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Introduction

Continuous collection of global satellite imagery over the years has contributed to the creation of a long data record from AVHRR, MODIS and other sensors. These records account now for 30+ years, and as the archive grows it becomes an invaluable source of data for many environmental related studies dealing with trends and changes at local and global scale. For atmospheric research this is perfect, however for studies dealing with phenomena at the surface of the earth, the presence of clouds, aerosols, spatial gaps, viewing issues, and less than consistent atmosphere correction and reprocessing makes it difficult to obtain good quality data everywhere and every time. These issues change by location and time, making it difficult to know at a glance the availability and quality of the data.

Objectives

Our goal was to assess:

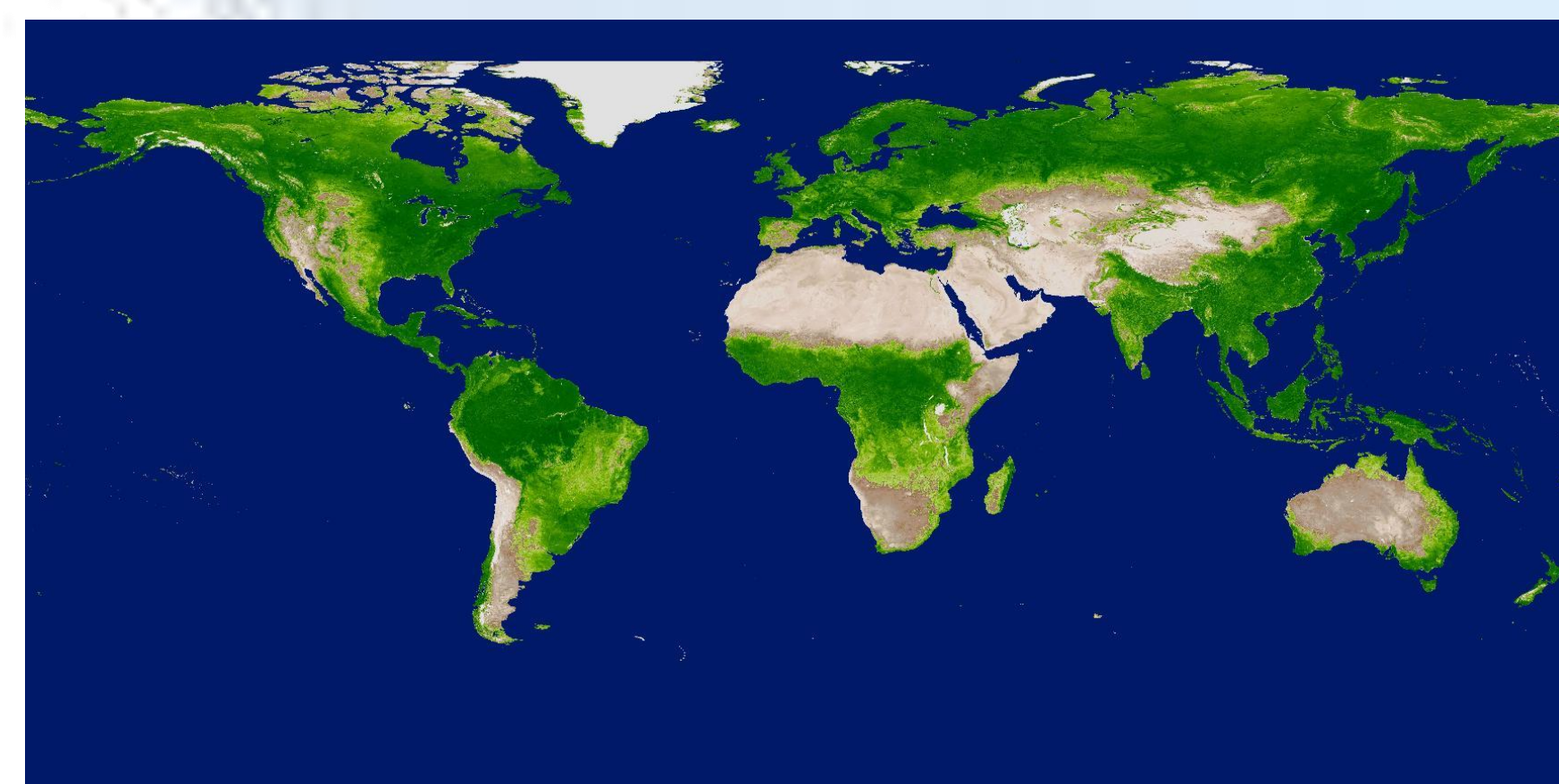
- The global data records quality
- The probability of getting good and enough data to perform a study at any given location and/or time
- The accuracy and certainty of these data

We generated global maps showing the problems and limitations of synoptic global remote sensing, the level of noise and errors in these records, and where science results could be suspect. In doing so we also identified opportunities for further work on these data records.

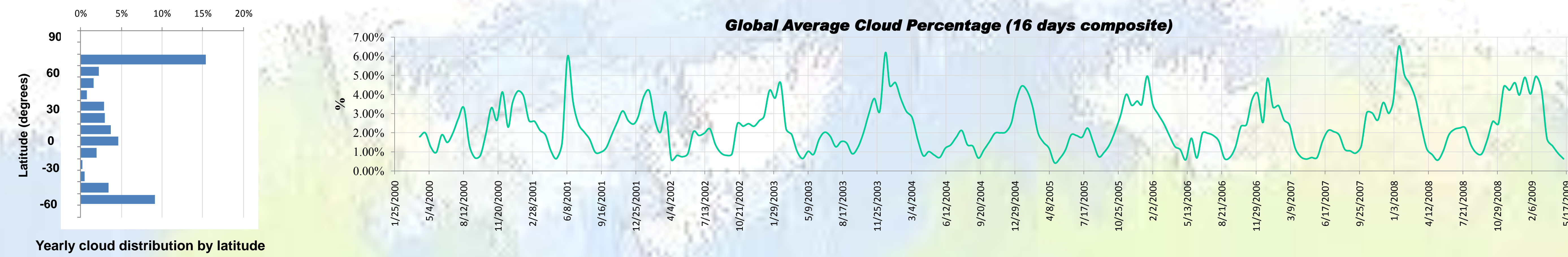
Data and Methodology

- Terra & Aqua 16-day CMG Vegetation Index record from 2000 to 2009. Additionally we used the Terra MODIS CMG land cover product
- Quality information was extracted from the CMG product and the new C5 pixel reliability measure
- The analysis was stratified per latitude, season, land cover and geographic location

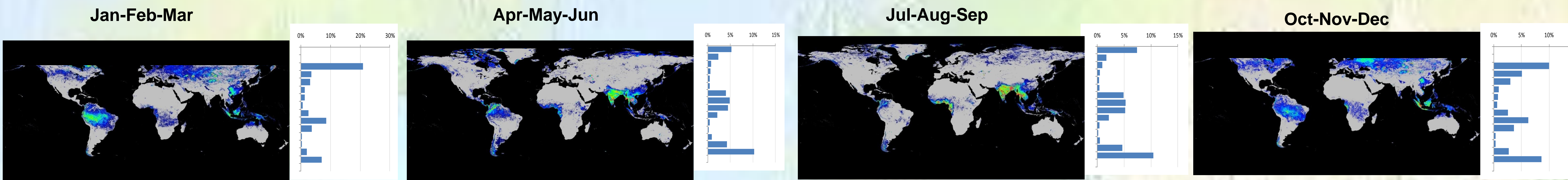
Results



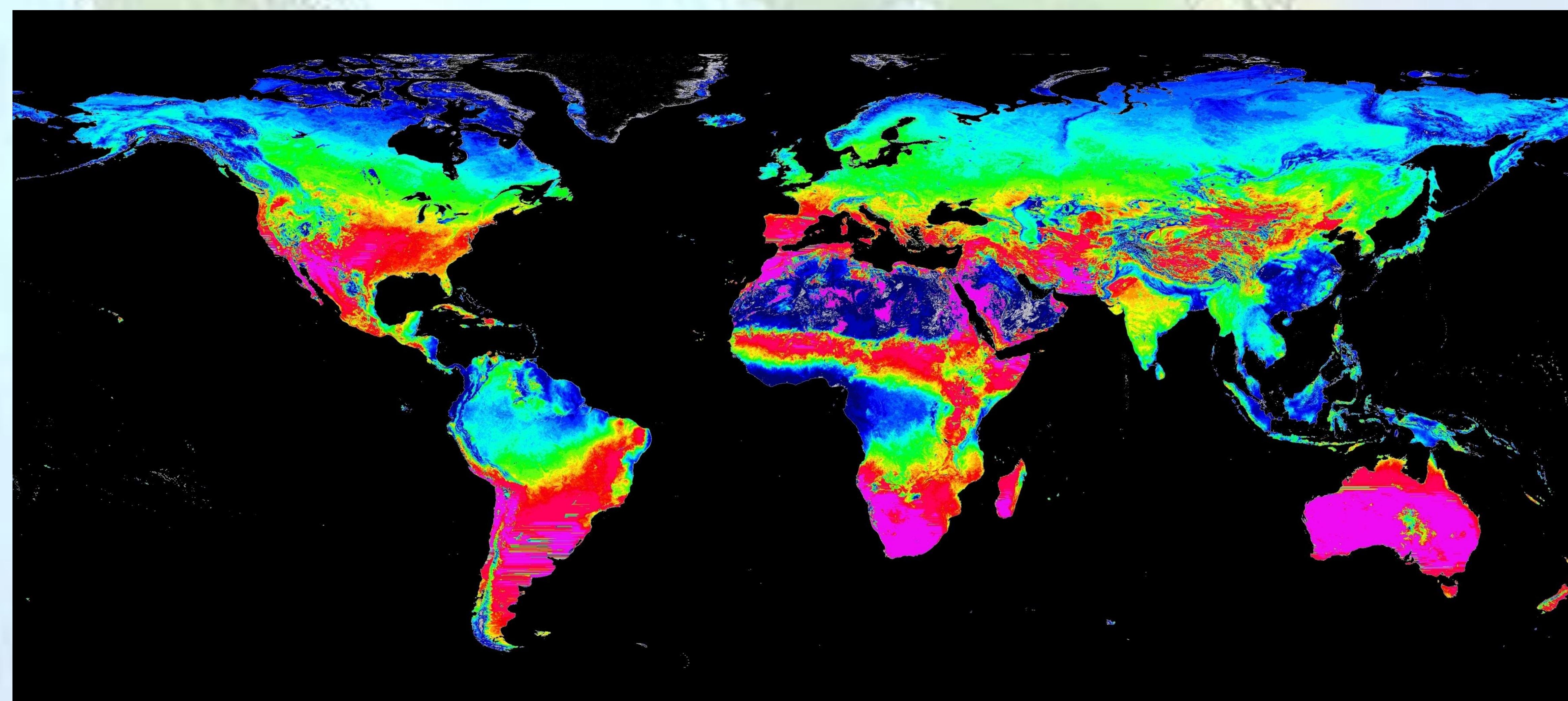
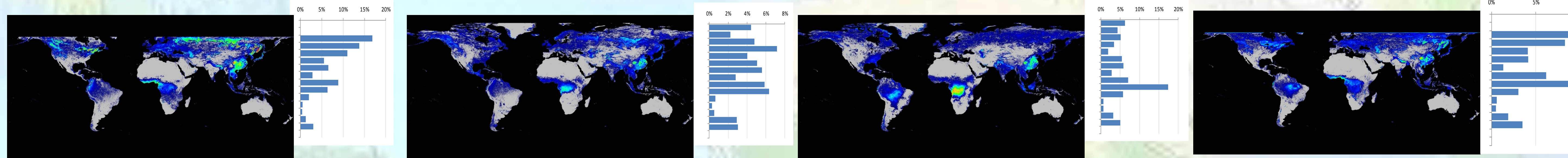
Typical global NDVI map (August 2008) showing vegetation at its peak. Only highest quality data retained. The two major biomes, **Rain forest and Boreal forest**, represent the bulk of global vegetation yet they are the areas **most prone to problems**.



Cloud distribution

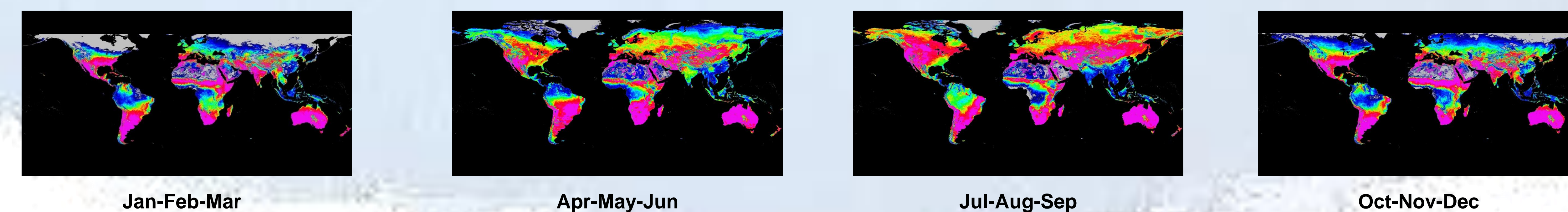


High Aerosol

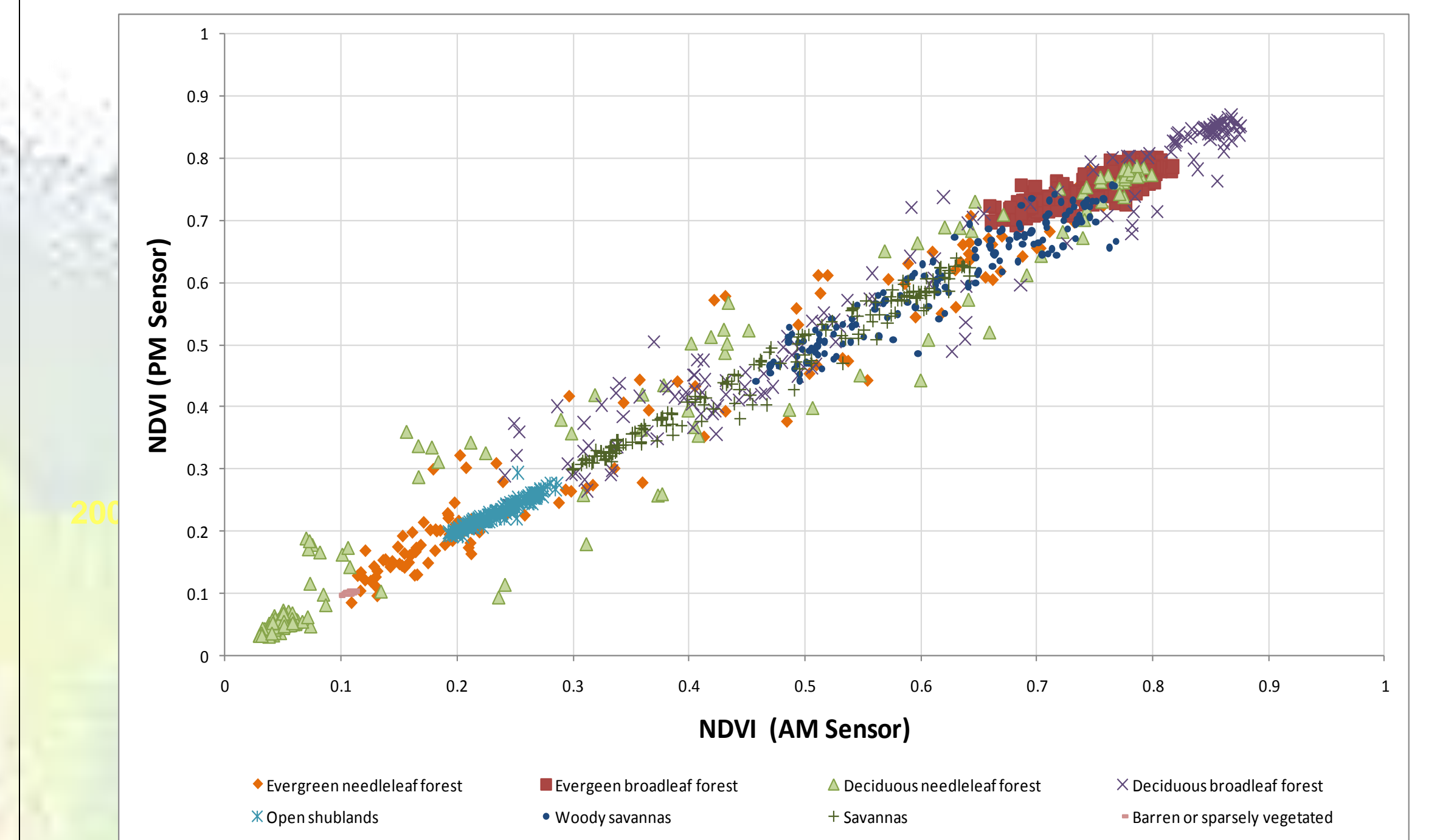


Average yearly good data yield

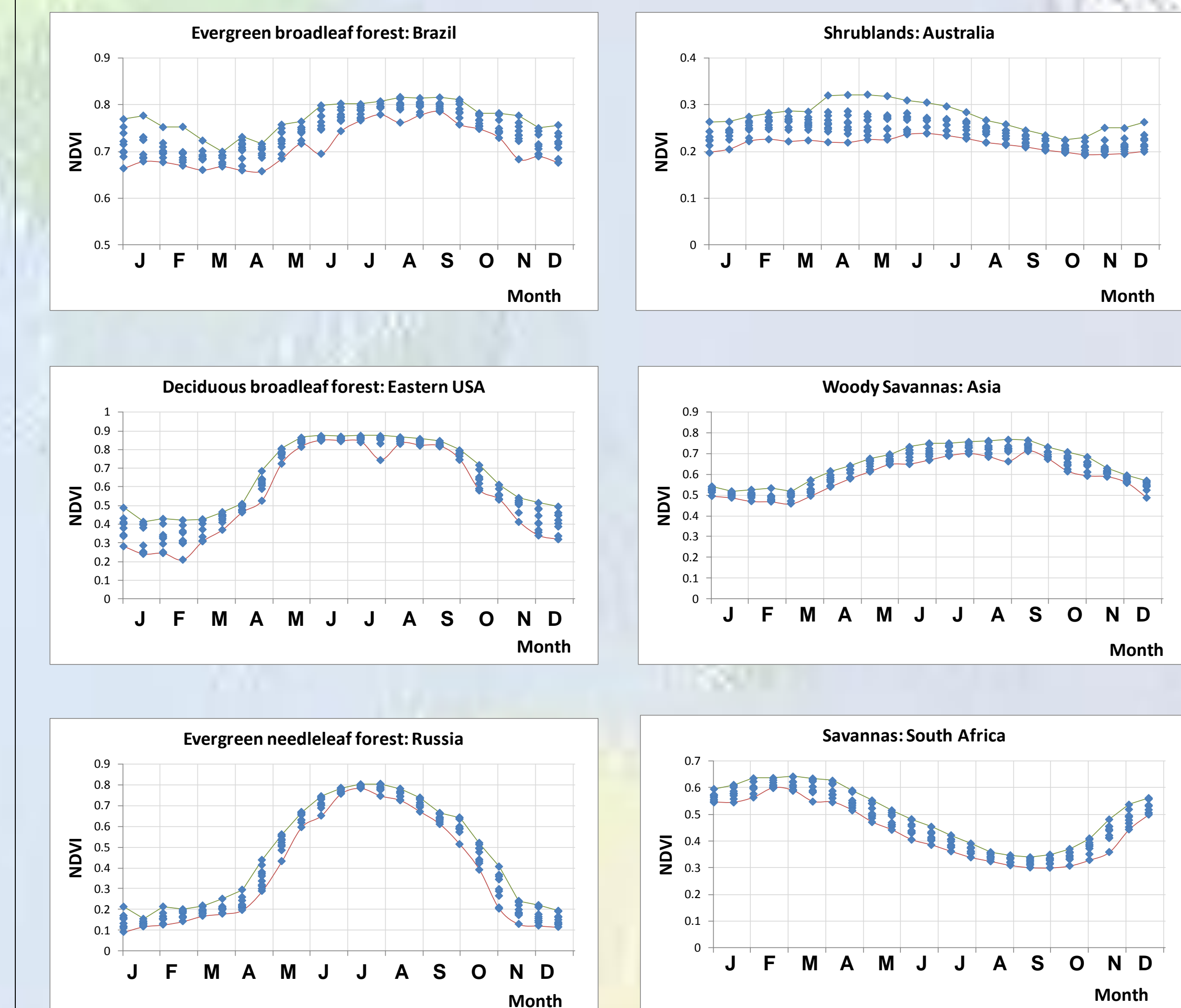
Seasonal good data yield



AM versus PM overpass



A morning versus afternoon overpass impacts the data, complicating continuity and accurate trend analysis. Deciduous needle leaf forest shows the largest difference, while open shrublands have the strongest correlation.



NDVI profiles for different biomes and different locations. These profiles illustrate the noise levels in the VI signals throughout the year. The noise will have implications on phenology estimation and subsequently vegetation change research. Almost all biomes are subject to noise and uncertainty, however the rainforest biome shows the largest level of noise.

Conclusions

Establishing the quality of the data should be the first step for accurate and successful data analysis. The global spatial and temporal distribution of data, quality, cloud and aerosol indicates that two major biomes, rainforest and boreal forests, are the most challenging owing to excessive cloud, snow/ice and aerosol cover and a host of other issues (ex: poor atmosphere correction).

This indicates that research using synoptic remote sensing over these areas needs to account for this uncertainty. These issues are further complicated by the lack of continuity across the various global imagers.

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