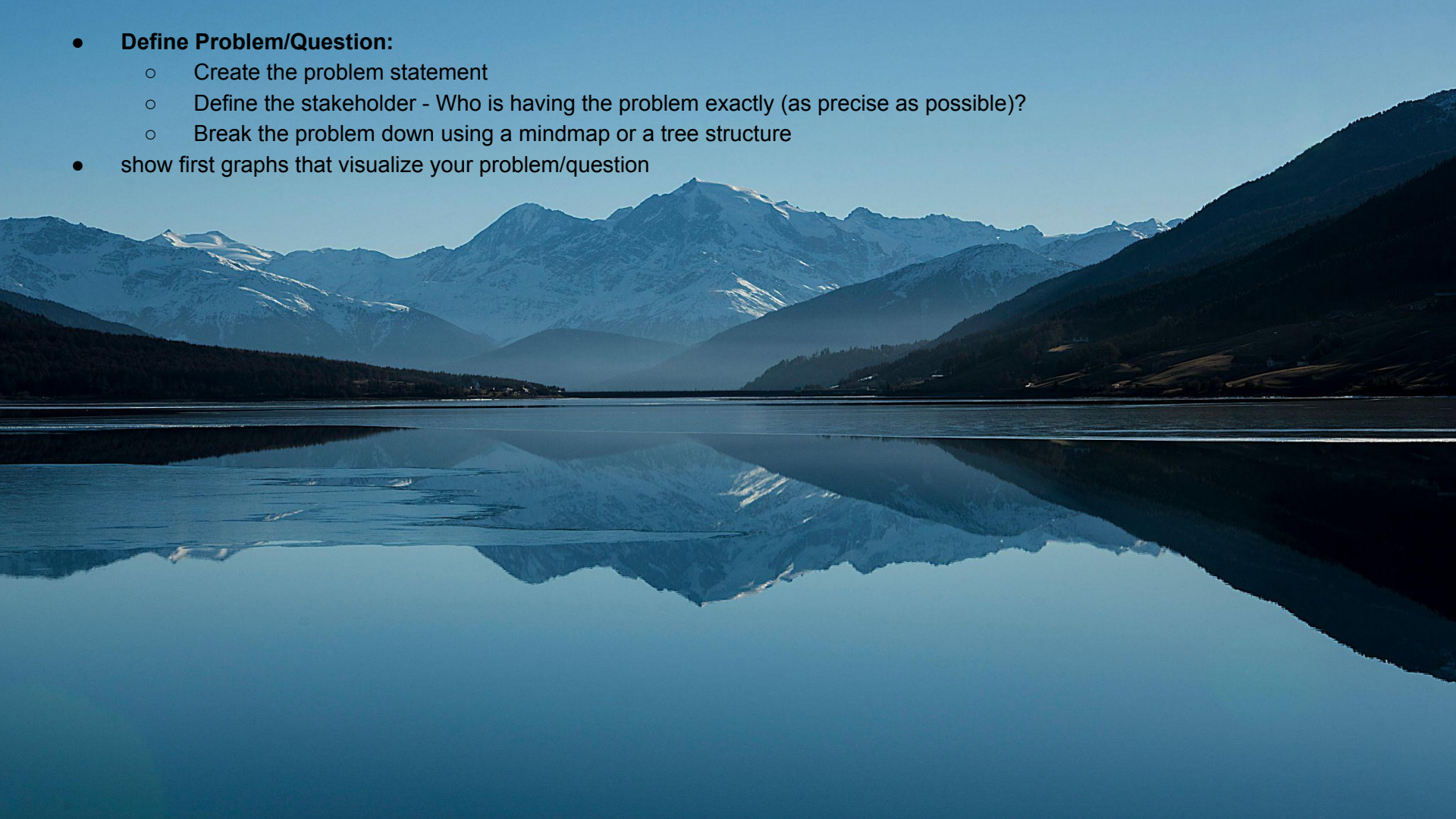
Department for analyses and visualizations

Success

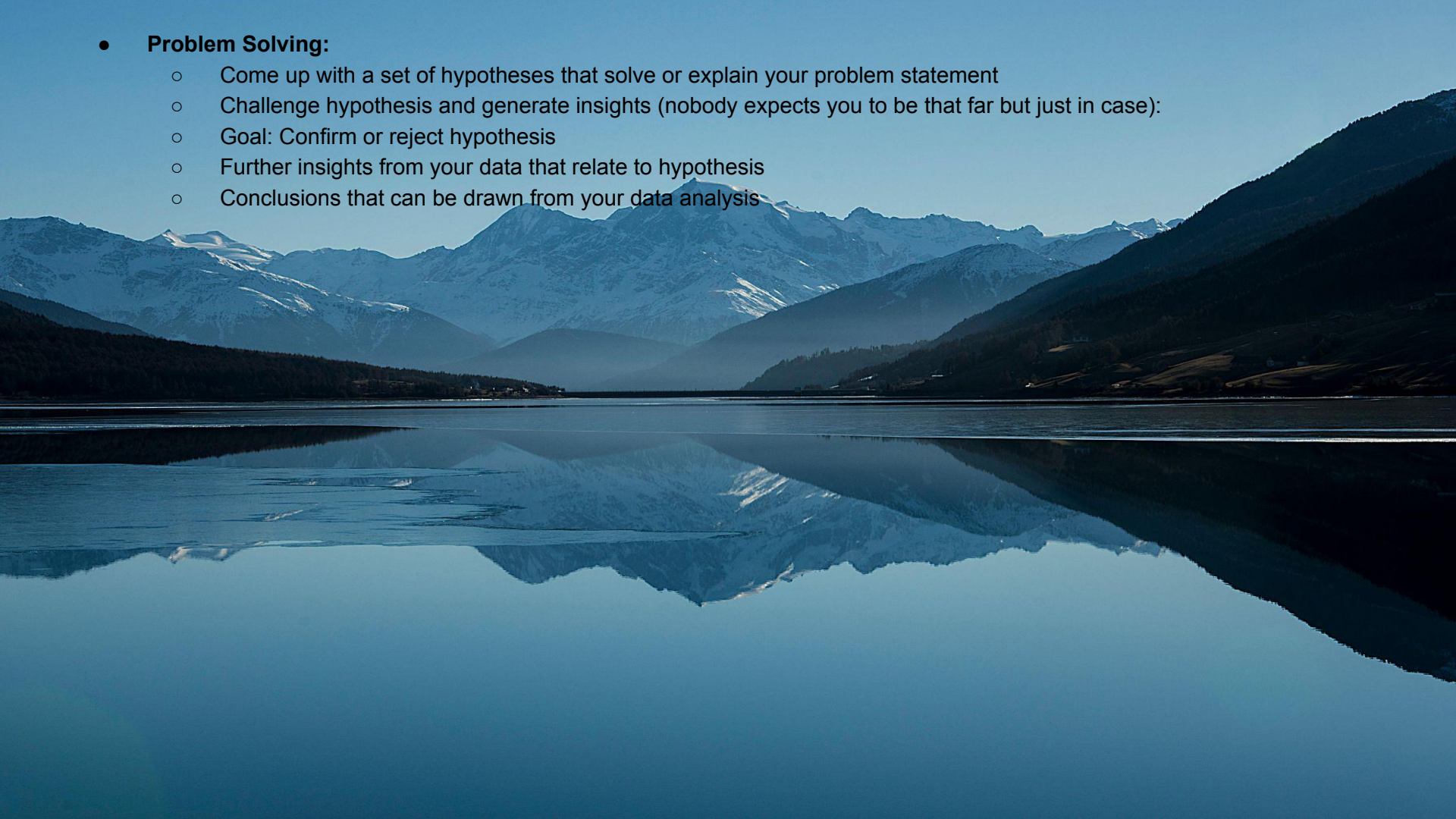


Problem:

- Define your team as part of an organization (Who are you working for to solve/ investigate this?)
- How is the organization operating?
- What is the main goal of that organization?
- How the organization defines success



- **Define Problem/Question:**
  - Create the problem statement
  - Define the stakeholder - Who is having the problem exactly (as precise as possible)?
  - Break the problem down using a mindmap or a tree structure
- show first graphs that visualize your problem/question



- **Problem Solving:**
  - Come up with a set of hypotheses that solve or explain your problem statement
  - Challenge hypothesis and generate insights (nobody expects you to be that far but just in case):
  - Goal: Confirm or reject hypothesis
  - Further insights from your data that relate to hypothesis
  - Conclusions that can be drawn from your data analysis

Key Datasets and Their Applications

GLDAS Noah Land Surface Model

The Global Land Data Assimilation System (GLDAS) Noah Land Surface Model uses satellite and ground-based observations to simulate land surface conditions, such as soil moisture, temperature, and energy fluxes.

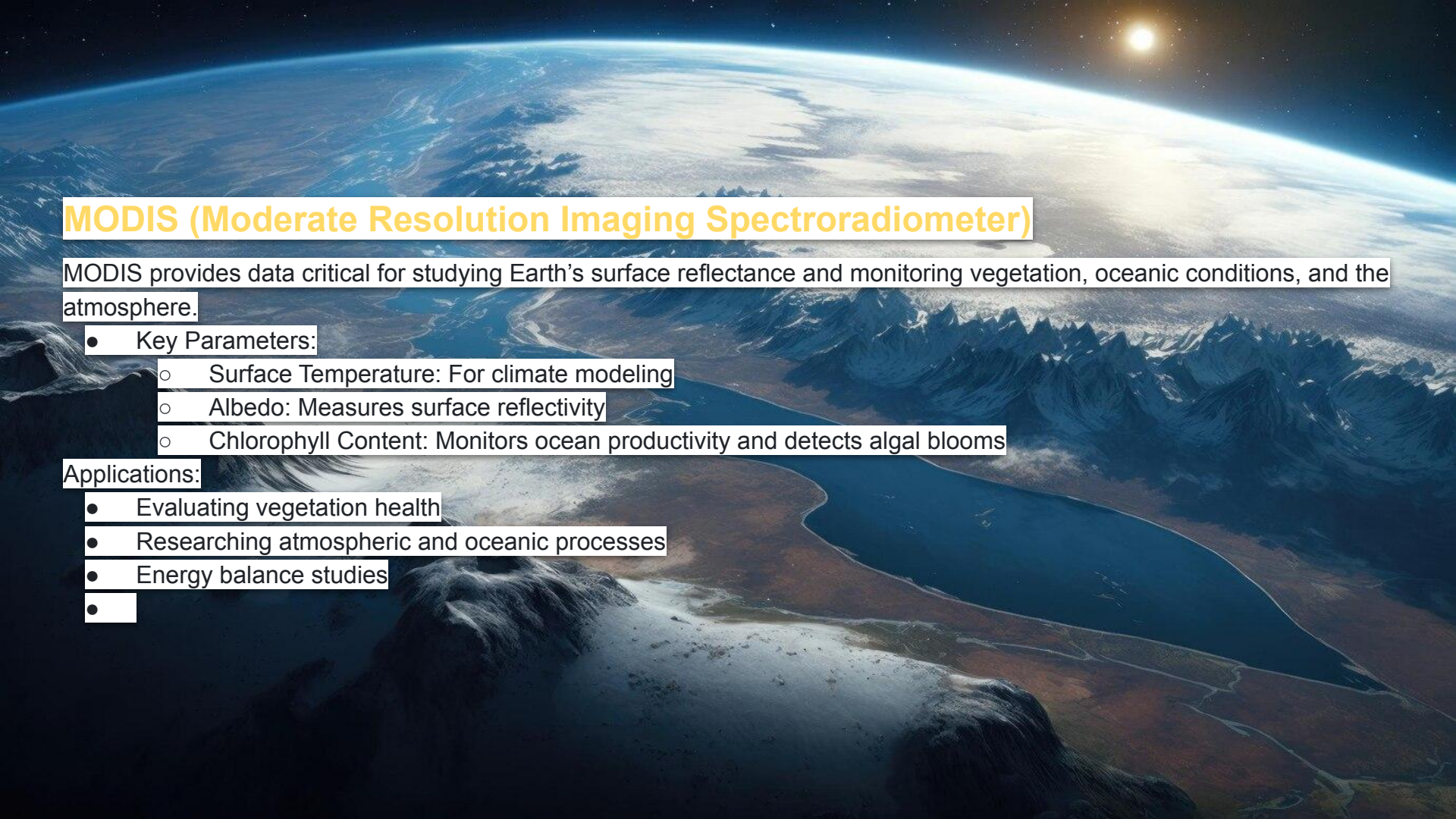
VIIRS Nighttime Day/Night Band (DNB)

The VIIRS (Visible Infrared Imaging Radiometer Suite) Nighttime DNB dataset captures illumination levels at night, making it valuable for urban and environmental studies.

- Data Source: Suomi NPP satellite
- Spatial Resolution: 0.1° for latitude and longitude
- Temporal Resolutions:
  - Nightly: Illumination for specific nights
  - Monthly: Average nighttime lights over a month
  - Annual: Yearly aggregates of nighttime light data

Use Cases:

- Tracking urban development and human activity
- Assessing light pollution's ecological impact
- Supporting disaster response and monitoring power outages



MODIS (Moderate Resolution Imaging Spectroradiometer)

MODIS provides data critical for studying Earth’s surface reflectance and monitoring vegetation, oceanic conditions, and the atmosphere.

- Key Parameters:
  - Surface Temperature: For climate modeling
  - Albedo: Measures surface reflectivity
  - Chlorophyll Content: Monitors ocean productivity and detects algal blooms

Applications:

- Evaluating vegetation health
- Researching atmospheric and oceanic processes
- Energy balance studies
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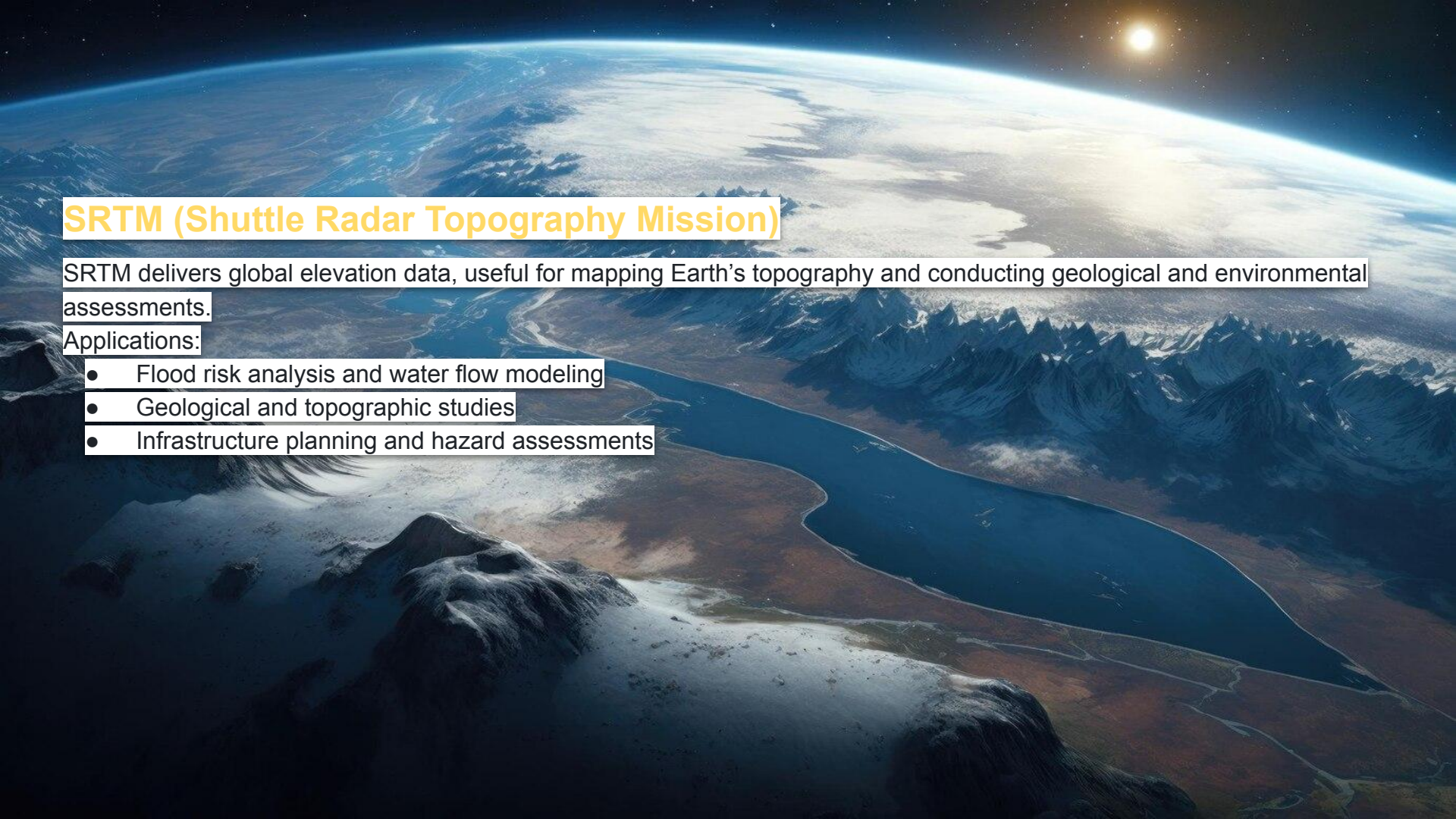


SRTM (Shuttle Radar Topography Mission)

SRTM delivers global elevation data, useful for mapping Earth’s topography and conducting geological and environmental assessments.

Applications:

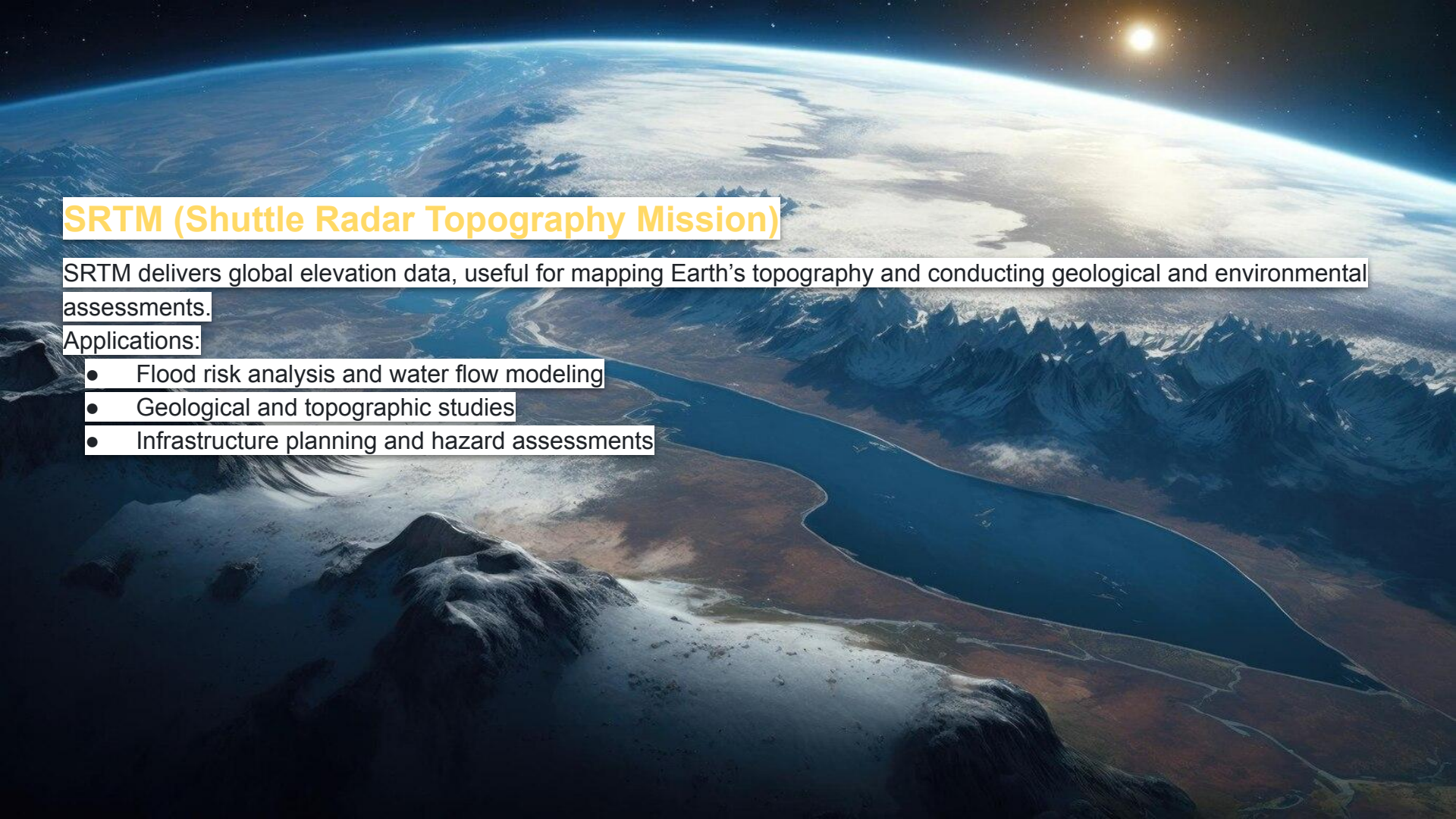
- Flood risk analysis and water flow modeling
- Geological and topographic studies
- Infrastructure planning and hazard assessments

API Overview:

Using the example of the "Nighttime Illumination Data"

API Framework

A FastAPI-based API fetches nighttime illumination data using NASA’s VIIRS dataset, offering functionality for various temporal resolutions and global coordinates.



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Team Structure & Roles

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- Alexander Schmidt

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- **Alexander Schmidt**

  Data acquisition, Data maintenance

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  Literature research, Conclusions

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- **Noah Kürtös**

  Literature research, Conclusions

- **Heiko Främbs**

  Communications, Project management

Key Stakeholders

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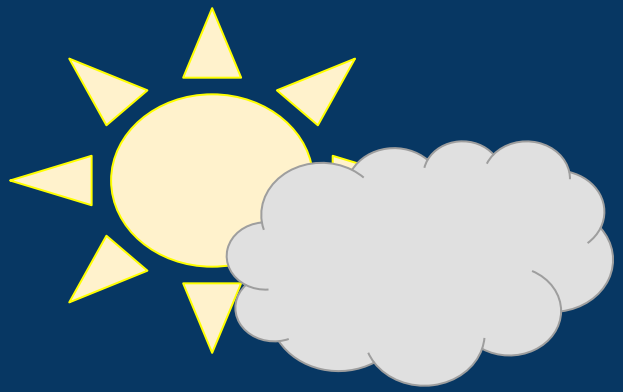
WMO

World Meteorological Organization



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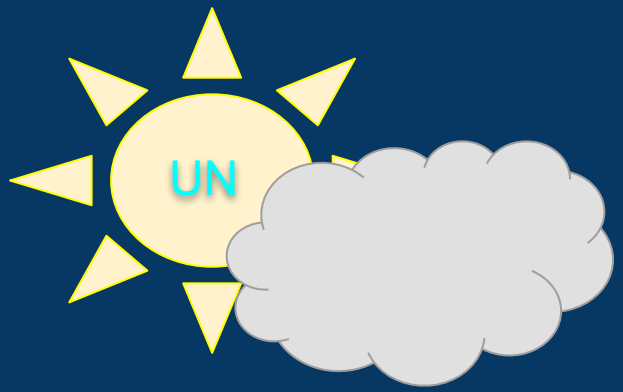
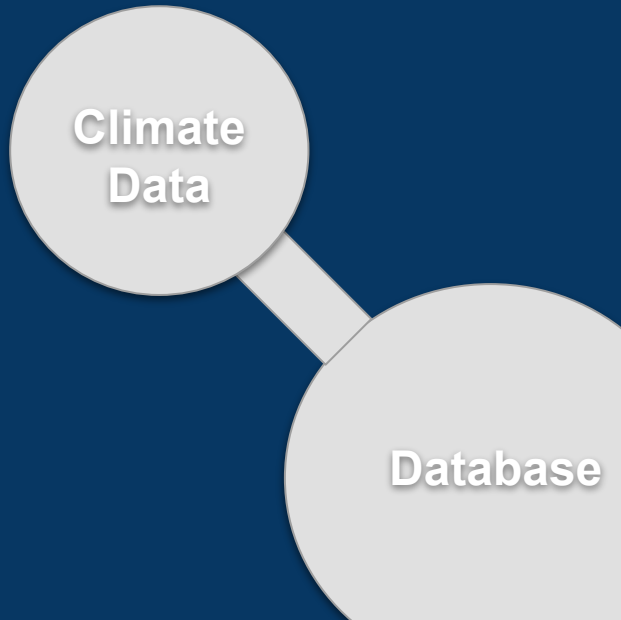


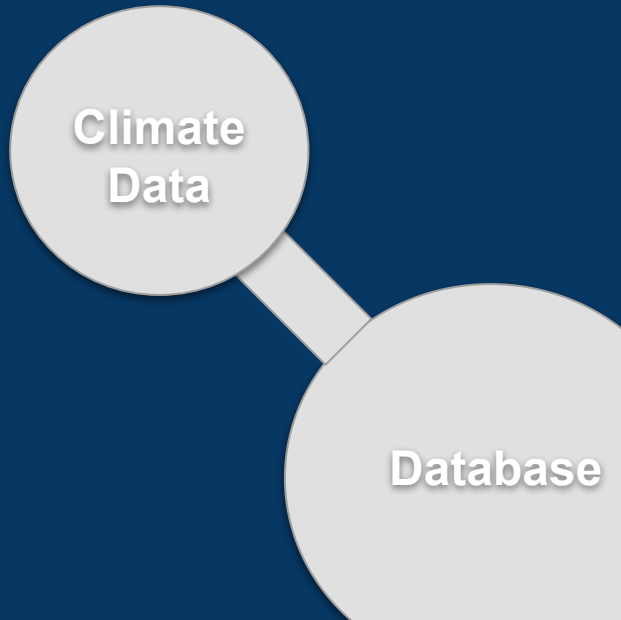
Data sources for geographical and climate data



Data sources for geographical and climate data

- METEOSTAT.net

  Weather data store



Data sources for geographical and climate data

- METEOSTAT.net

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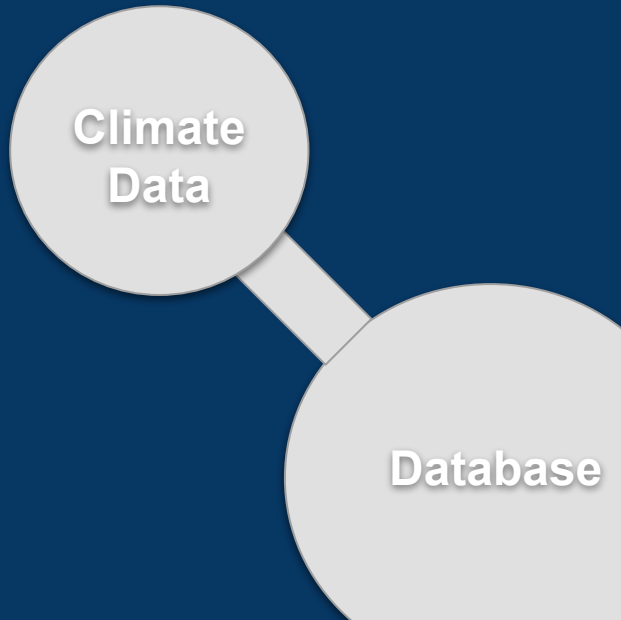
- EARTHDATA - NASA.gov

  visualization and analysis of satellite Earth science data



Data sources for species

- IUCNREDLIST.org

  Red list of threatened species

Filtered by year and coloured parameter

Classifications

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Classifications

- **WEATHER (desert, mountains)**

Filtered by year and coloured parameter

Classifications

- WEATHER (desert, mountains)

- ILLUMINATION (urban areas)

Filtered by year and coloured parameter

Classifications

- WEATHER (desert, mountains)
- ILLUMINATION (urban areas)
- VEGETATION (forest)

Data acquisition

- API connection/Database download
- Clean (Python)
- Upload (SQL)

Timeline

Timeline

- Week 1

  Data gathering

Timeline

- Week 1

  Data gathering

- Week 2

  Data filtering/formating

  Data analyzing/visualisation

Timeline

- Week 3

  Data visualisation

  Webpage implementation

  Create presentation

Timeline

- Week 3

  Data visualisation

  Webpage implementation

  Create presentation

- Week 4

  Finalizing presentation

  Finalizing Webpage

Process in classification

- Analyze weather data to define desert areas
- Define forest areas
- Define Illumination for urban regions
- Group areas into “Pixels”
- Implement species data

Blockers

- Size of Databases

  (A lot of Weather stations, a lot of weather recordings per weather stations)

- Database Formats

  (*Unsuitable formats)*

Thank you for your attention!

Q&A