

DIRECT READOUT LAND PRODUCTS/ALGORITHMS: **Burned Area**

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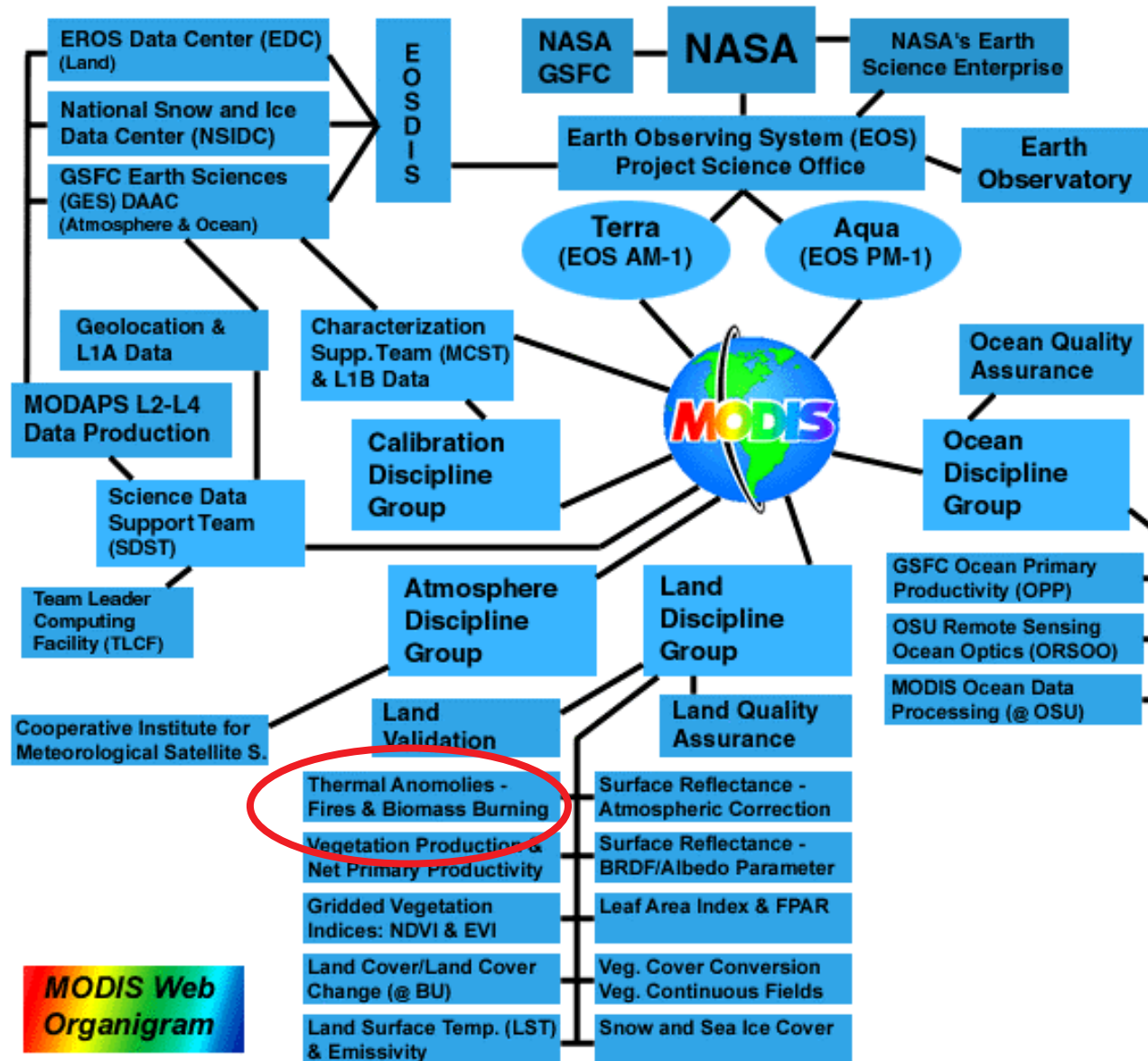
\$ Boston University, Department of Geography

Mexico-City: 8th-11th October 2007
Unidad de seminarios / UNAM

Production de nourriture and the current state

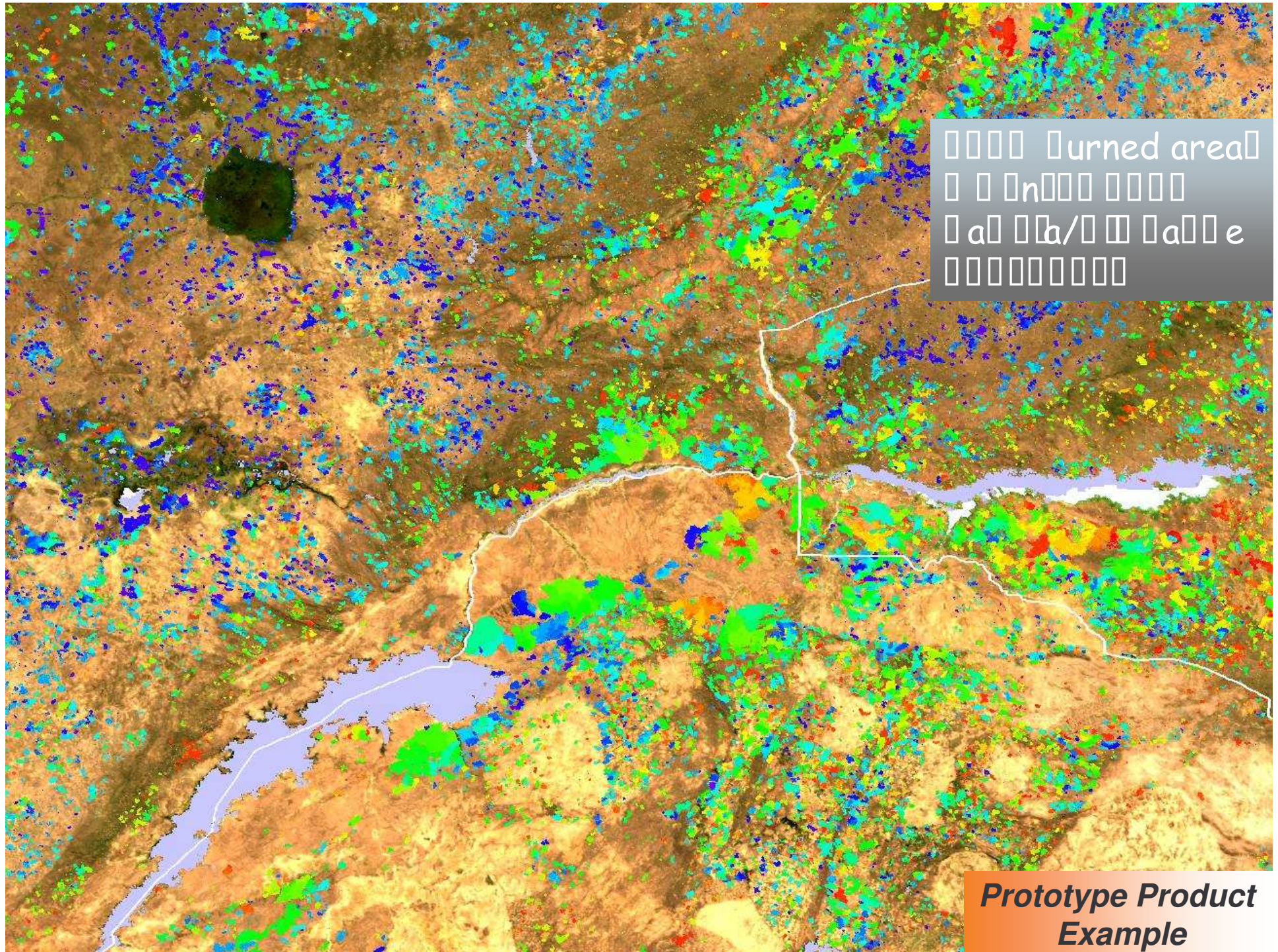
MODIS Science Team Organization & Products

(products = derived information, i.e. *not* images)



Global MODIS Burned Area Product

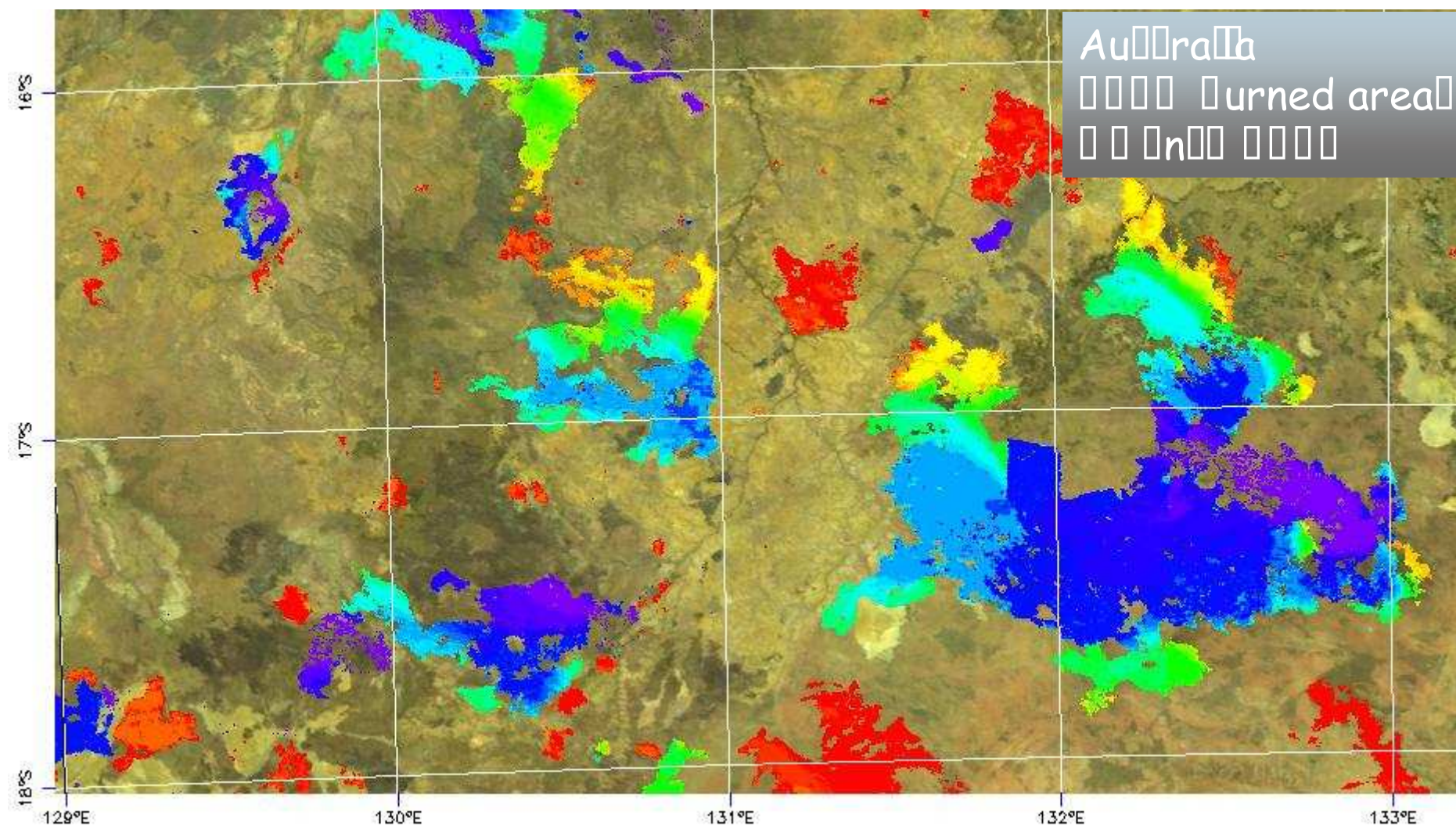
- Funded as part of NASA MODIS Fire Science Team (Justice *et al.*) to complement the well established (Collection 1,3,5) MODIS 1km active fire product
- Global applications
 - Green house gas & aerosol emissions estimation
 - Applied users (e.g., natural resource management)
 - LCLUC research (e.g., Fire – Climate – People)
- Product prototyping by regional algorithm development during the MODIS Collection 4 era
- Collection 5 processing now underway for MODIS data sensed 2000+ (reprocessing) and Feb. 2007+

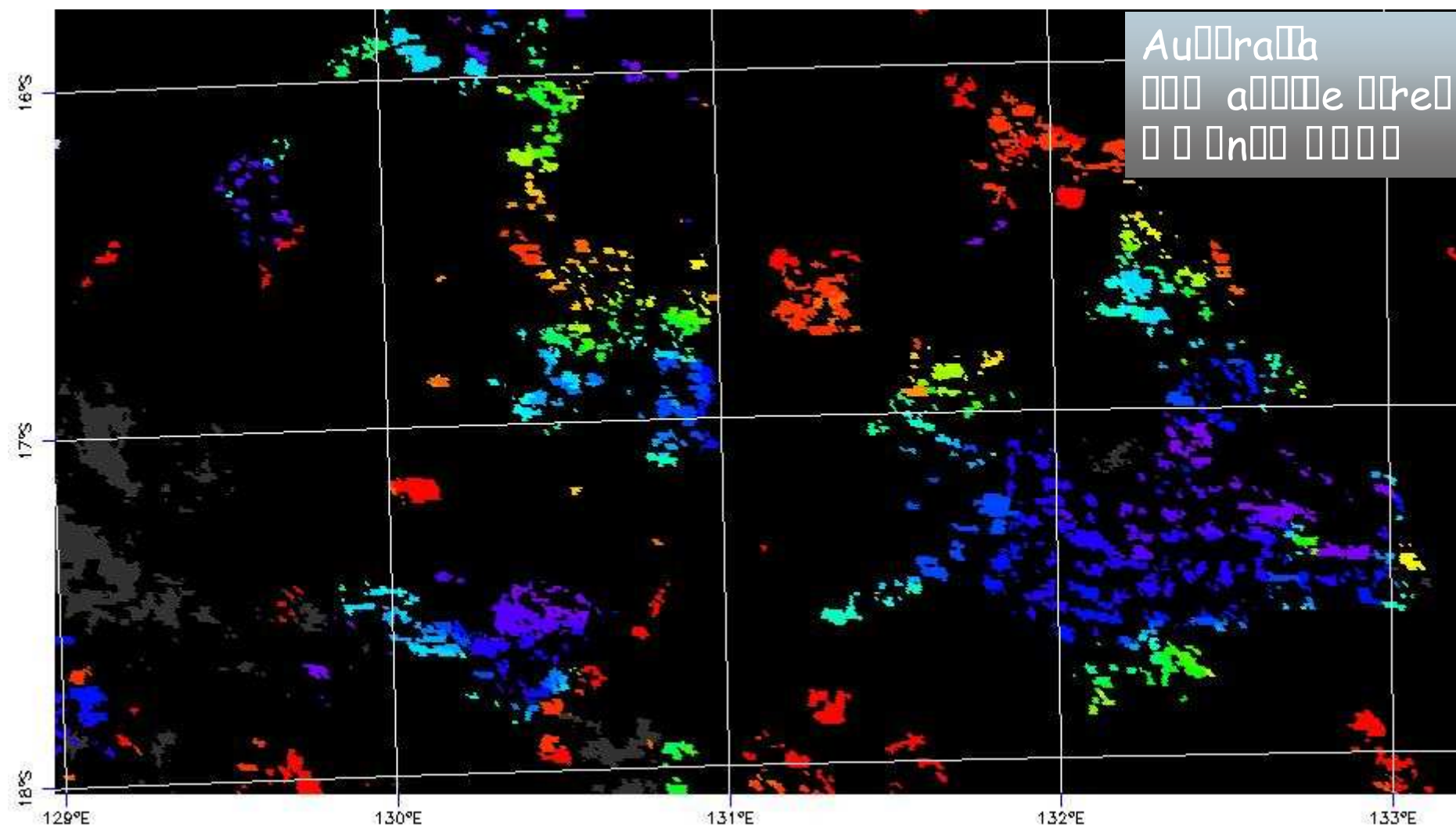


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**Prototype Product
Example**

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The Global MODIS Burned Area Product

MCD45

- **Monthly Product (MCD45A1)**
 - 500m approximate day of burning over month +/- 8 days
 - 10x10 degree MODIS Land tiles
 - extensive QA & metadata
 - EOS-HDF
- **Annual Synthesis Product (forthcoming)**
 - as monthly product but for calendar year
- **CMG 0.25 deg product (forthcoming)**
 - aggregated information for climate modeling community (continental scale, easily accessible format)

Algorithm

- *Rolling BRDF based expectation change detection*
 - Semi-Physically based; less dependent upon imprecise but noise tolerant classification techniques; very few thresholds
 - Automated, without training data or human intervention
 - **Applied independently per pixel to daily gridded MODIS 500m land surface reflectance time series**
- => globally map 500m location and approximate day of burning**

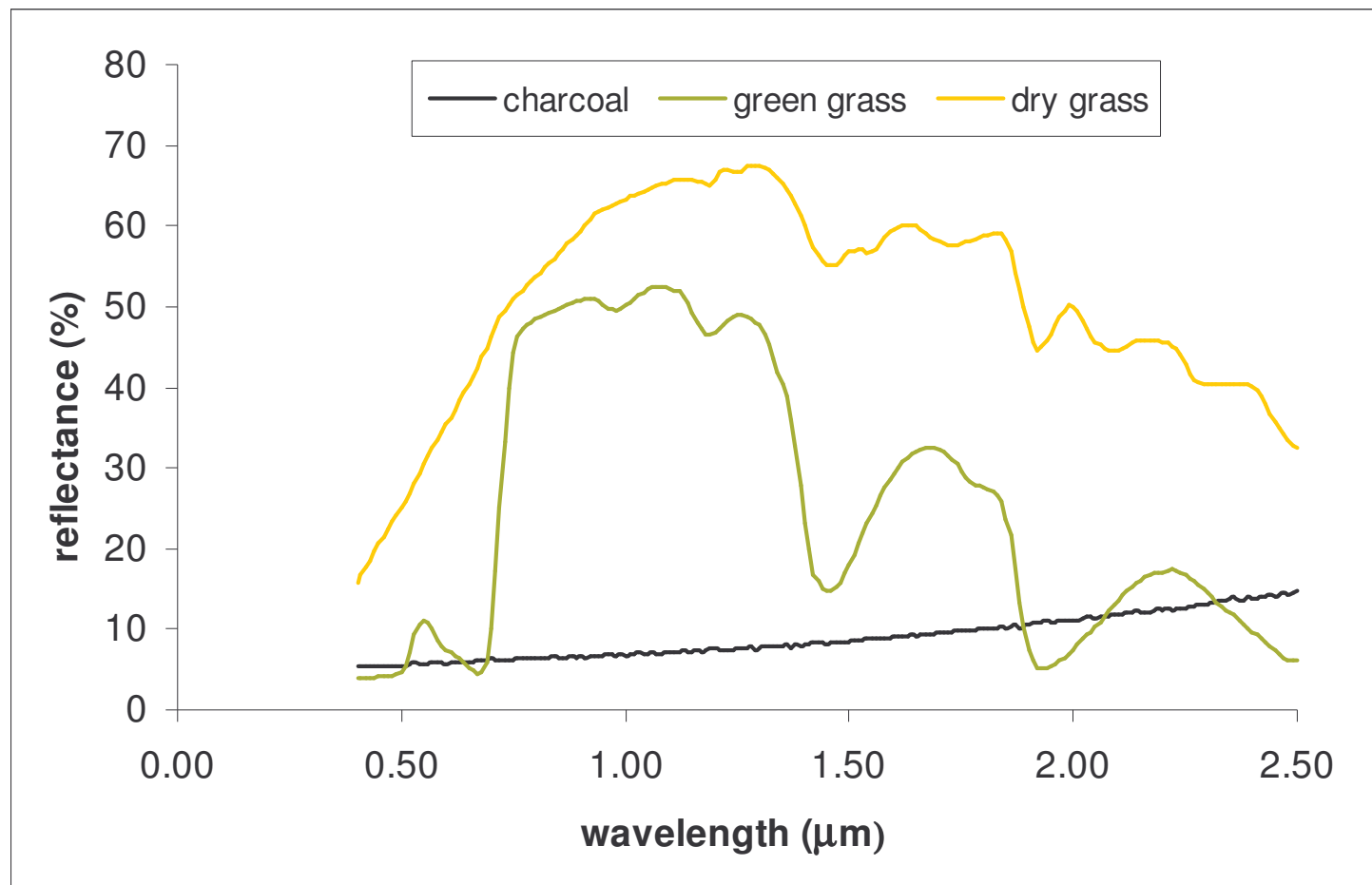
Burned Area □ Chara □ □ er □ □ ed □ □

- deposits of charcoal and ash
- removal of vegetation
- alteration of vegetation structure
- exposure of underlying material



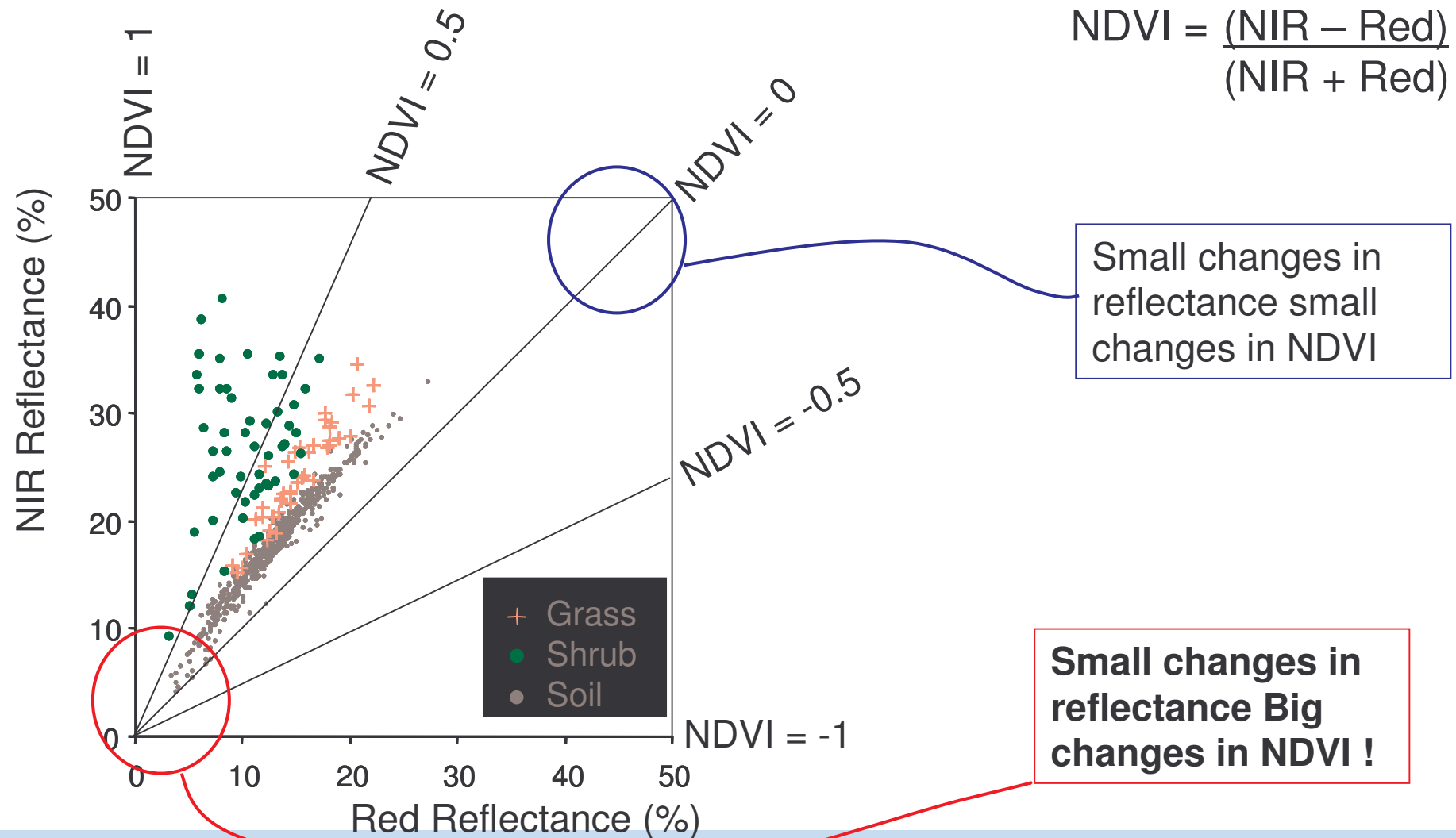
Cheikh Mbow,
Senegal

Land surface reflectance characteristics of bare ground, green grass and dry grass

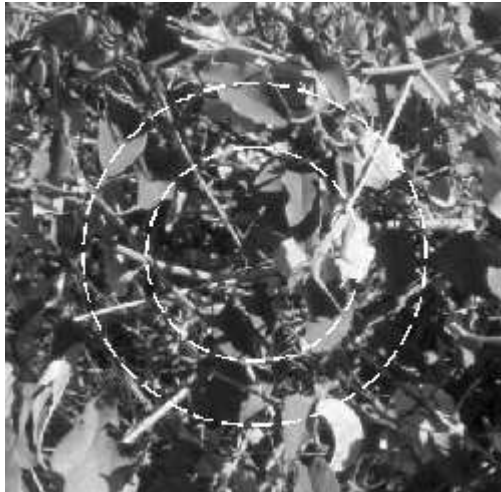
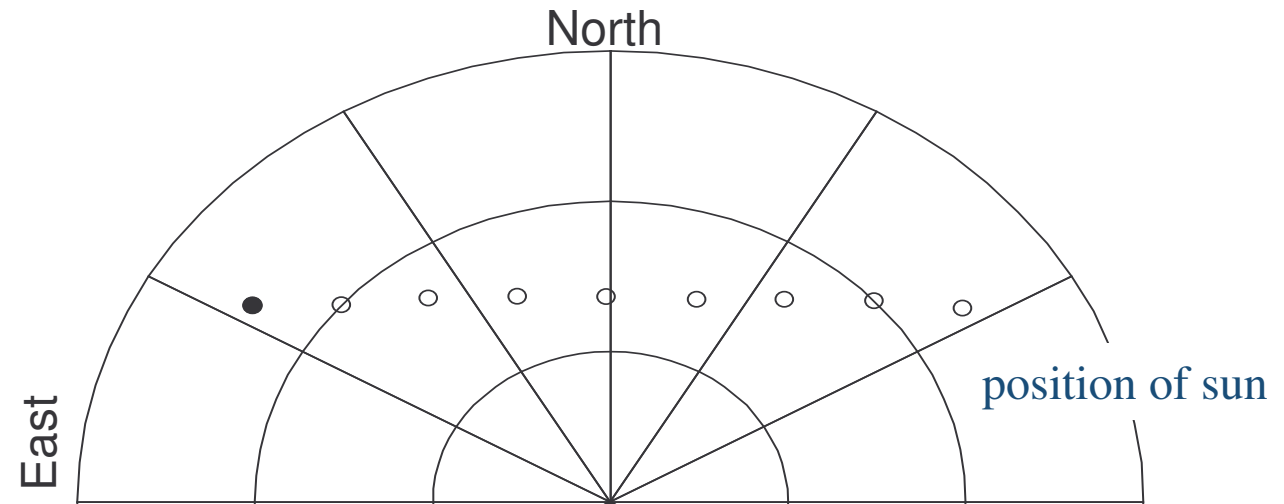


i.e. burning reduces reflectance at reflective wavelengths

NDVI is higher for bare ground and urban areas
are sensitive to small reflectance



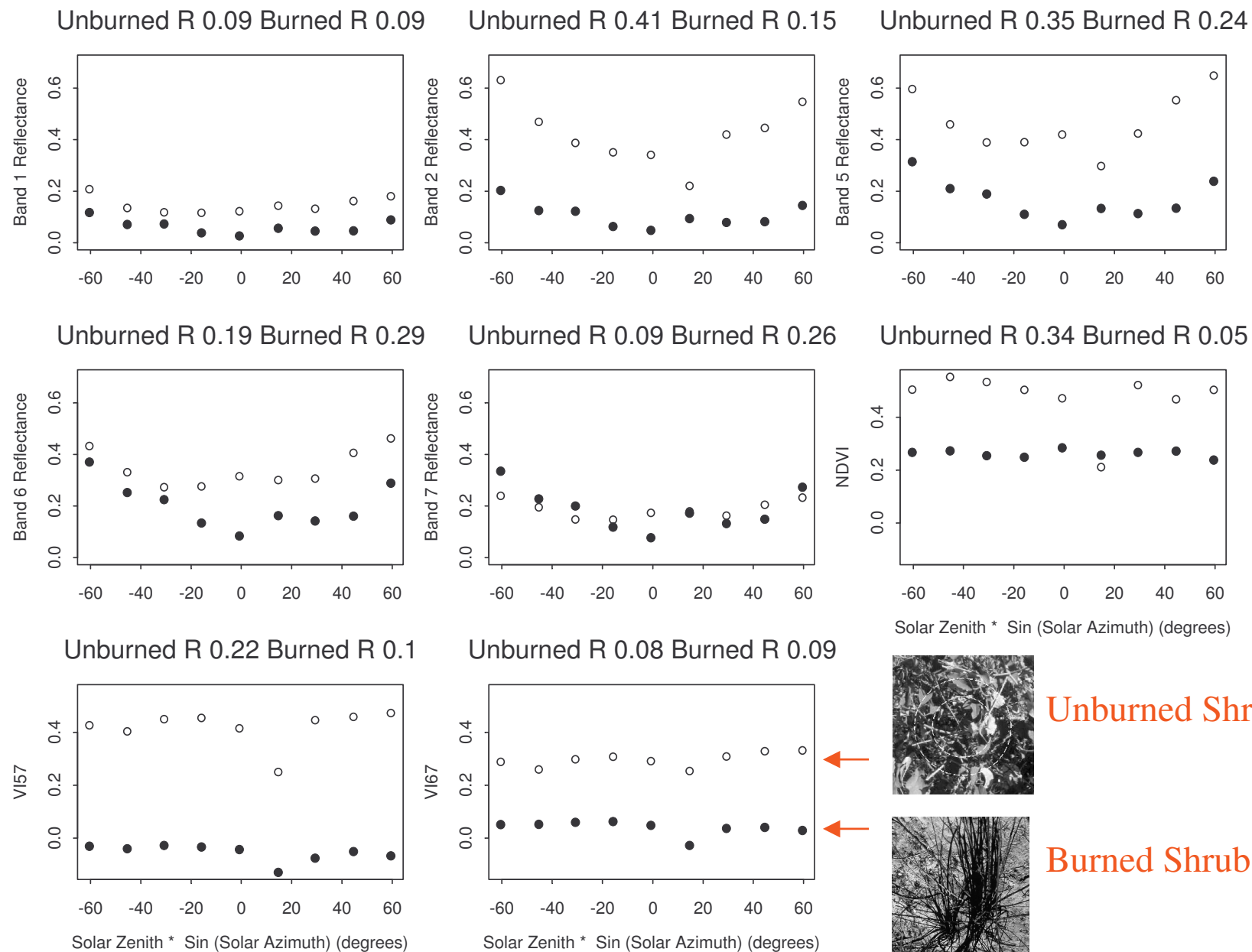
Field data
 feature on
 burned and
 unburned
 over a day
 Na



Unburned Shrub

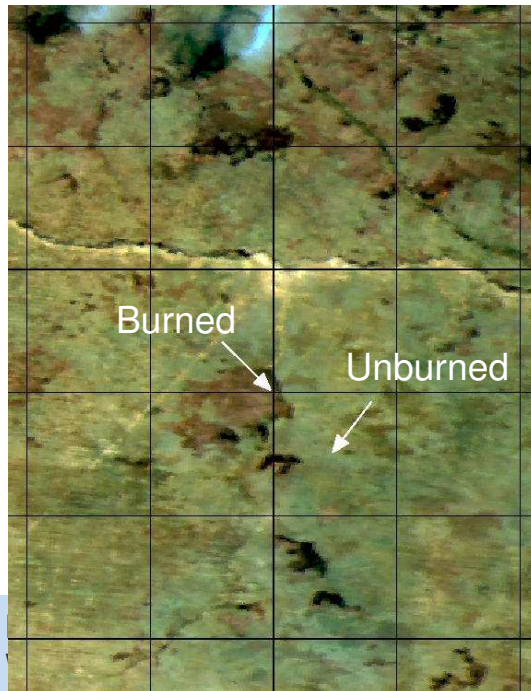


Burned Shrub

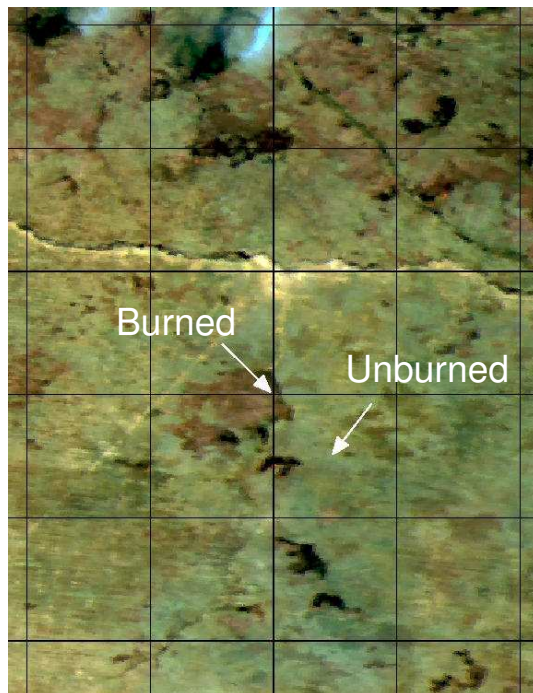
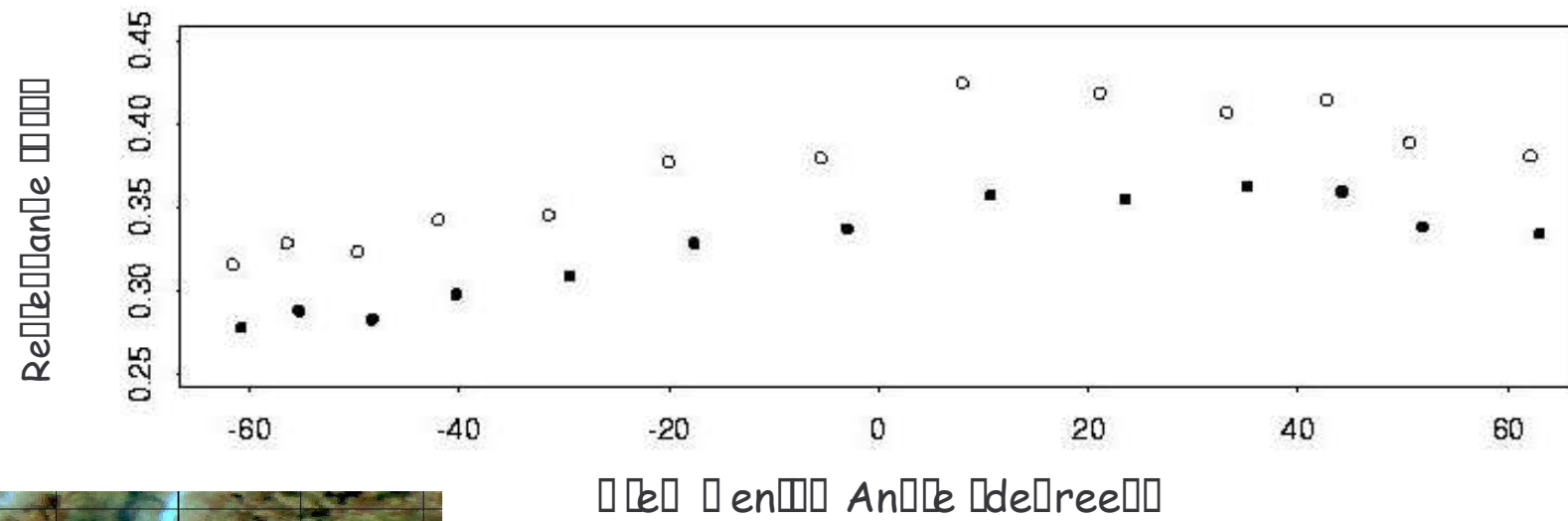


Terrestrial vegetation:

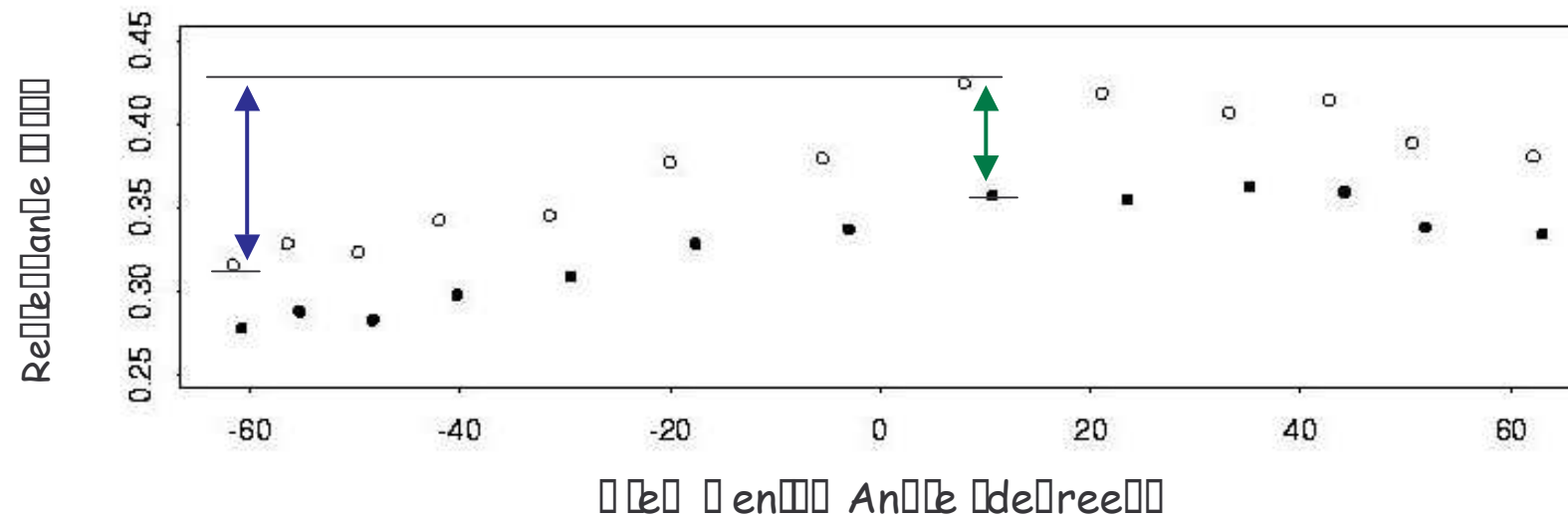
Can data from MODIS $2500\mu\text{m}$ and surface reflectance for
unburned and burned forested regions



Analyzing/Naive Bayesian model and deep neural network
to predict the forest

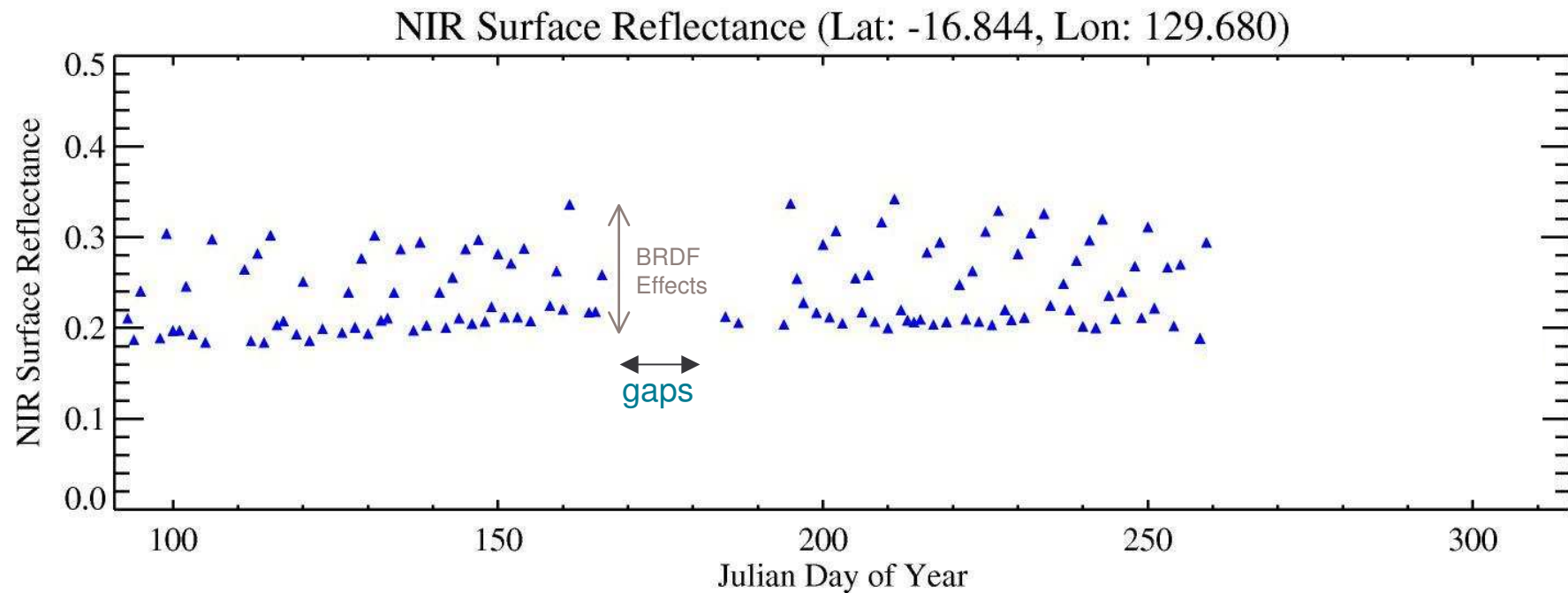


Analysis/Naive Bayesian model and decision tree and other methods

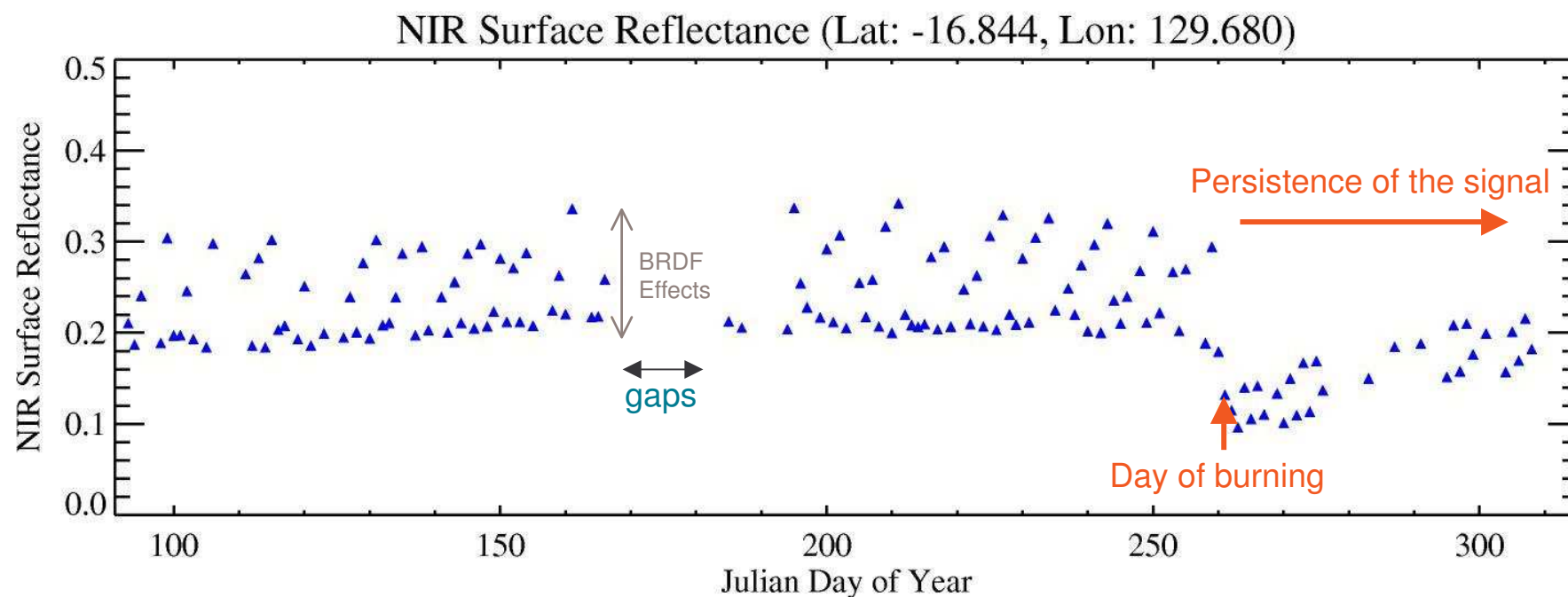


reflectance reduction **due to burning** < reduction **due to BRDF effects**

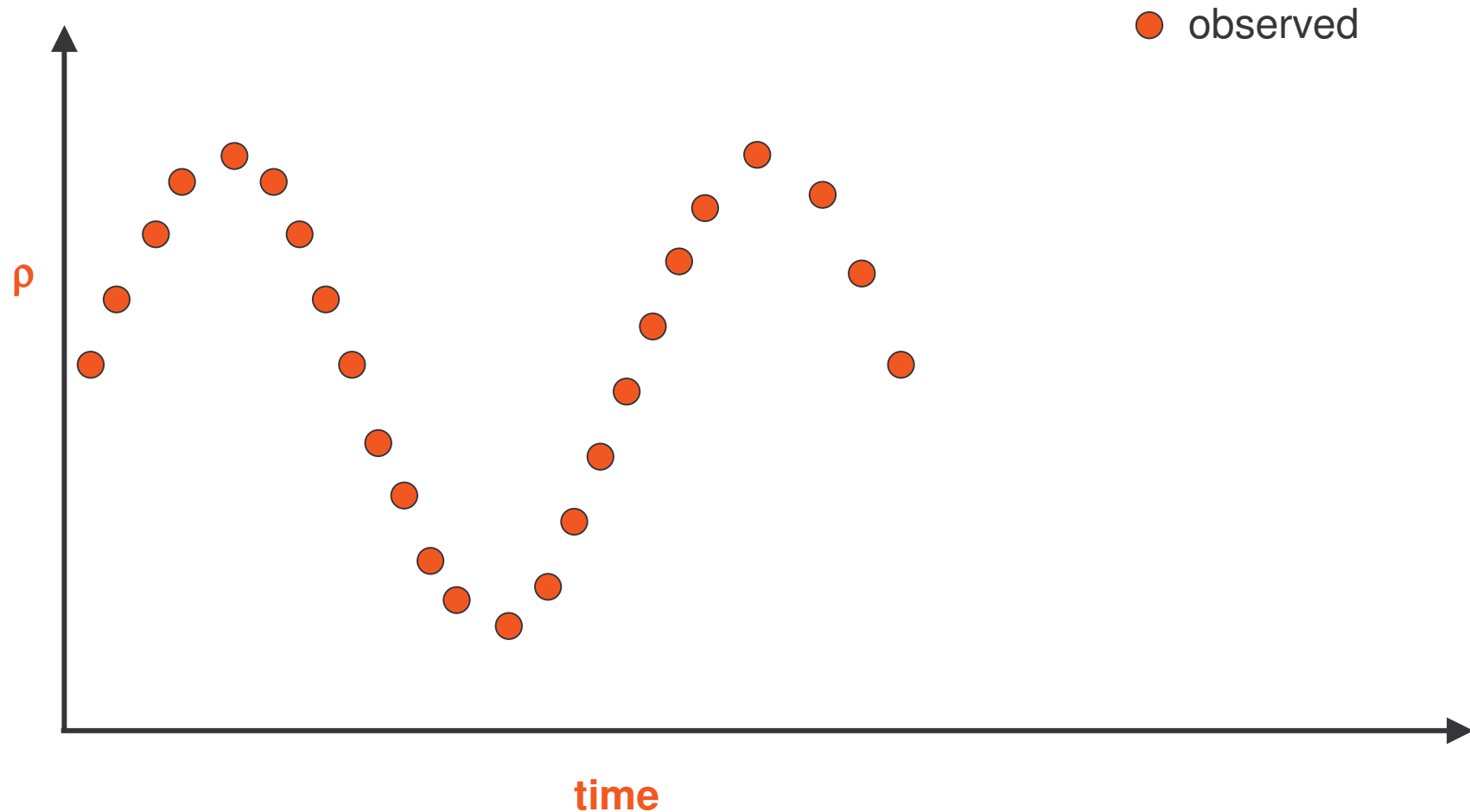
The challenge of change detection of Burned Areas



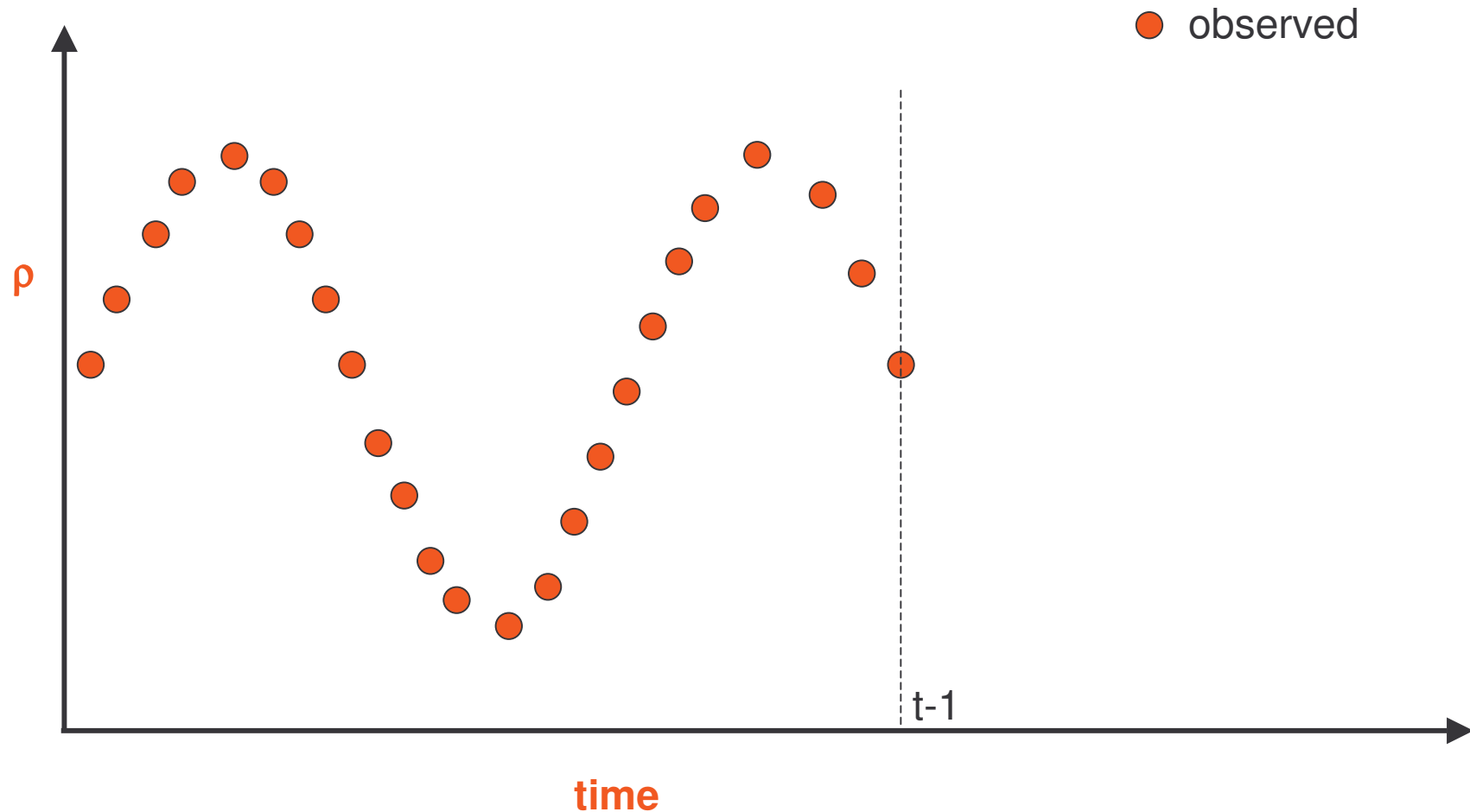
The challenge of change detection of Burned Areas



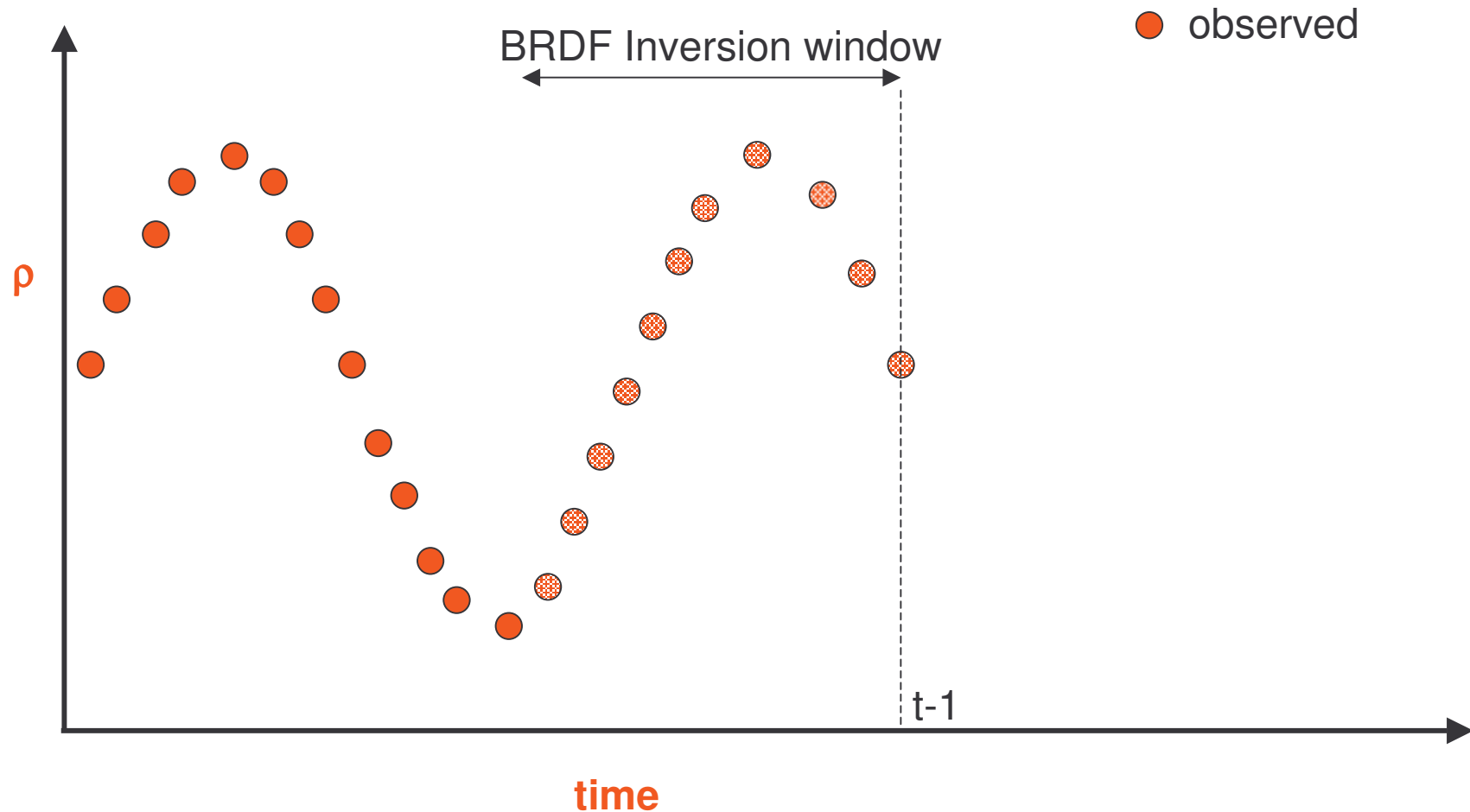
Conceptual Scheme (one pixel, time series)



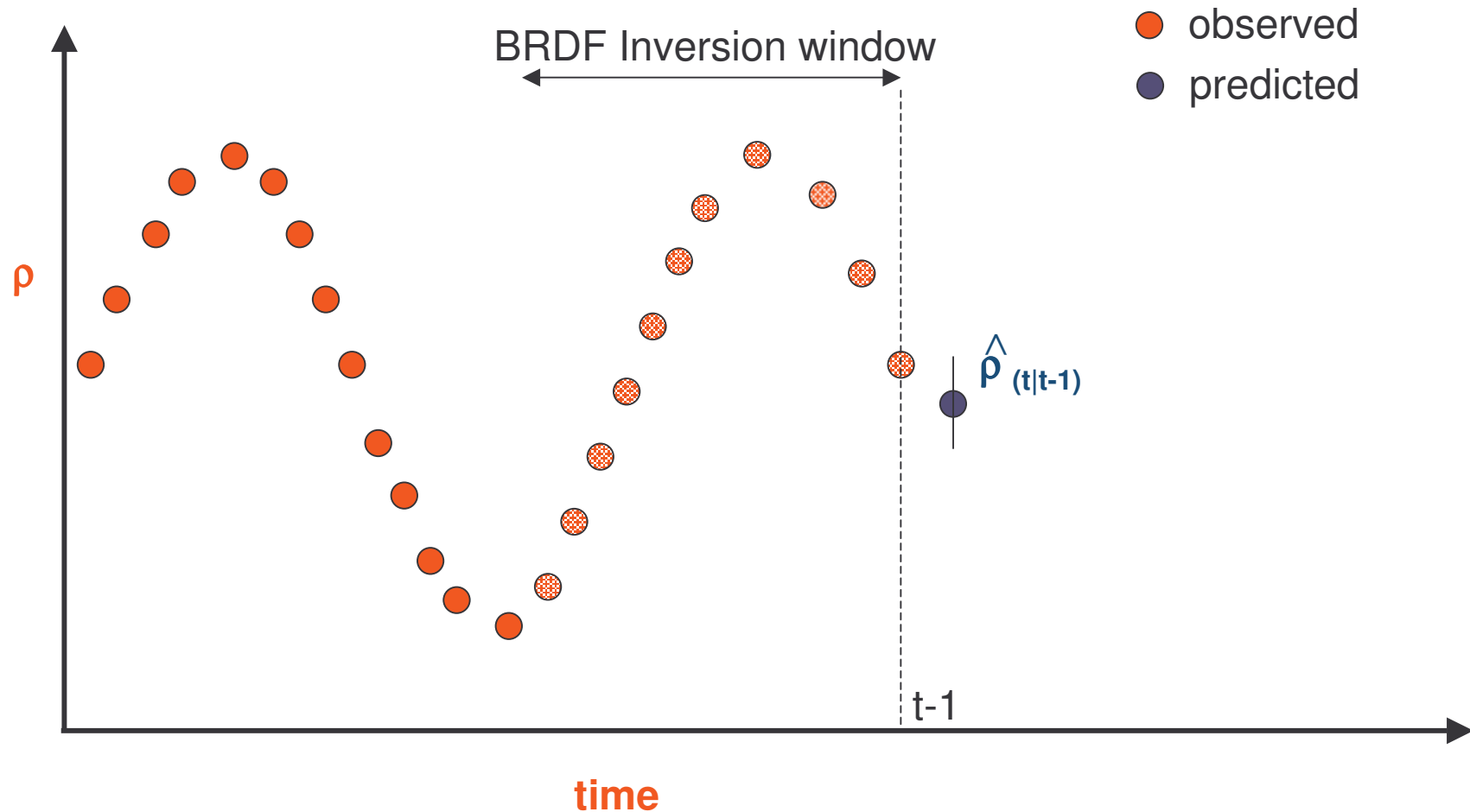
Conceptual Scheme



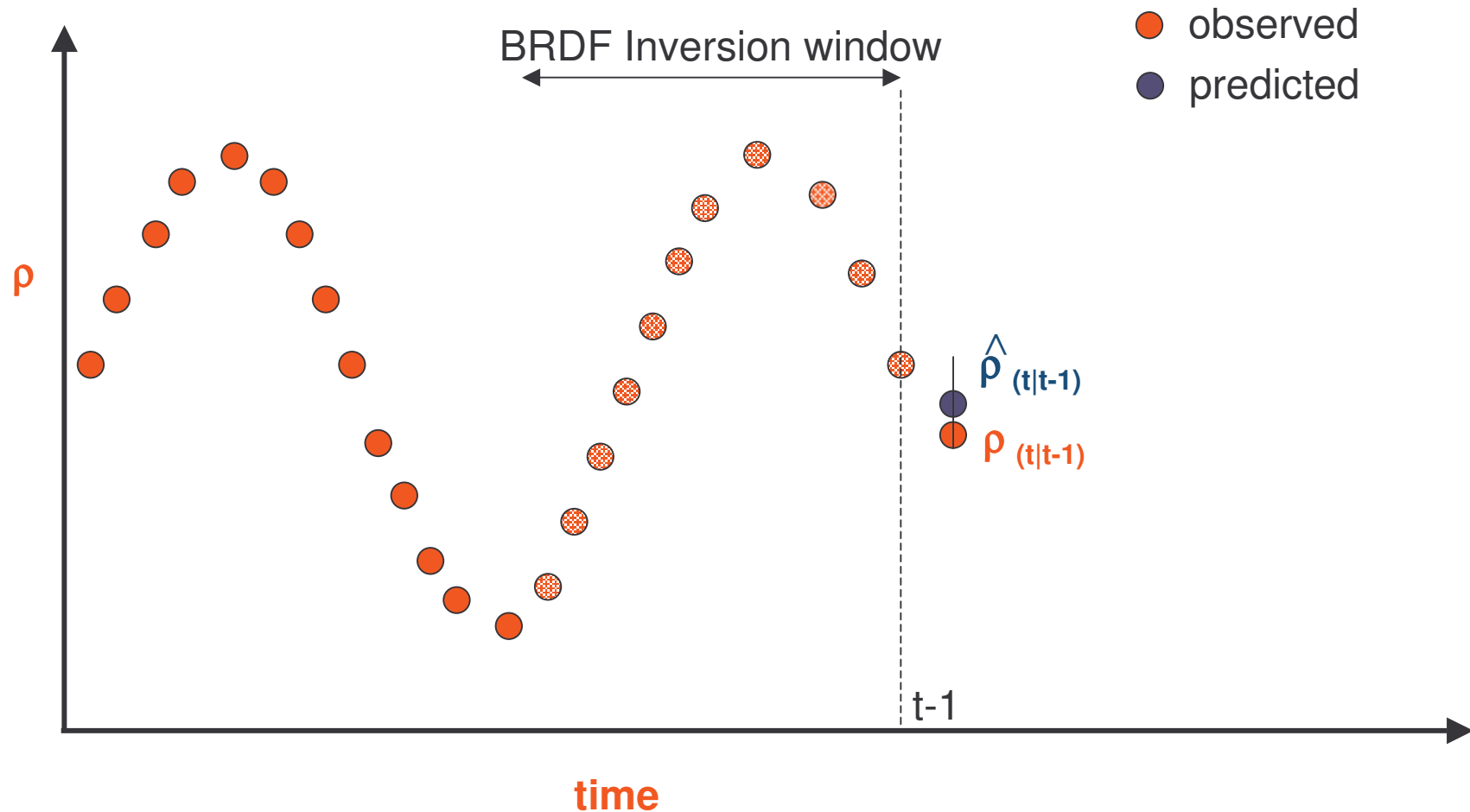
Conceptual Scheme



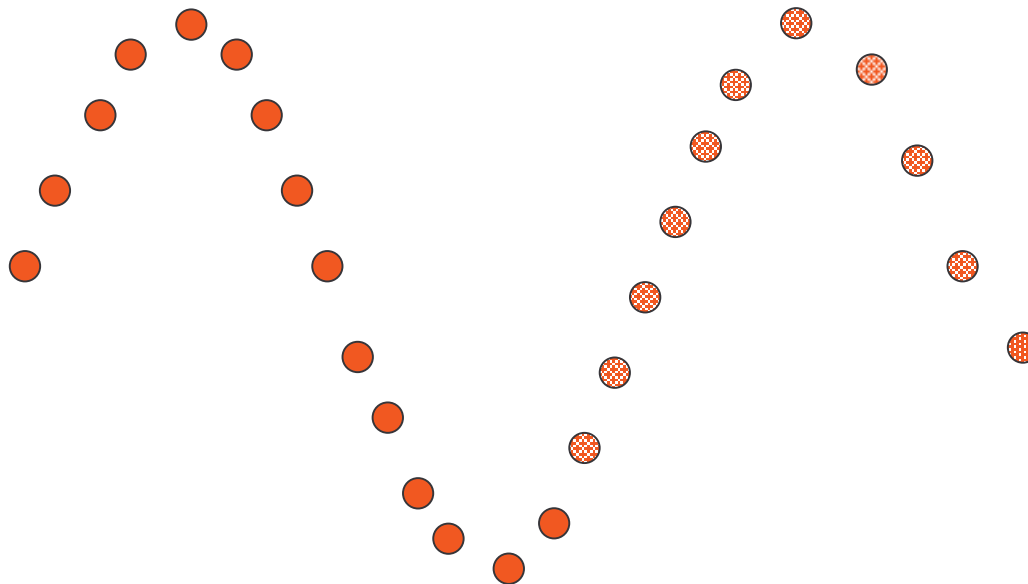
Conceptual Scheme



Conceptual Scheme



Conceptual Scheme



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