

Student Scholarship

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Data Collection and HPC Ingestion of Historical Satellite Images from IBM Pairs GeoScope

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Data Collection and HPC Ingestion of Historical Satellite Images from IBM Pairs GeoScope



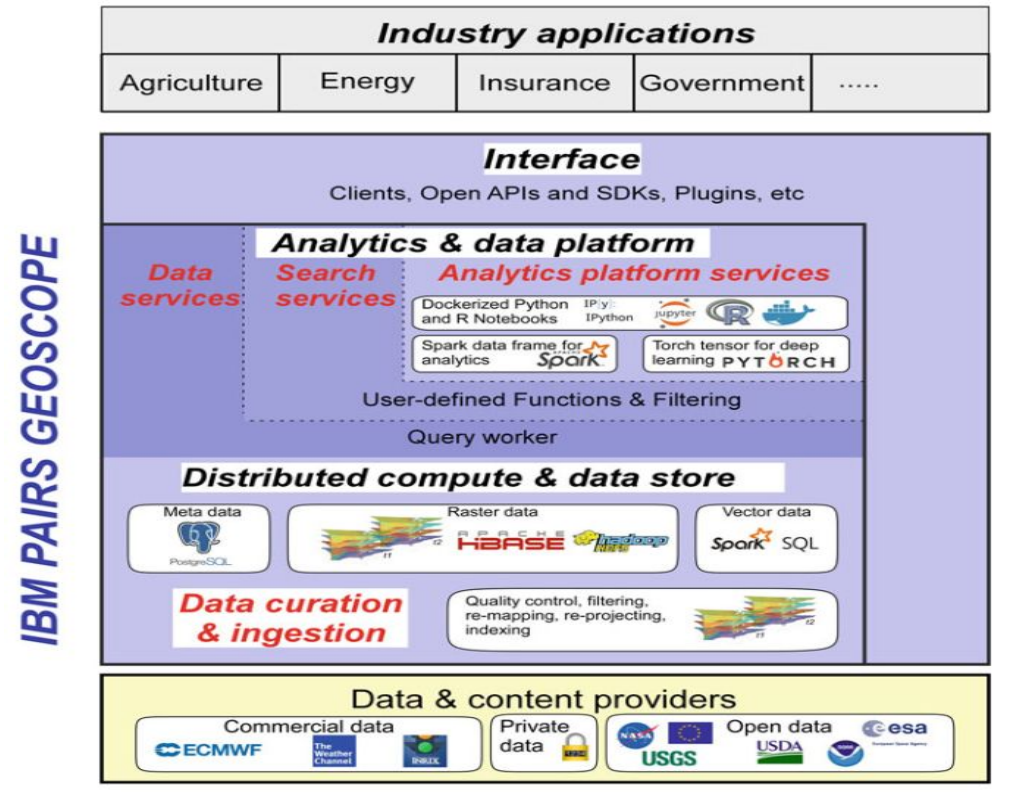
Baseline for :Developing predictive models for Nitrogen flows Monitoring the Growth and Health of Crops Using MODIS Satellite Imagery

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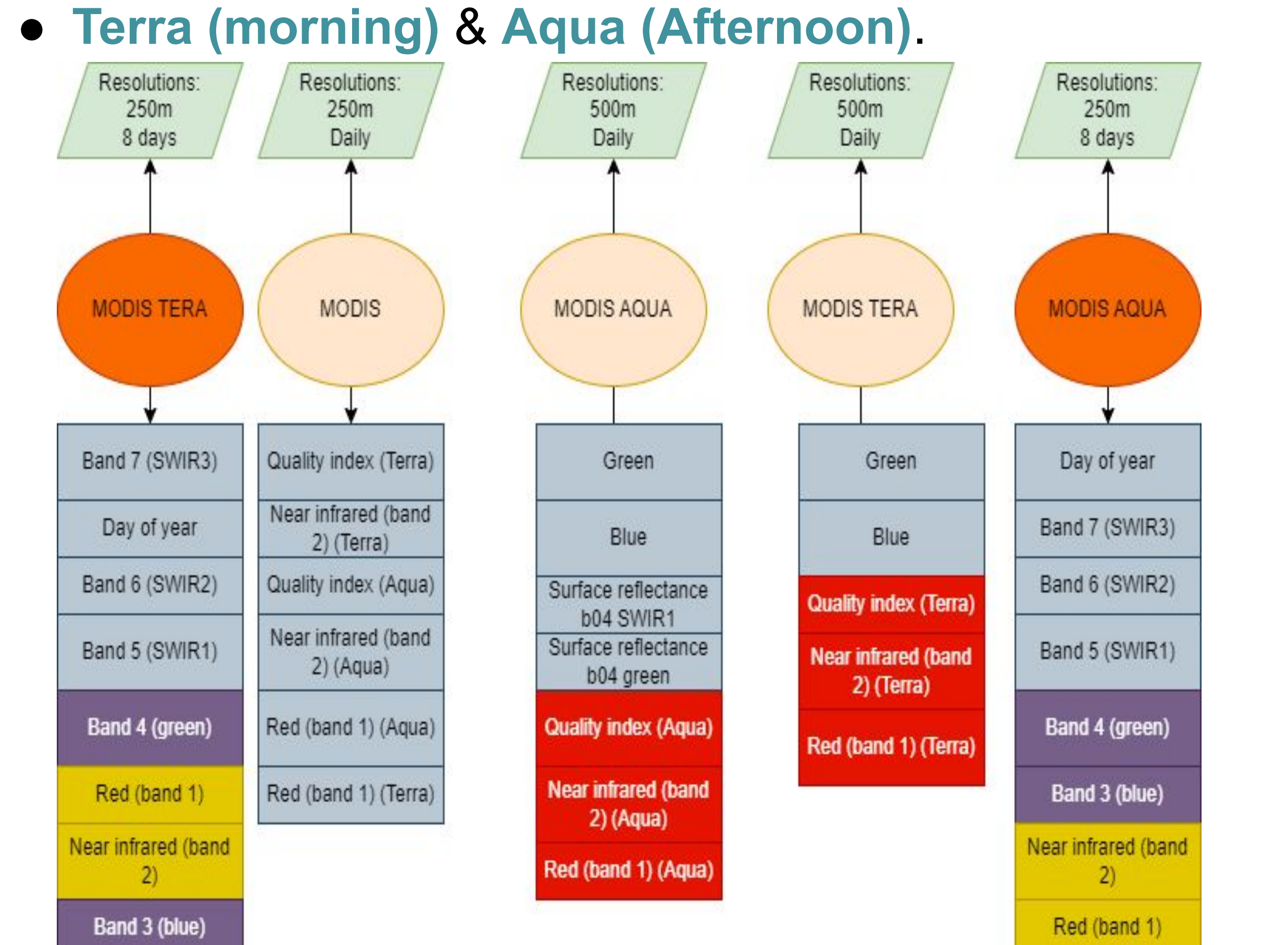
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Introduction

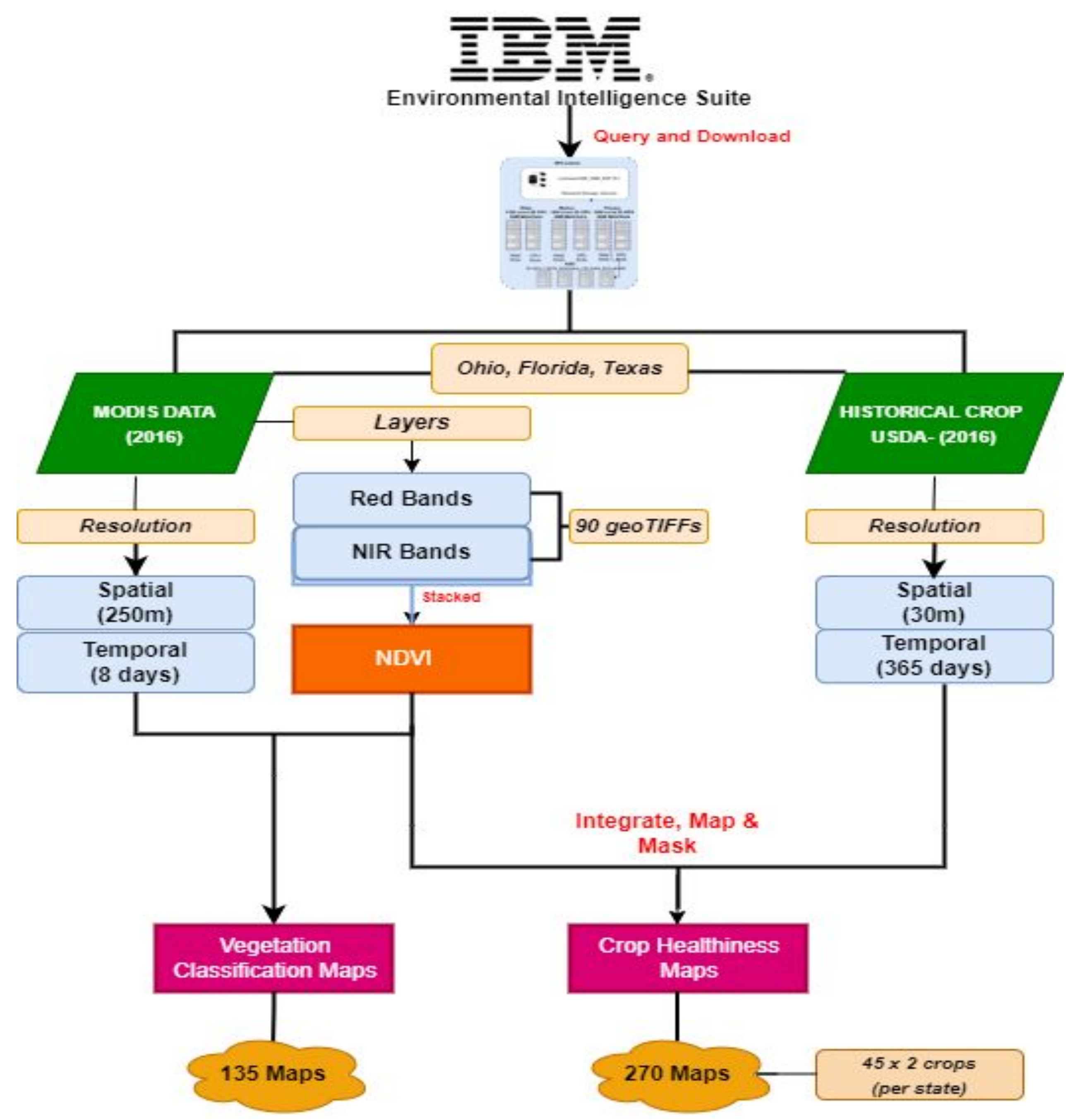
- IBM Environment Intelligence Suite (EIS)**
- IBM EIS (IBMpairs) enables access to
 - Petabytes data
 - Geospatial-temporal
 - Different sources & time.
- Queried datasets
 - As zip files
 - geoTIFFS & json files
 - Explored, FAIRified
 - Ingested into HPC CRADLE



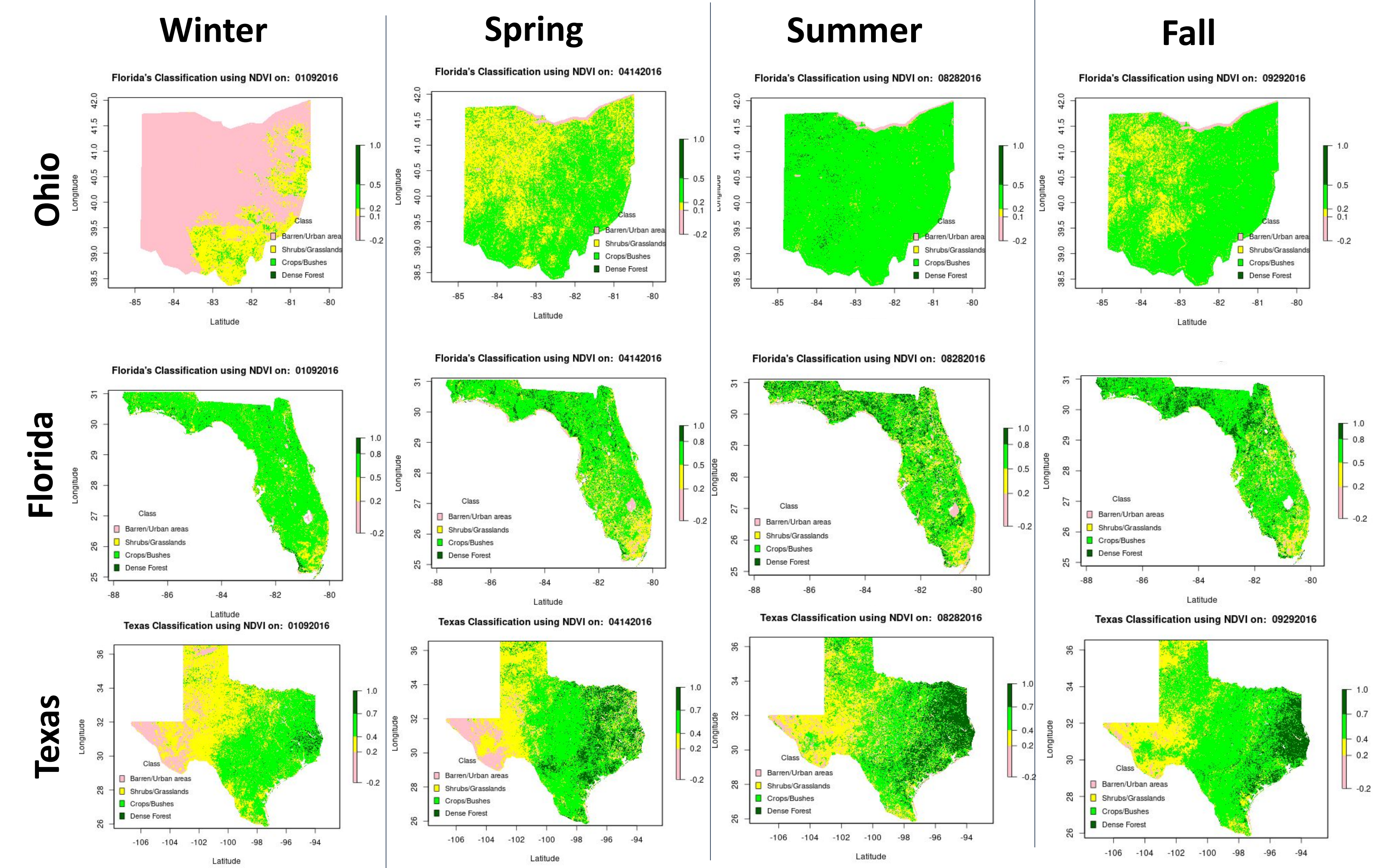
Moderate Resolution Imaging Spectroradiometer (MODIS)



Methodology



Vegetation Classification



Vegetation Index

- MODIS Satellite Images (red and NIR bands)** were used to classify Ohio, Florida and Texas.
- Classification is done with the calculated NDVI.
 - Shrubs/Grasslands
 - Crops/Bushes
 - Dense Forest+
 - Barren/Urban areas

$$NDVI = \frac{NIR - Red}{NIR + Red}$$

Normalized Difference Vegetation Index

Conclusion

- Gains**
 - Valuable insights into monitoring growth of crops
 - Daily achievable
 - Monitoring metrics can be used to predict the flow of N and P.
- Next**
 - Integrate other datasets
 - Predictive models for Nitrogen-Based Fertilizers (NBF).
 - Explore other bands in the MODIS datasets
 - IBM EIS in building efficient technology for NBF.

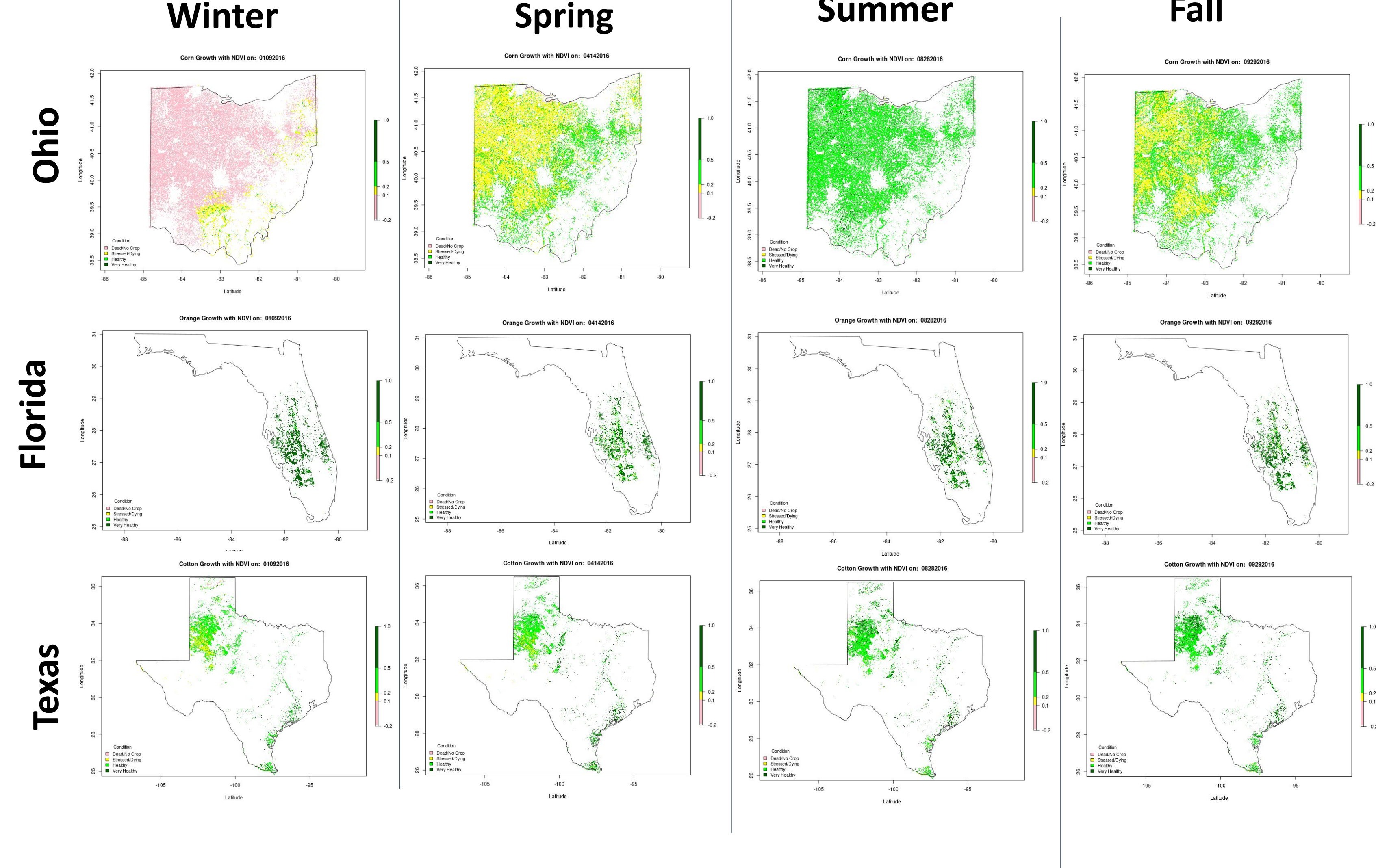
Interdisciplinary Approach & EWD/DCI

Predictive models with allow to track, estimate and predict N and P flows in watersheds and

- Estimate how CASFER technologies with impact the migration of nutrients to water

 Therefore this project is strongly connected to CASFER mission and it involves thrust 1, thrust 2 and thrust 3

Crop Healthiness



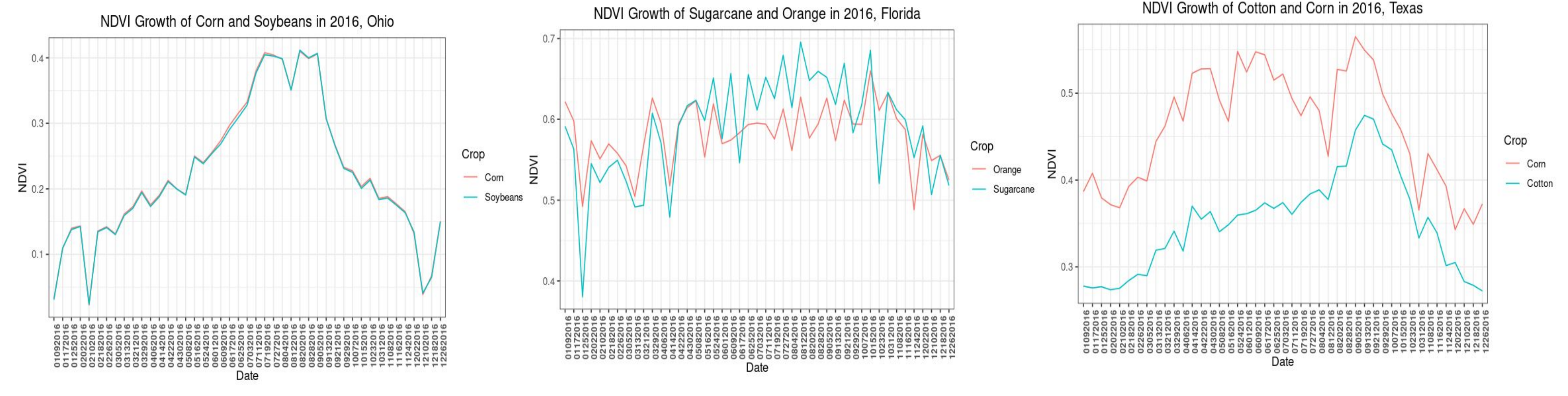
- MODIS & Historical Crop data** helps to monitor the health of crops in time series across the year
 - 0.5 < index < 1: Very healthy
 - 0.2 < index < 0.5: Healthy
 - 0.1 < Index < 0.2 : Stressed or dying
 - Index < 0.1 : Dead
- Ohio: Corn and Soybeans** were studied
- Florida: Oranges and Sugarcane** were studied
- Texas: Cotton and Corn** were studied
- The greenness of the crops vary with seasons, location and crop type.

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Trends in the growth of some crops across Ohio, Florida and Texas in 2016

Thrust Interactions

