

# Collection 6 MODIS Land Cover and Land Cover Dynamics

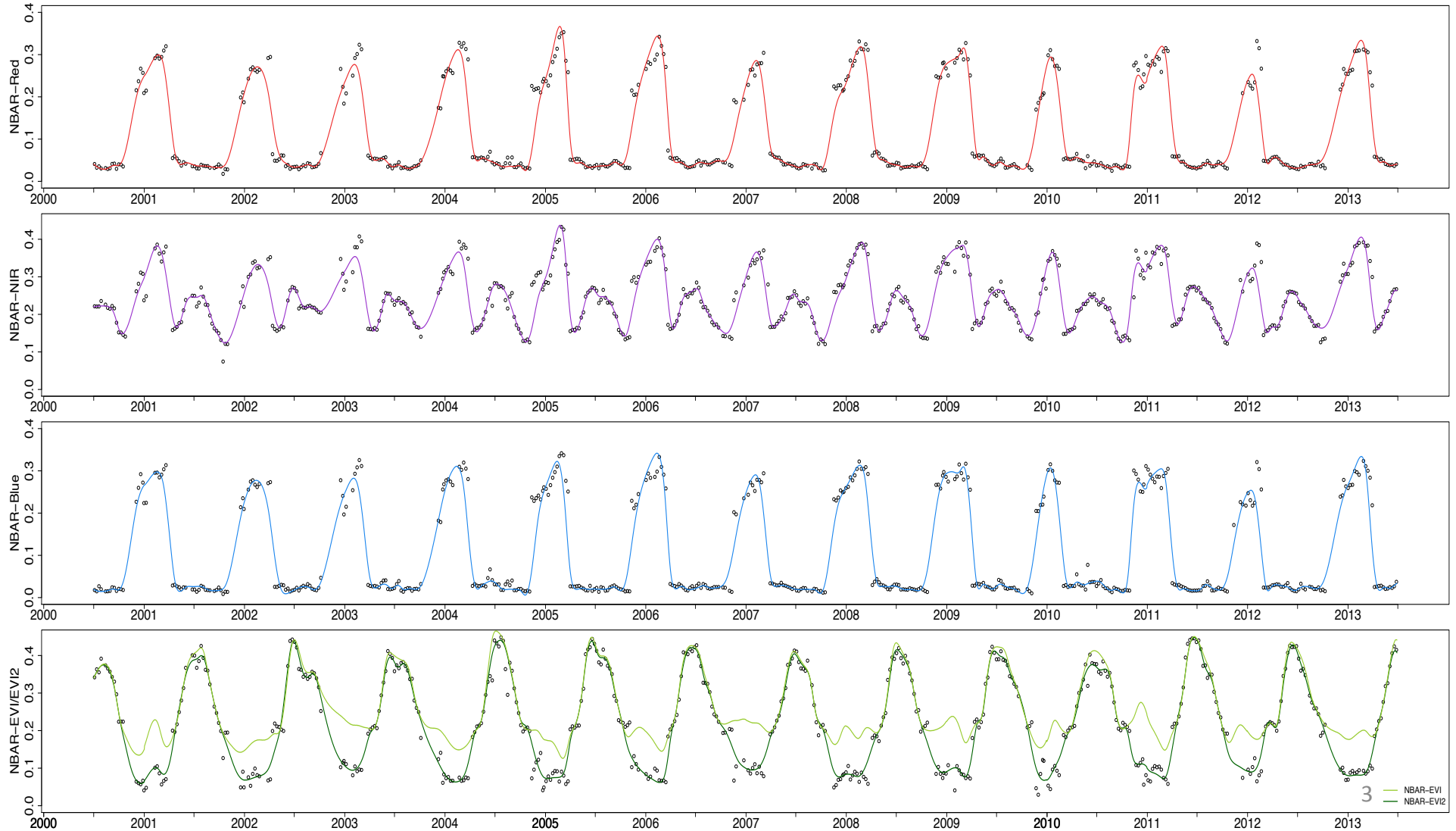
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MODIS Science Team Meeting, April 28-30<sup>th</sup> 2014

# Overview of MCD12 Changes

- Upstream improvements: Daily NBARs (MCD43A4)
- Common, spline-smoothed inputs
- Interaction between Q1 and Q2 products
  - Using Phenology metrics as inputs to Land Cover classifications
  - Using existing Land Cover to parameterize phenology algorithm

# Spline Smoothing NBAR

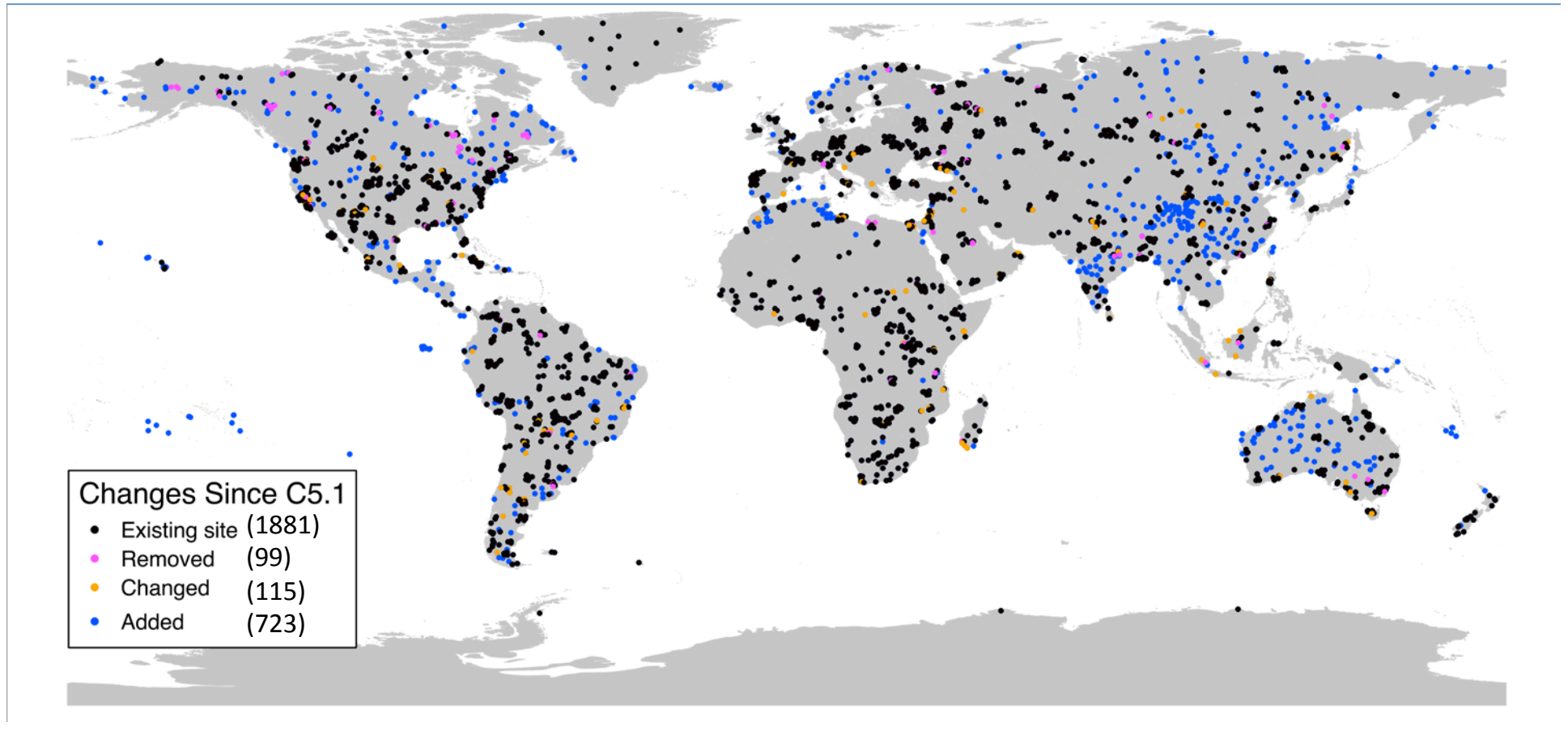
Motivation: fill temporal gaps, smooth noise



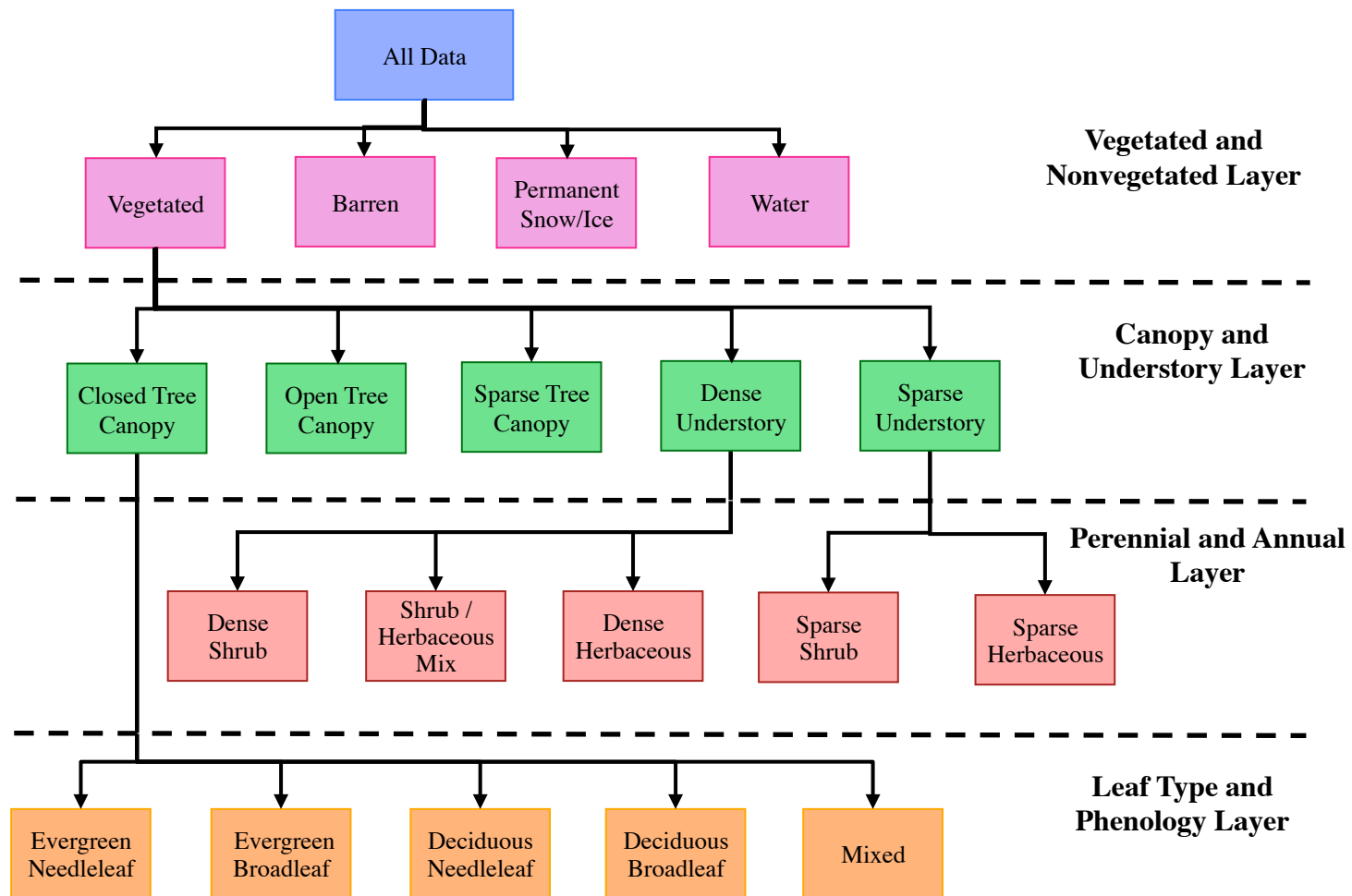
# C6 MCD12Q1: Land Cover Type

- C5 issues
  - Noisy inputs and missing data
  - Challenges mapping agriculture, wetlands, urban, shrubland classes
  - Changing LC labels through time (“stabilization”)
- Algorithm Refinements
  - Smoothed and gap-filled inputs
  - Hierarchical classification
  - RandomForest replaces ensemble C4.5 decision trees
  - New land cover schema based on FAO-LCCS
  - Better algorithm for multi-year stabilization

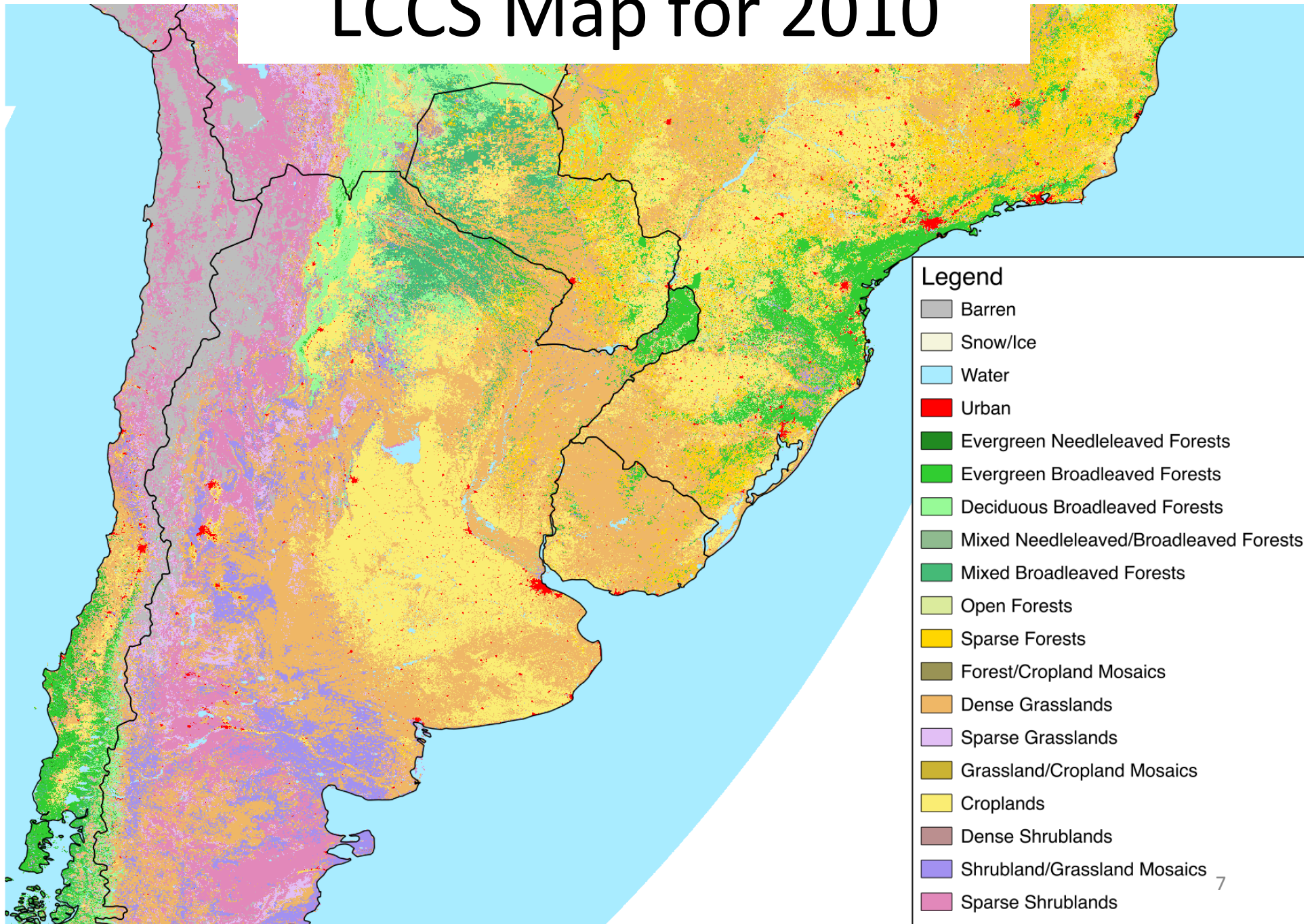
# Training Site Updates Since MCD12Q1 Collection 5.1



# Land Cover Hierarchy



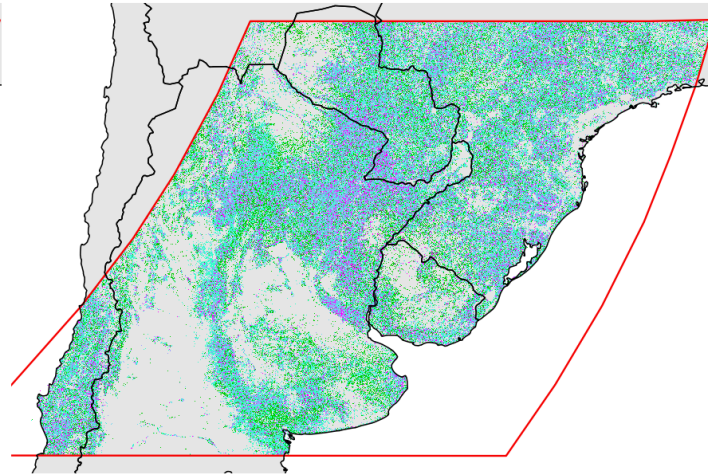
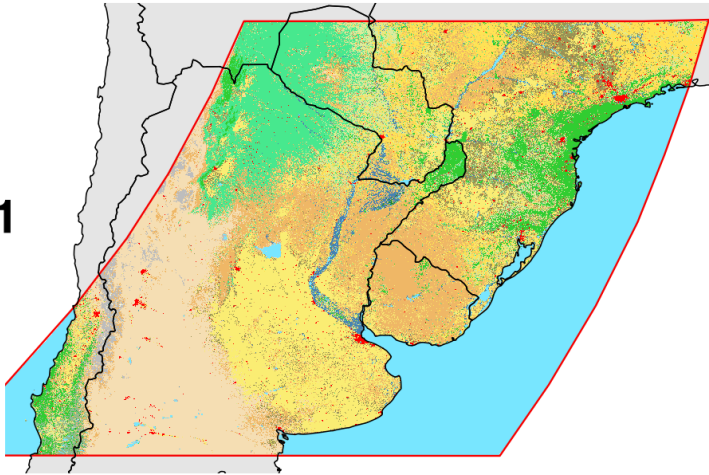
# LCCS Map for 2010



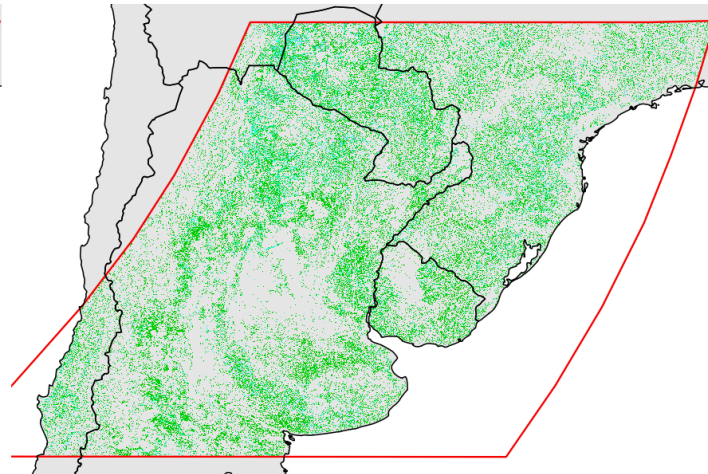
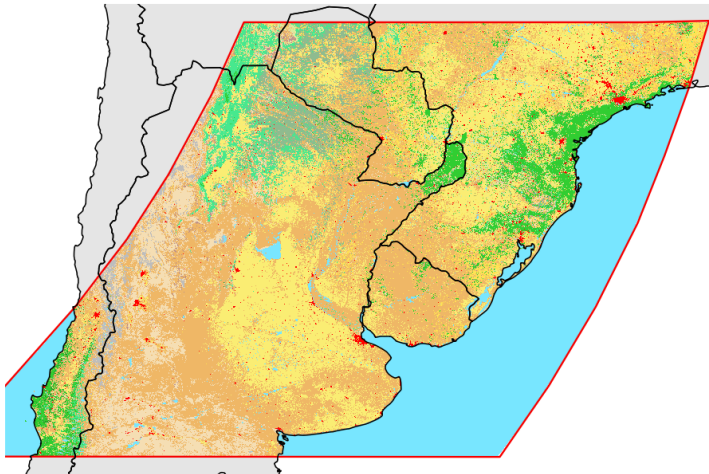
## 2010 IGBP Label

## Stability Through Time

C5.1



C6



### IGBP Classes

- |                              |                                       |
|------------------------------|---------------------------------------|
| Evergreen Needleleaf Forests | Wetlands                              |
| Evergreen Broadleaf Forests  | Croplands                             |
| Deciduous Broadleaf Forests  | Urban and Built-up Lands              |
| Mixed Forests                | Cropland / Natural Vegetation Mosaics |
| Woody Savannas               | Permanent Snow / Ice                  |
| Savannas                     | Barren                                |
| Open Shrublands              | Water Bodies                          |
| Grasslands                   |                                       |

### Number of Toggles Between 2001-2011

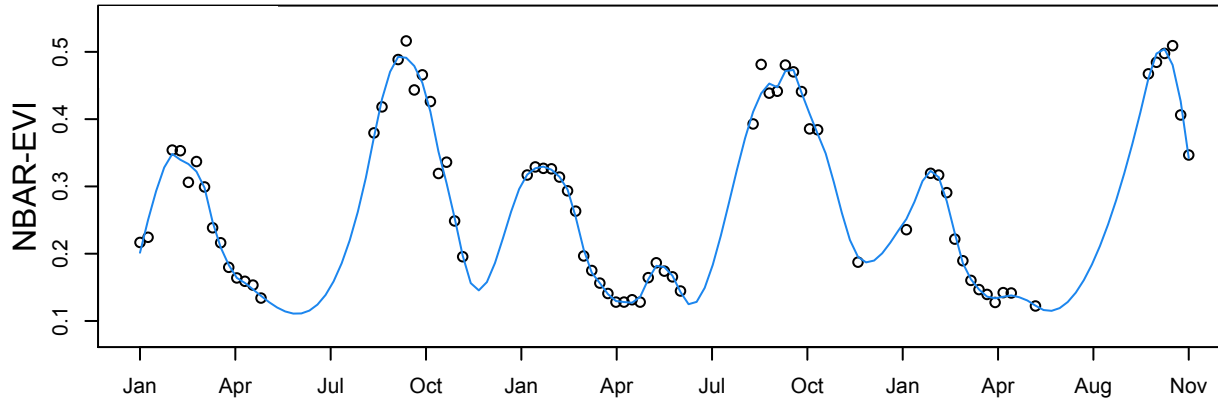
- |                      |
|----------------------|
| No Toggles           |
| One Toggle           |
| Two Toggles          |
| Three Toggles        |
| Four Toggles         |
| Five or More Toggles |



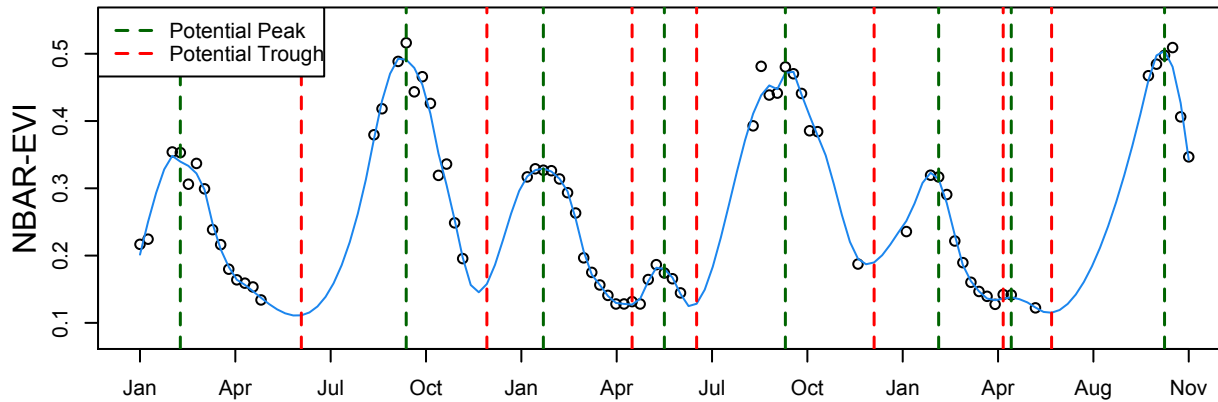
# C6 MCD12Q2: Land Cover Dynamics

- Issues
  - QA/QC
  - Early bias
  - Missing data
- Algorithm Refinements
  - Spline-fit daily NBARs
  - Greater flexibility, particularly in agriculture
  - Working QA/QC

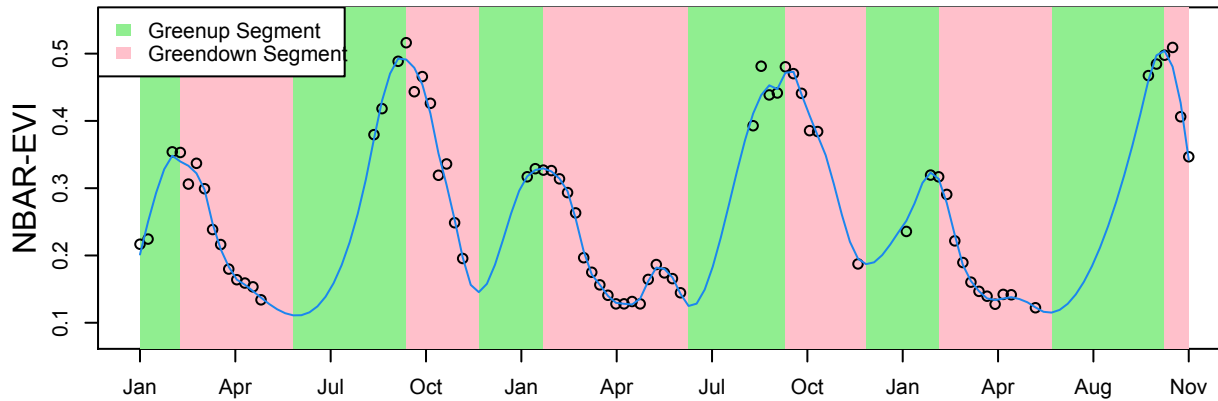
# Time series segmentation procedure



1) Assemble & smooth

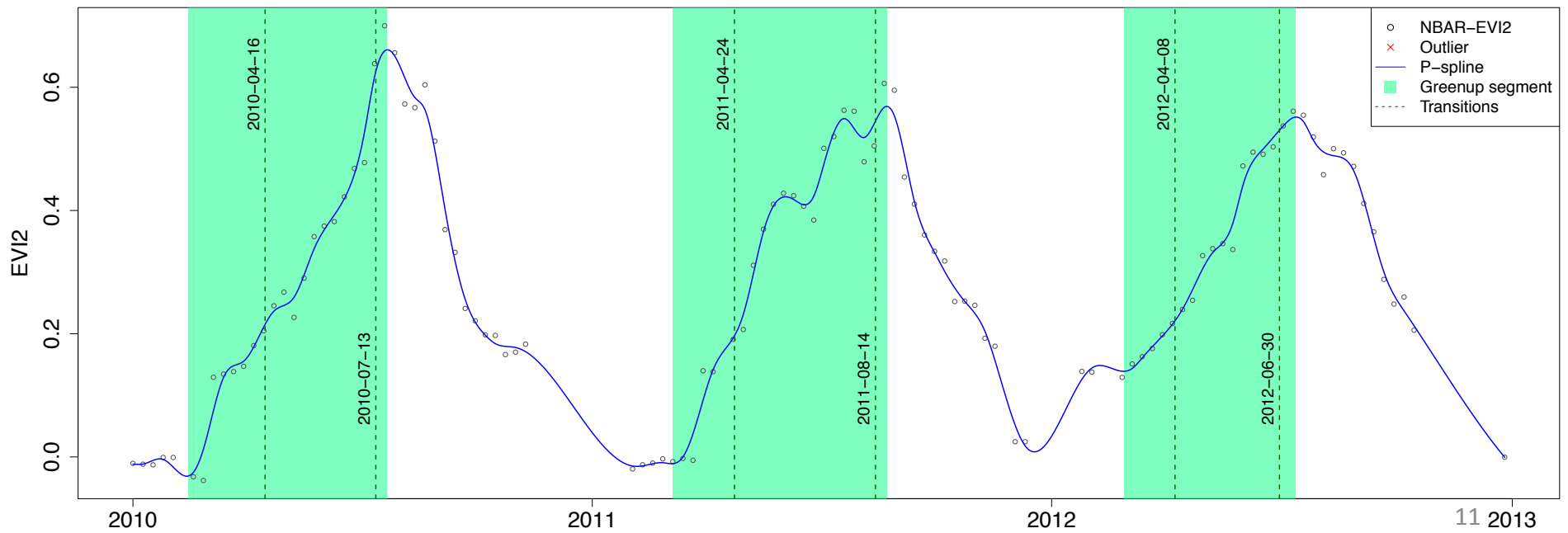
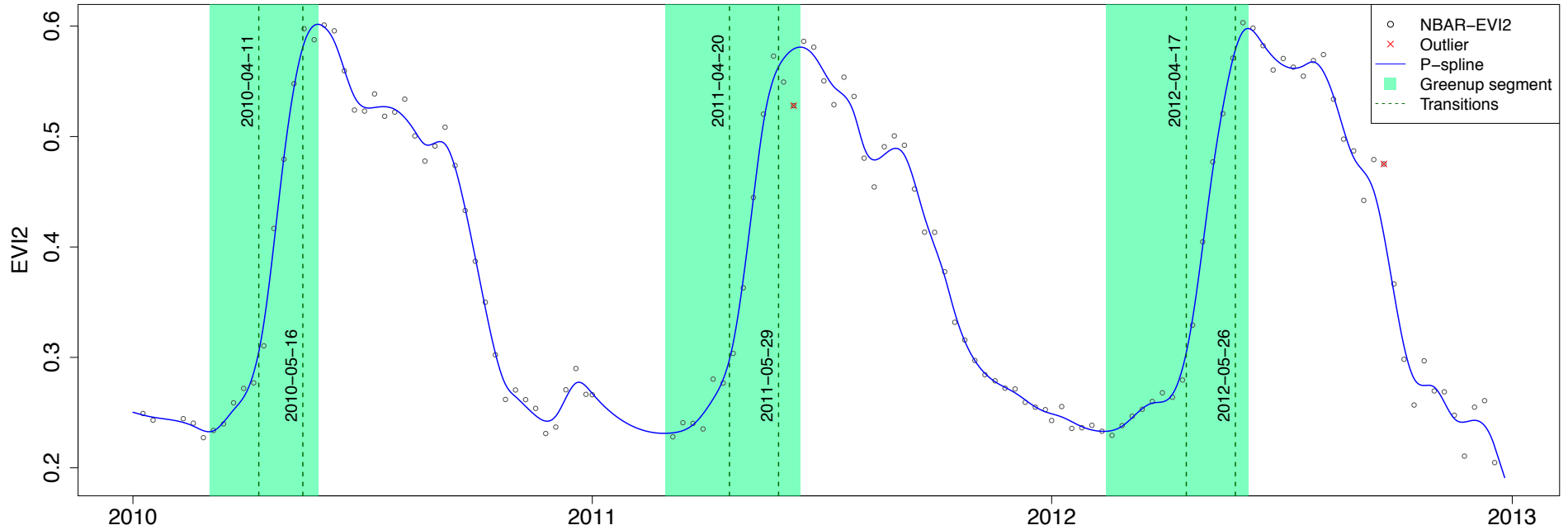


2) Potential peaks/troughs

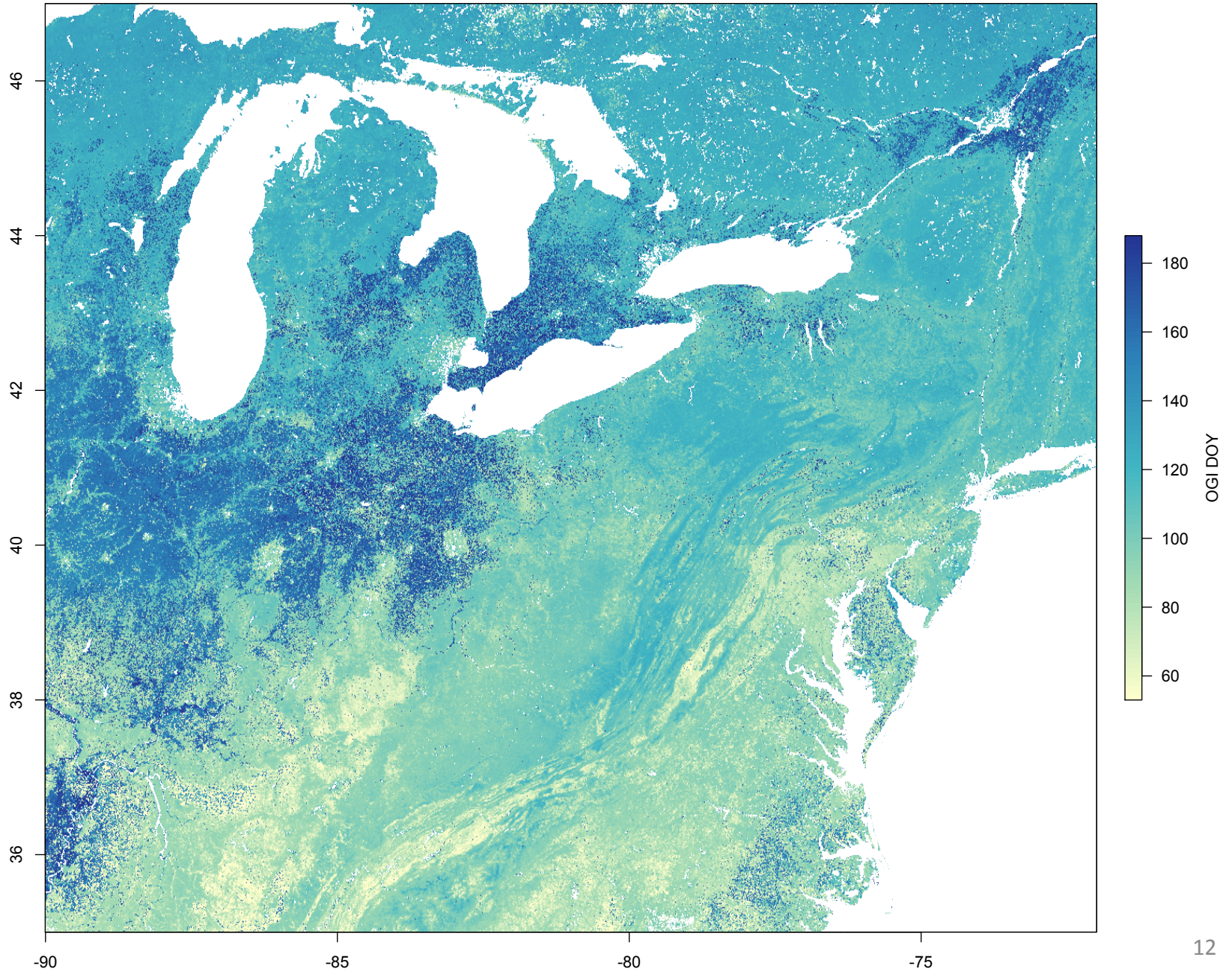


3) Filter peaks/troughs, finalize segments

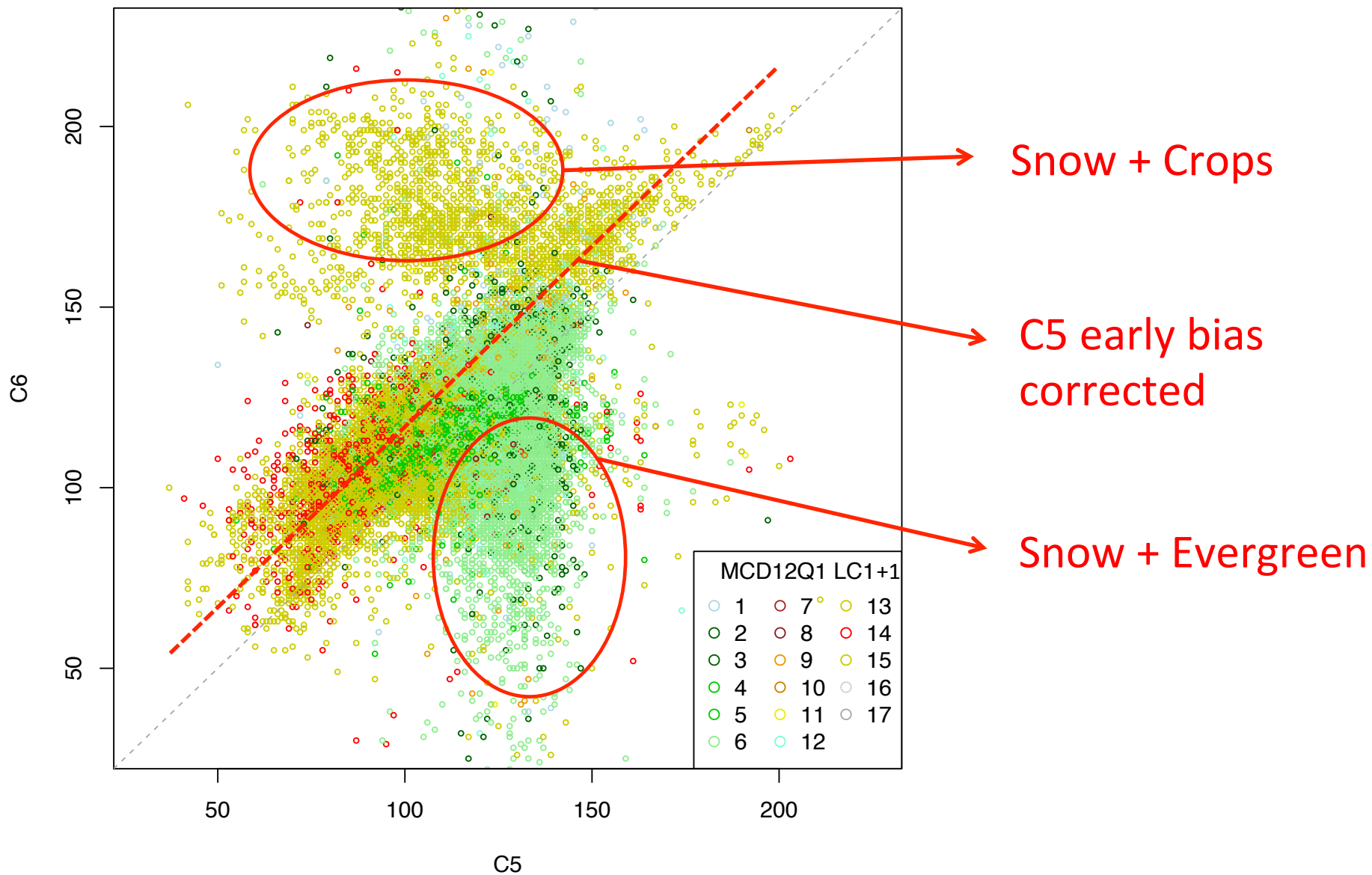
# An argument for splines vs. logistic functions



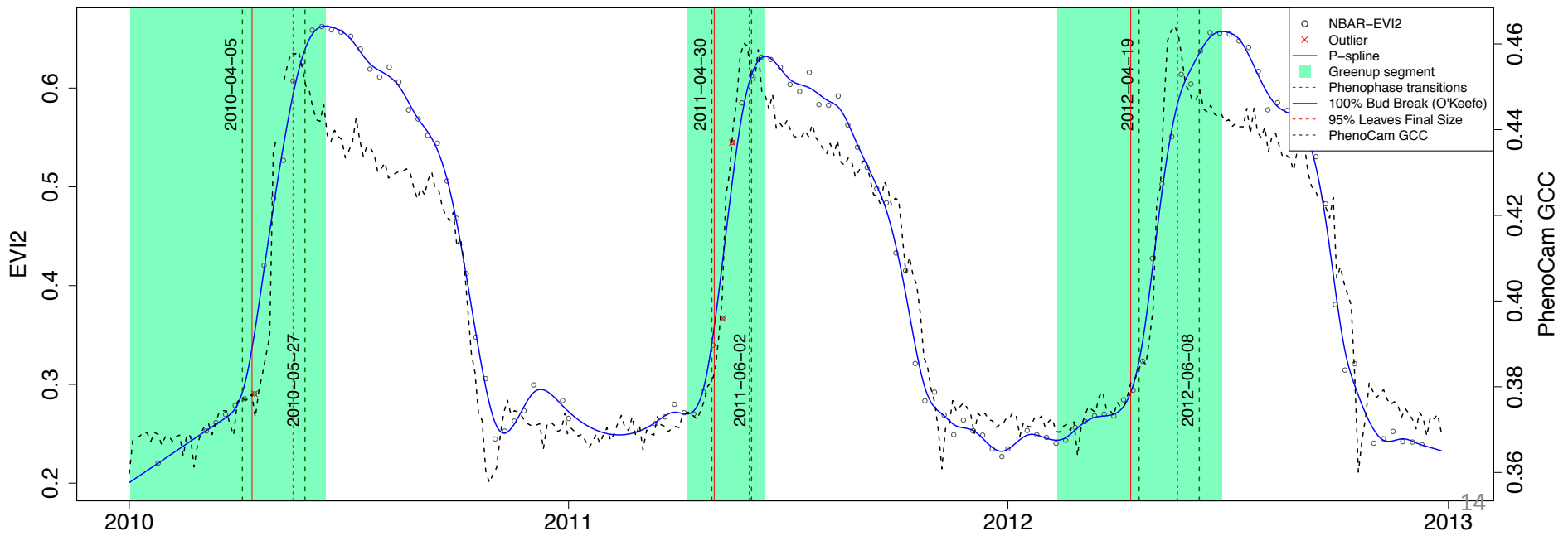
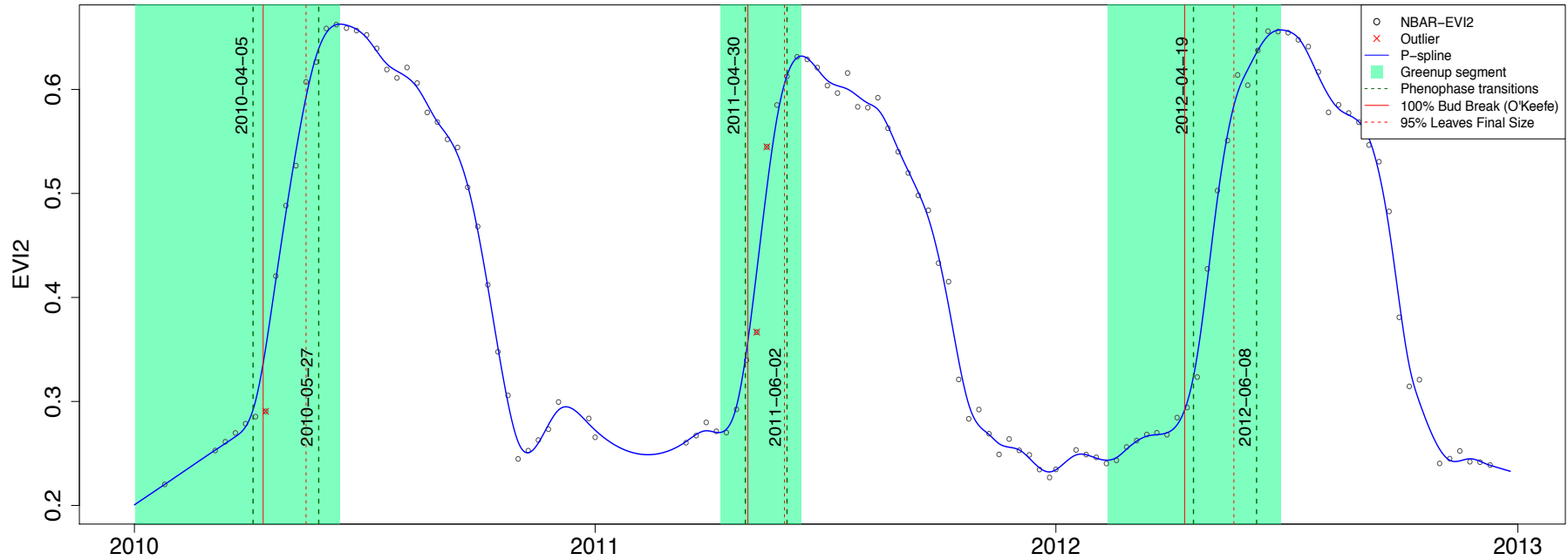
# Preliminary results: OGI 2011 Eastern North America



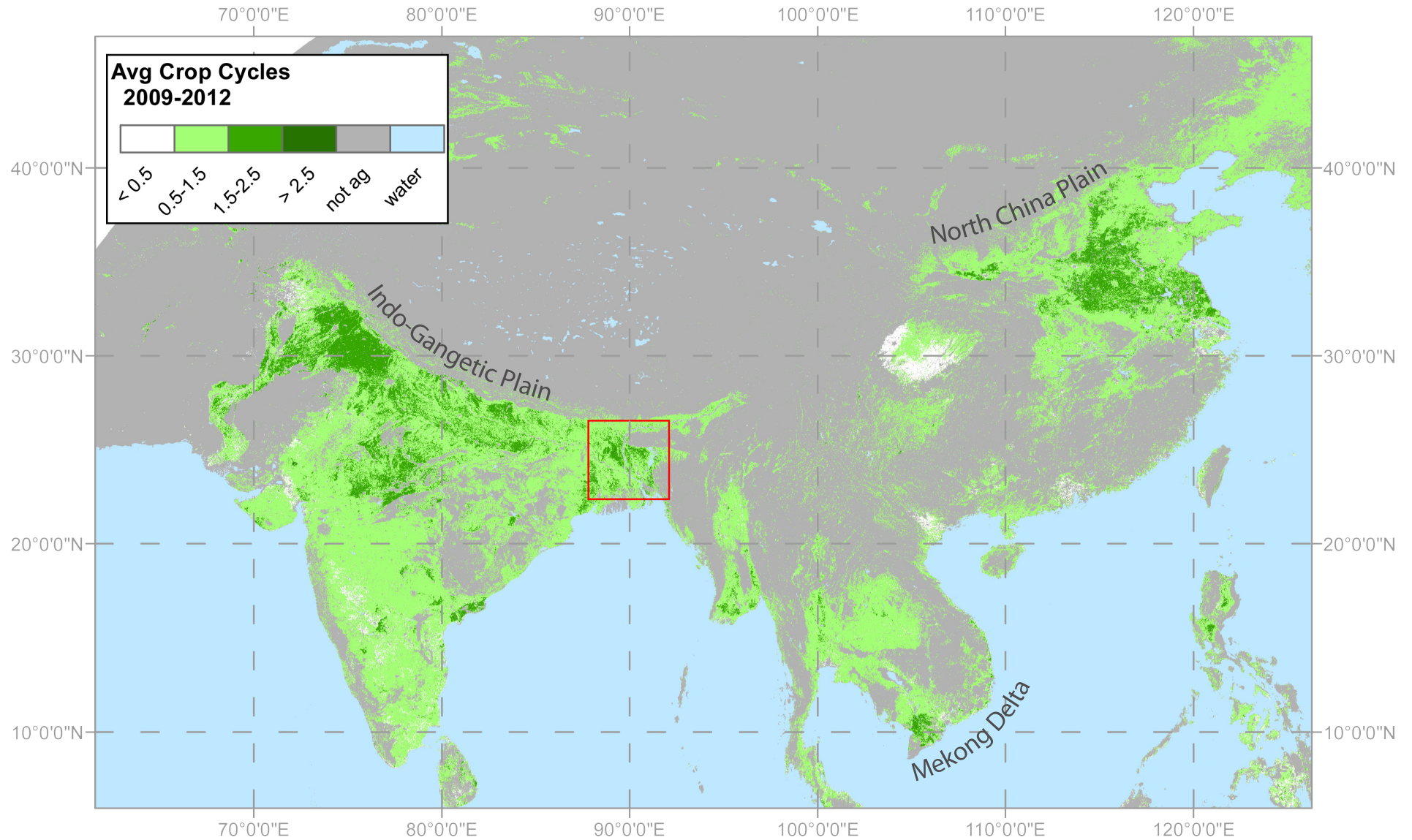
### OGI: 20% Threshold



# Comparison @ HF w/ PhenoCam and O'Keefe Datasets



# Improved performance in croplands: multicropping



# Summary/Looking Forward

- C6 Refinements
  - Better performance in croplands
  - Reduced bias
  - Less missing data
  - Improved QA/QC
- Assessment
  - Ground datasets are limited, but the PhenoCam network offers a new opportunity for assessment

