

MODIS/VIIRS LAI & FPAR – 2016 UPDATE

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MODISLAI & FPAR – 2016 UPDATE

- Analyzed C6 LAI/FPAR product
- Results published in 2 papers
- C6 LAI/FPAR “improved” relative to C5
- Details in 2 posters @ this meeting

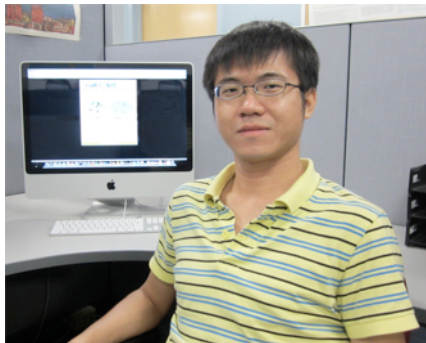


1. Yan et al., 2016. Evaluation of MODIS LAI/FPAR Product Collection 6. Part 1: Consistency and Improvements, Remote Sensing, doi:10.3390/rs8050359
2. Yan et al., 2016. Evaluation of MODIS LAI/FPAR Product Collection 6. Part 2: Validation and Intercomparison, Remote Sensing, doi:10.3390/rs8060460



MODISLAI & FPAR – 2016 UPDATE

- Seasonal changes in leaf area of Amazonian rainforests and Drought impacts
- Based on MAIAC reflectance products
- Results published in 2 papers



1. Bi et al., 2016. Sunlight mediated seasonality in canopy structure and photosynthetic activity of Amazonian rainforests. Environ. Res. Lett., doi: 10.1088/1748-9326/10/6/064014.
2. Bi et al., 2016. Amazon Forests' Response to Droughts: A Perspective from the MAIAC Product, Remote Sensing, doi:10.3390/rs8040356



MODISLAI & FPAR – 2016 UPDATE

- Developing prototype LAI/FPAR products from MAIAC reflectances
- Focus on Amazonian rainforests
- Results in 1 paper
- Details in a poster @ this meeting

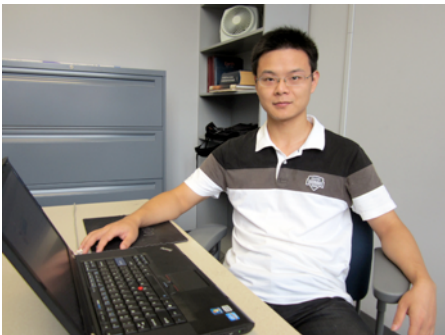


Chen et al., 2016. Development of a prototype LAI/FPAR products from MAIAC reflectance product, (to be submitted by end-June-2016 to RS).



MODISLAI & FPAR – 2016 UPDATE

- CO2 fertilization greening the Earth
- Results published in 1 paper
- Based on LAI data set developed from MODIS and AVHRR GIMMS NDVI3g



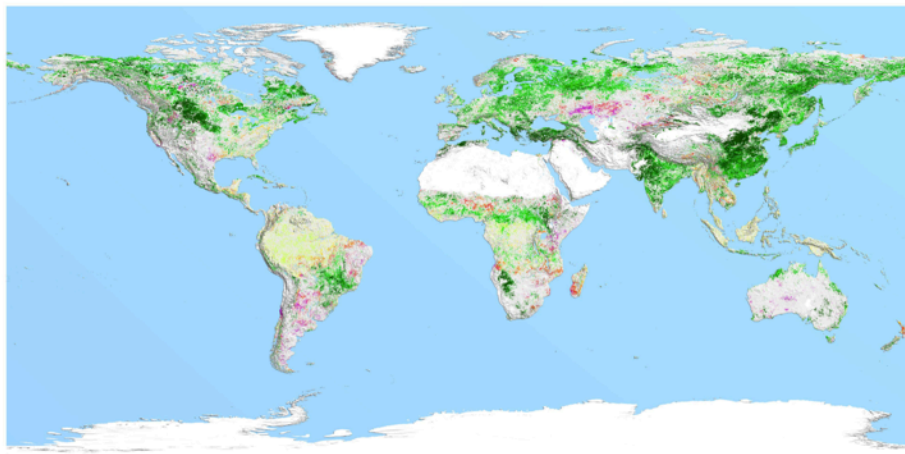
1. Zhu et al., 2016. Greening of the Earth and its Drivers. Nature Climate Change, doi:10.1038/nclimate3004.



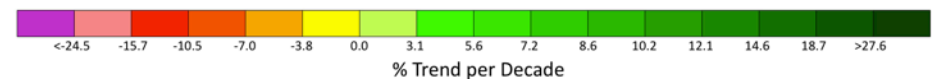
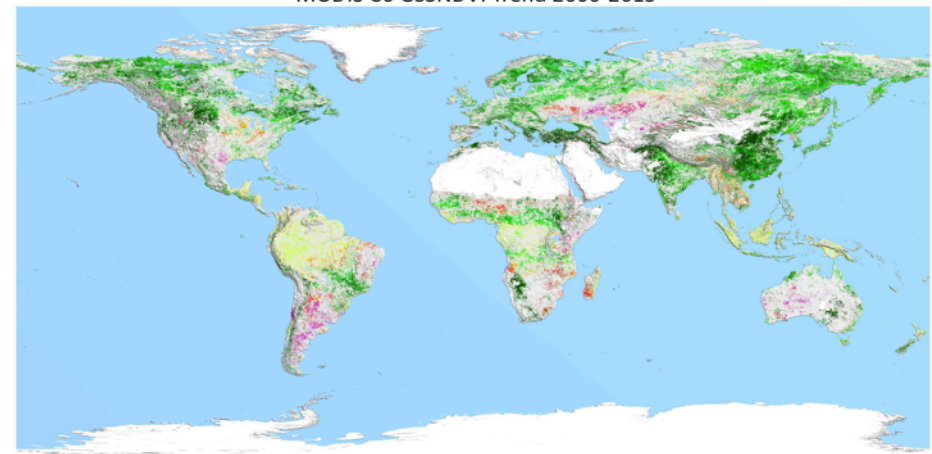
MODISLAI & FPAR – 2016 UPDATE

- Does MODIS see a “greener Earth”?
- Yes (25 -30% of vegetated area showing stat. sig. greening trends)
- Work in progress – results in a poster @ this meeting

MODIS C6 GSSLAI Trend 2000-2015



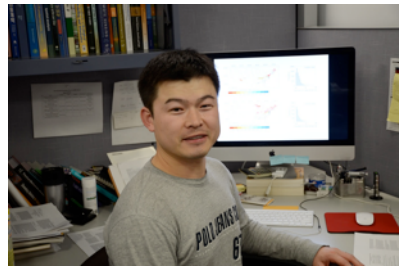
MODIS C6 GSSNDVI Trend 2000-2015



MODISLAI & FPAR – 2016 UPDATE

- Does MODIS see a “greener Earth”?

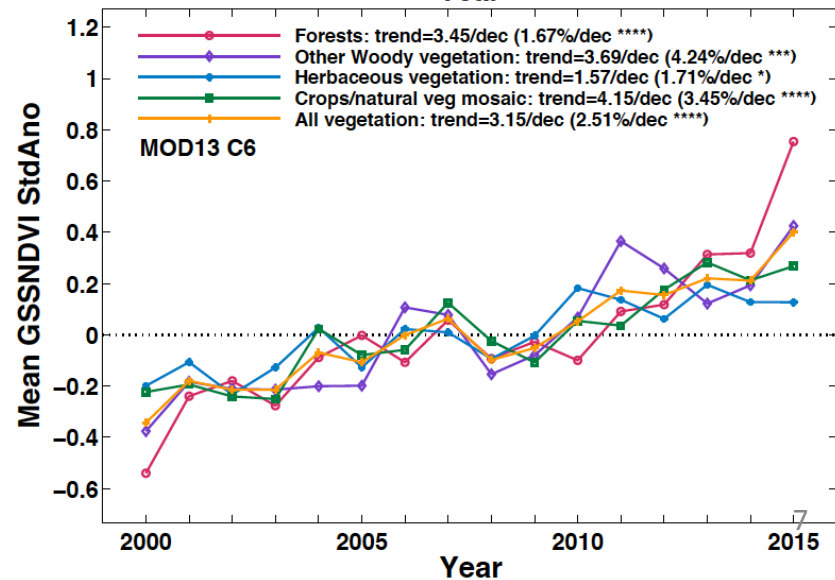
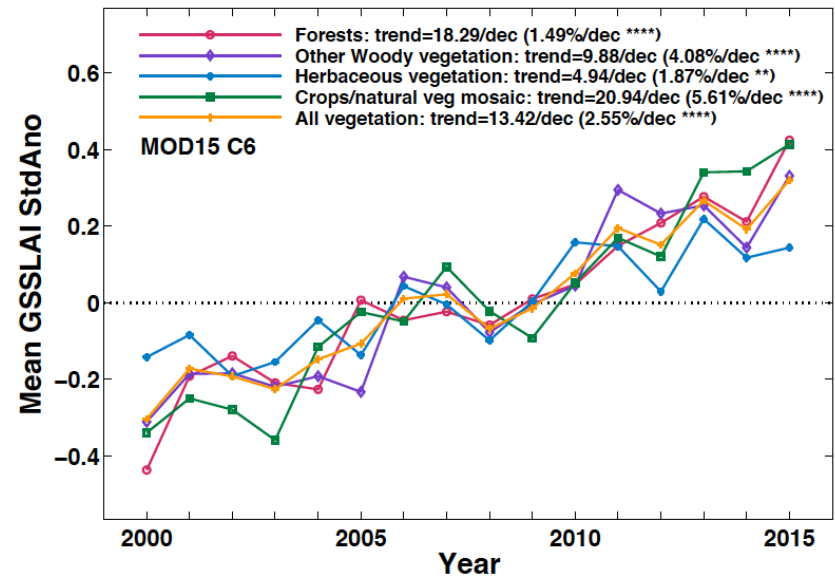
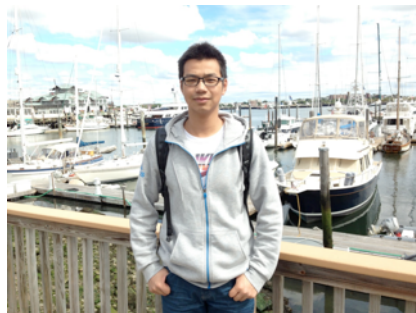
Taejin Park



Kai Yan



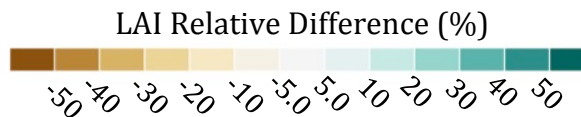
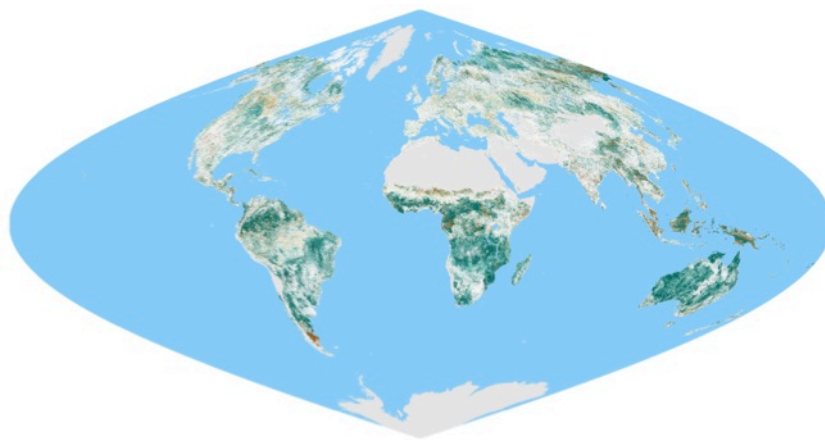
Chi Chen



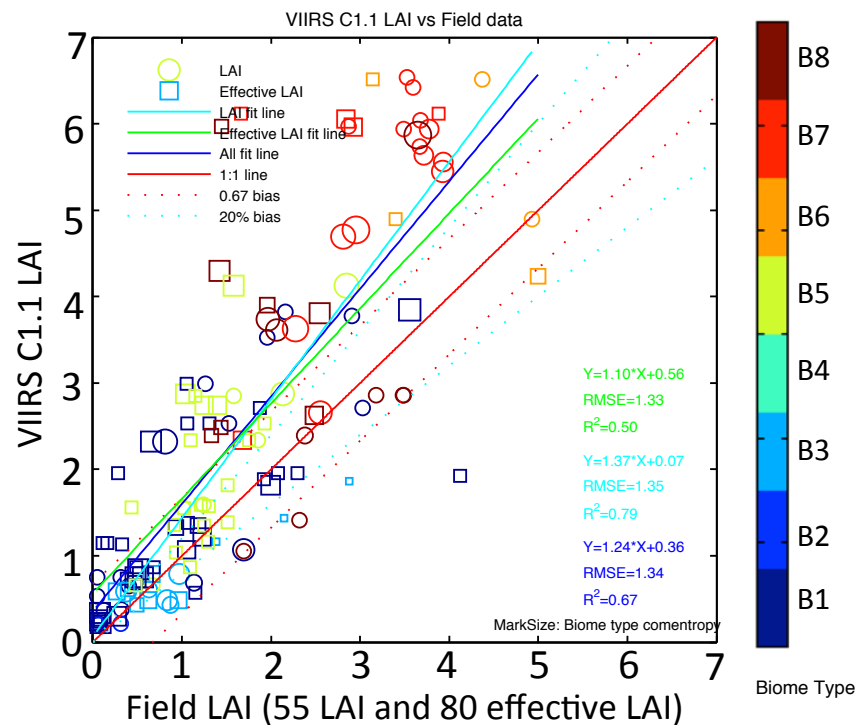


✓ Evaluation of MODIS LUT based VIIRS Product

- Overestimations are observed relative to MODIS and field data
- Adjustments for VIIRS spectral band composition are needed

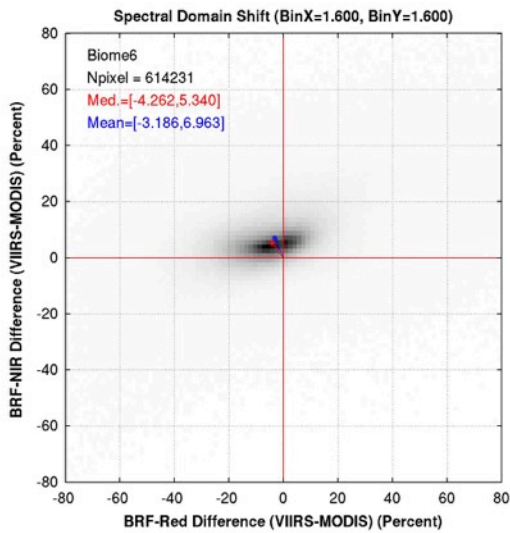


$$\text{Relative Difference (\%)} = 100 \times \frac{\text{VIIRS} - \text{MODIS}}{\text{MODIS}}$$

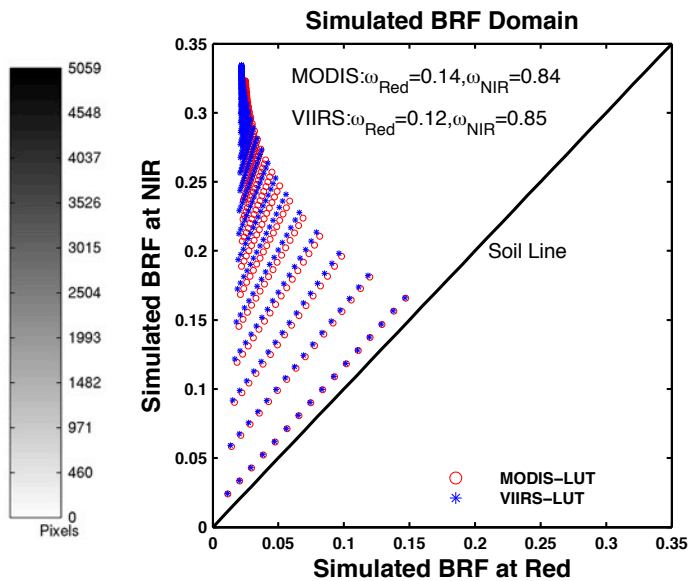




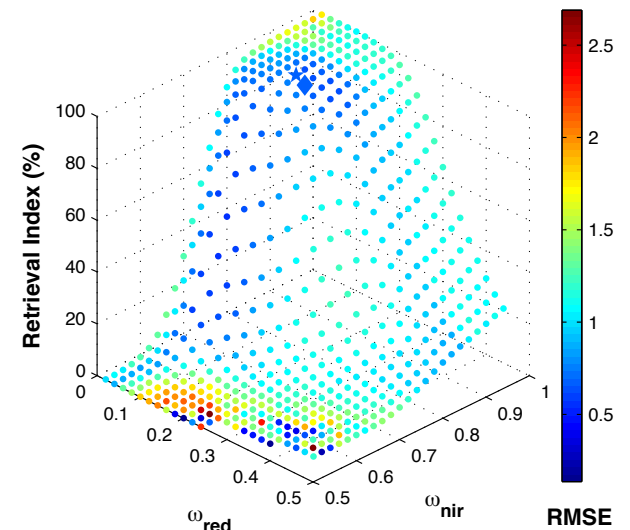
- ✓ LUT adjustment for VIIRS spectral band composition
 - Observed BRF spectral domain shift (Biome 6 as an example)
 - All biomes show similar directional BRF shift (but magnitude varies)
 - Optimizing VIIRS- and biome-specific configurable parameters
 - Solution of problem - maximize RI (spatial coverage) & minimize RMSE



BRF spectral domain shift inferred from observations (Lower Red and Higher NIR)



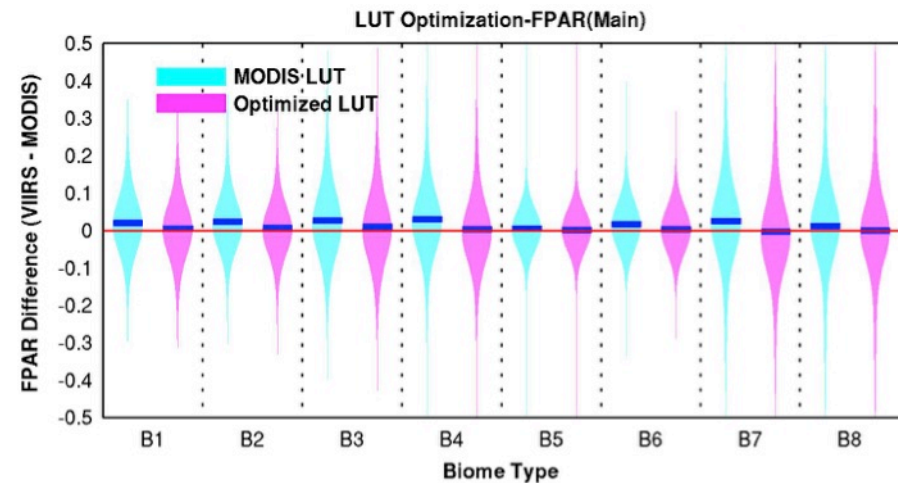
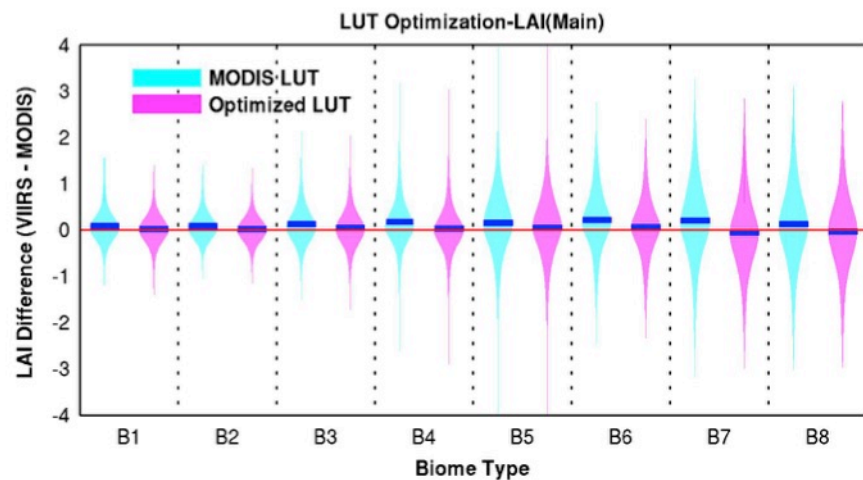
Spectral space shift due to single scattering albedo modulation



Optimal parameterization with minimizing RMSE and maximizing RI

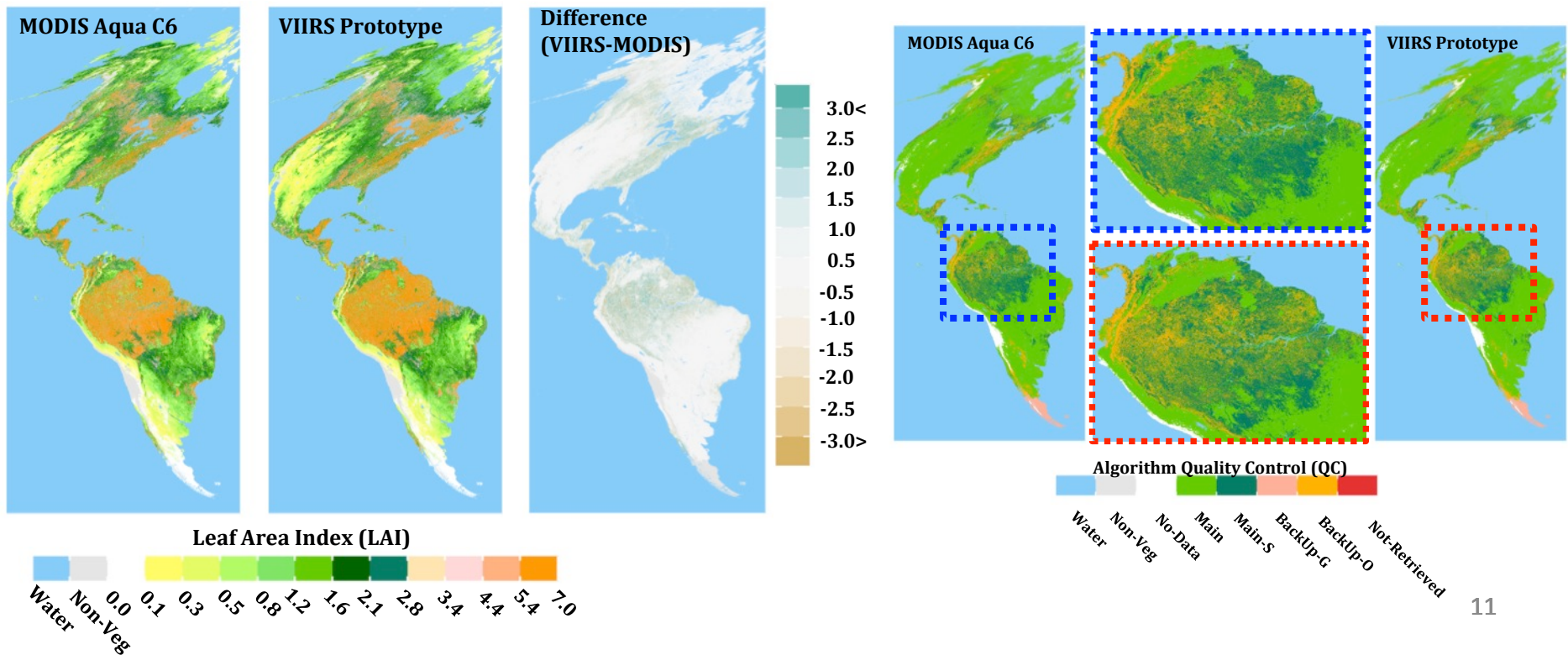


- ✓ **Global scale LAI/FPAR comparison between optimized VIIRS & MODIS C6**
 - Before adjustment, positive LAI biases are observed in all biomes (mean bias=+0.12)
 - After adjustment, observed biases (mean bias=+0.02) in LAI are significantly reduced with better RMSE (=0.55)
 - This improvement is also observed in FPAR case



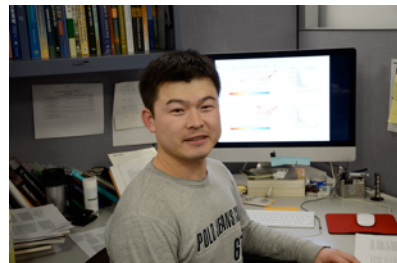


- ✓ Global scale LAI/FPAR comparison between optimized VIIRS & MODIS C6
 - Overall, comparable spatial distribution of LAI/FPAR & spatial coverage
 - Larger discrepancies are mostly induced by algorithm path mismatch (i.e., Main vs. Backup)
 - Relatively higher uncertainty in dense forest can be another causal factor (i.e., saturation)





- More details in a poster @ this meeting
- LUT submission end of summer 2016
- ATBD and papers aim for submission end 2016
- Lead work by Taejin Park (NASA Grad Fellow)



SUMMARY

- MODIS: Exciting times
- VIIRS: Two issues (a) HDF5 and (b) At least one more science test needed
- **THANK YOU!**

