



Non-linearities between rainfall and vegetation in drylands

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Structure

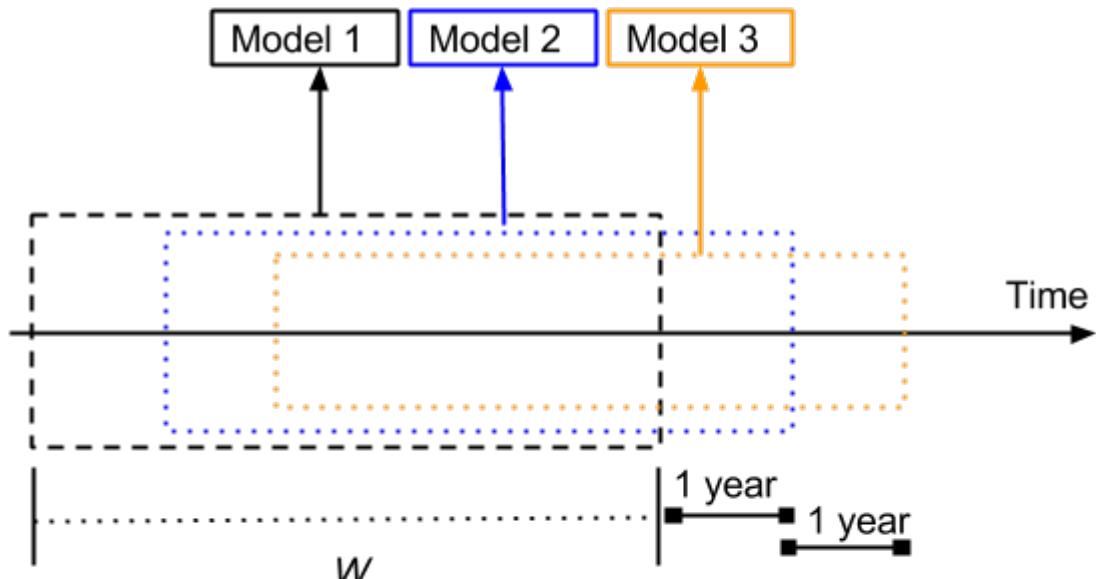
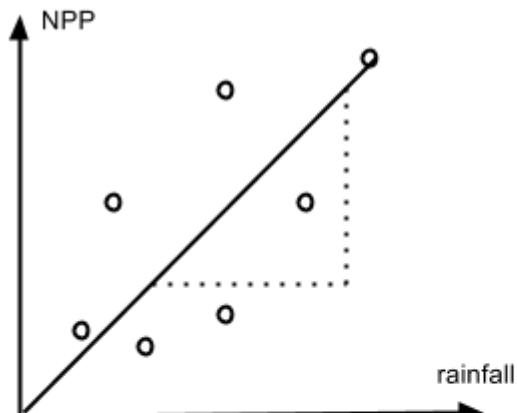
1. Overview
2. A small experiment
3. Results

Overview

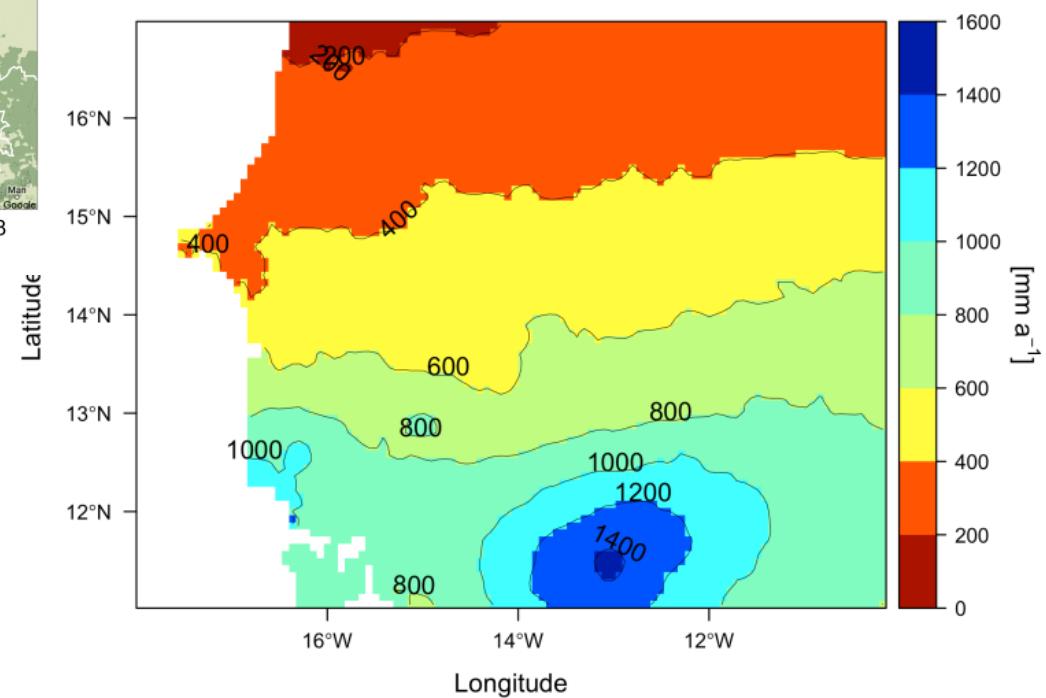
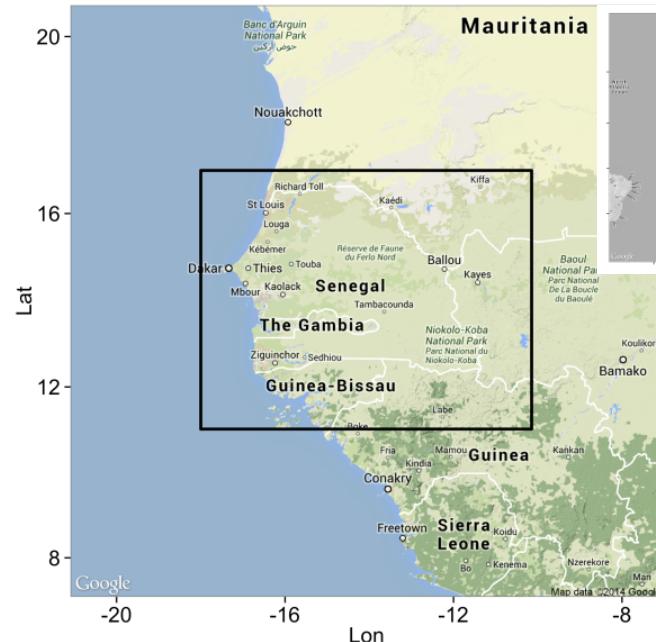
- Several approaches to monitor dryland degradation based on EO exist
- Need to disentangle climatic effects from human pressure
- RUE, RESTREND, multiple linear regression...
- Basic assumption: constant linearity between rainfall and vegetation

Are rainfall-vegetation relationships temporally linear?

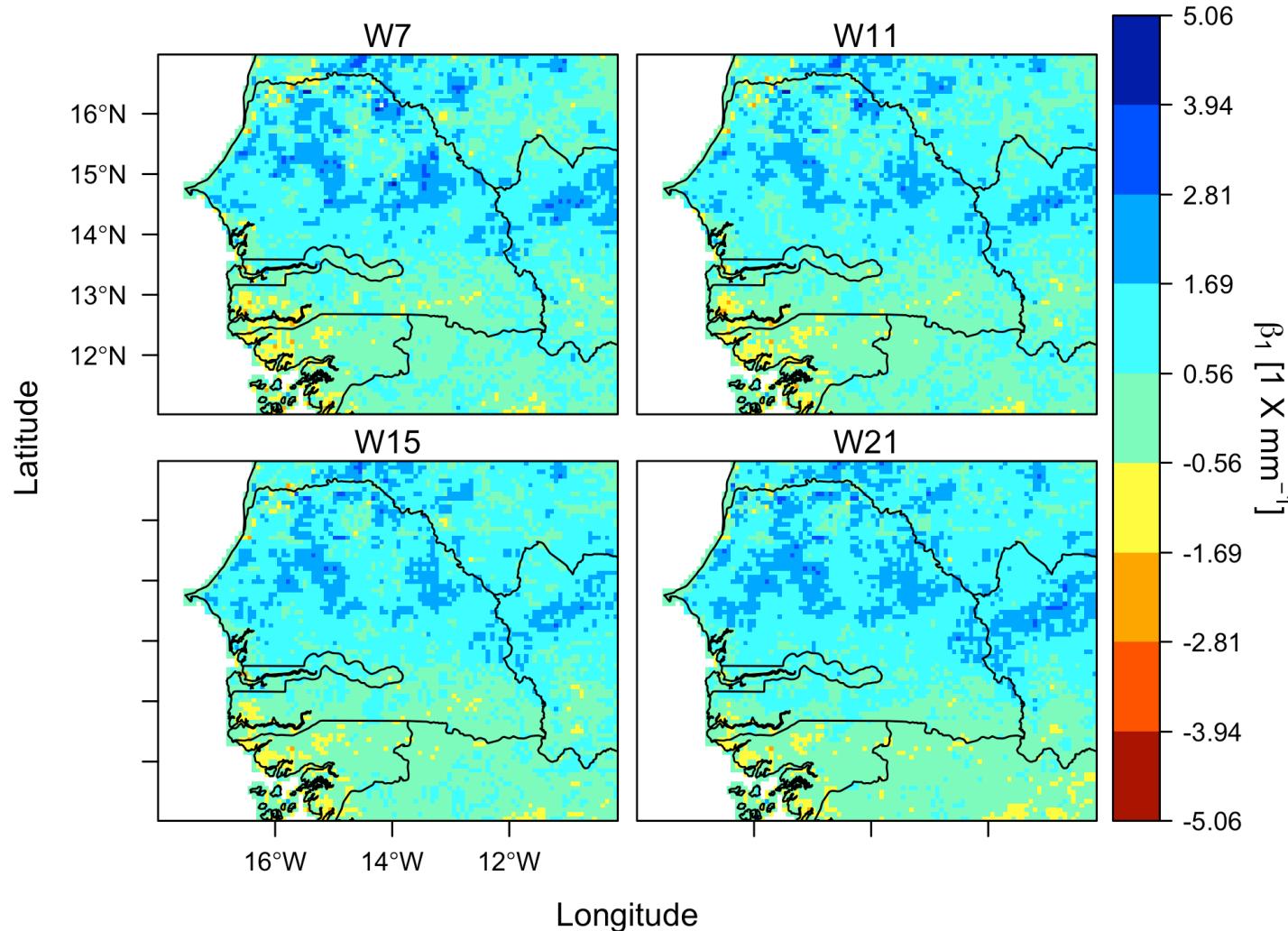
- Shifting regression
- Cyclic fraction NDVI (GIMMS 3g), 1983-2011
- Annual rainfall (ARC2), 1983-2011
- Time series of model coefficients



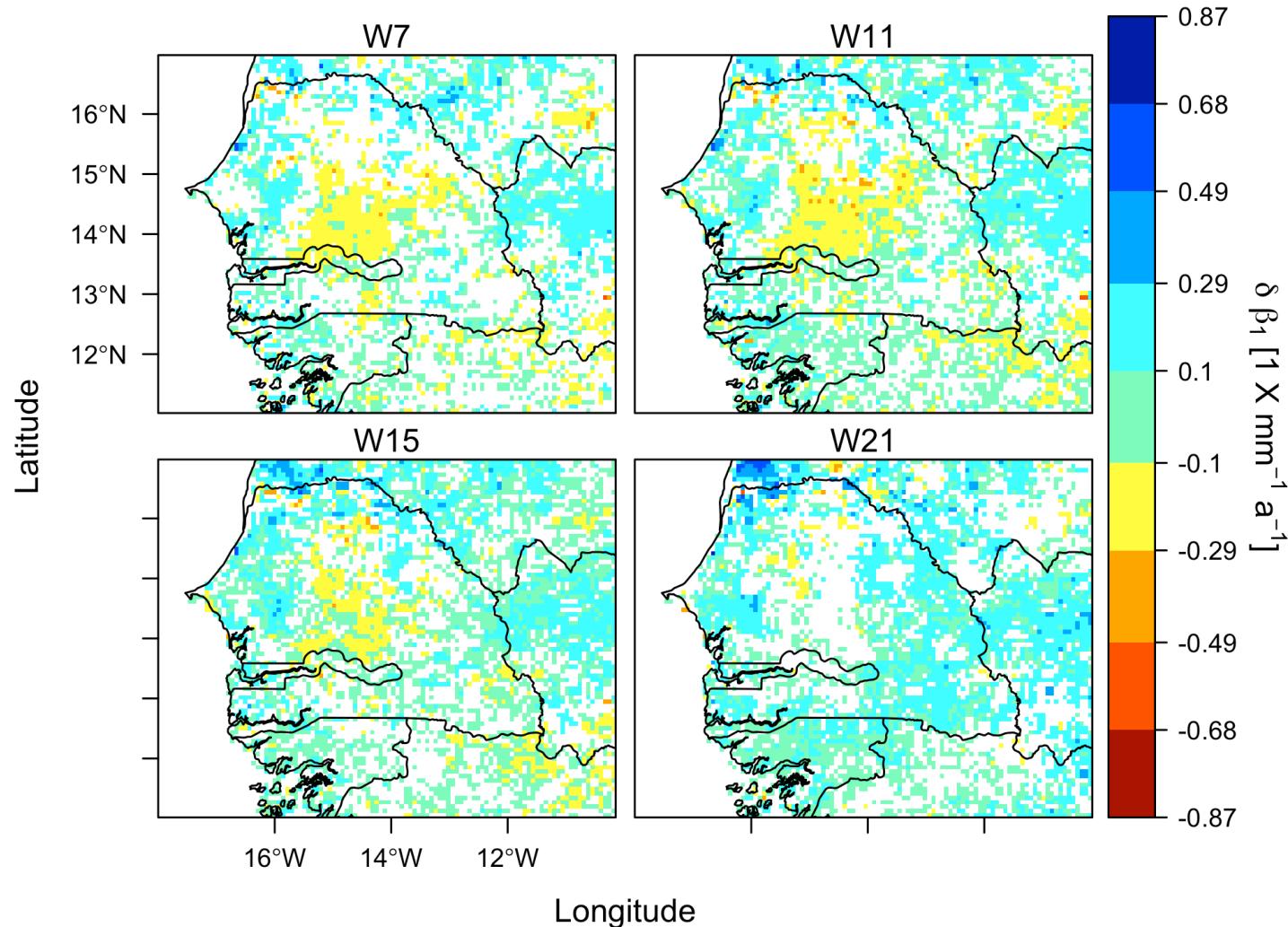
Study Site



Mean Coefficients



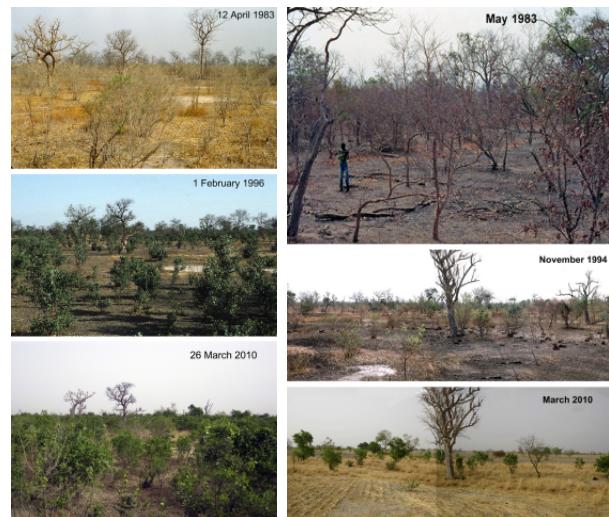
Coefficient Trends



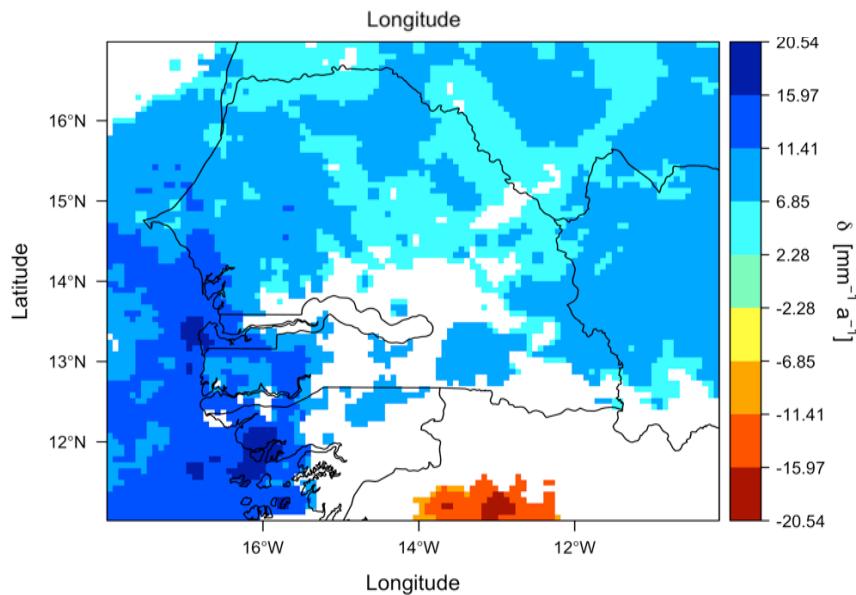
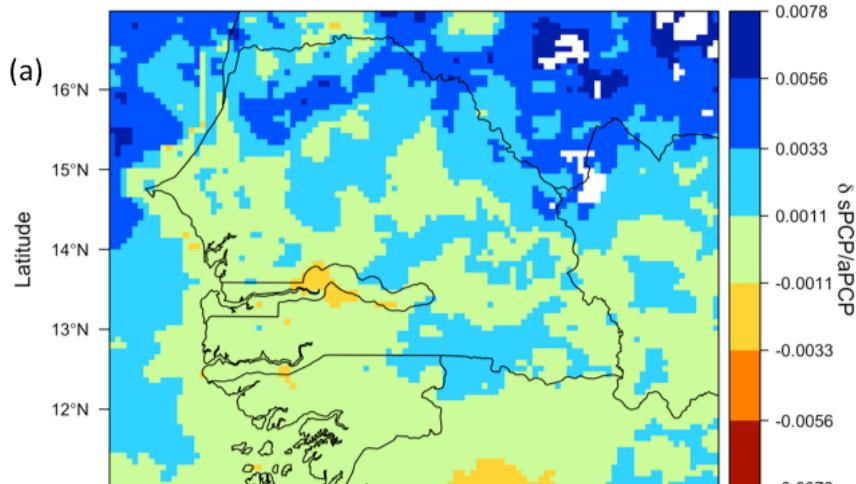
Potential Explanations?



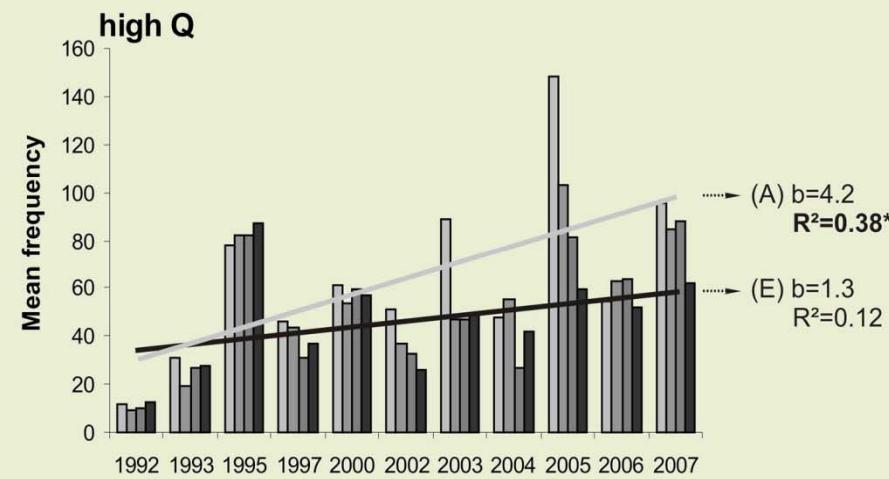
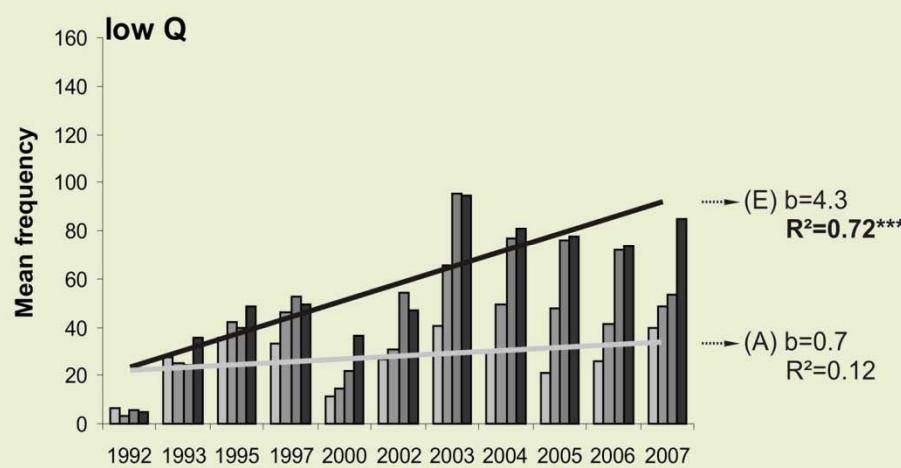
Budde et al., 2004



Herrmann et al., 2013

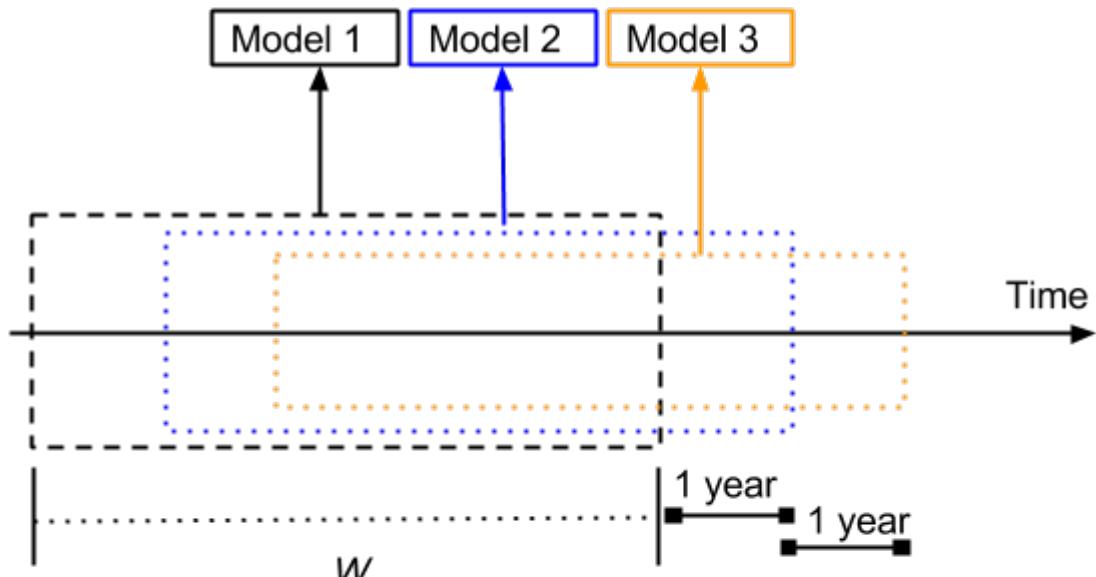
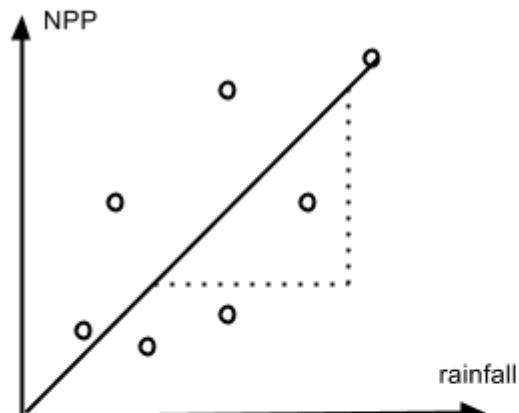


What about land use?

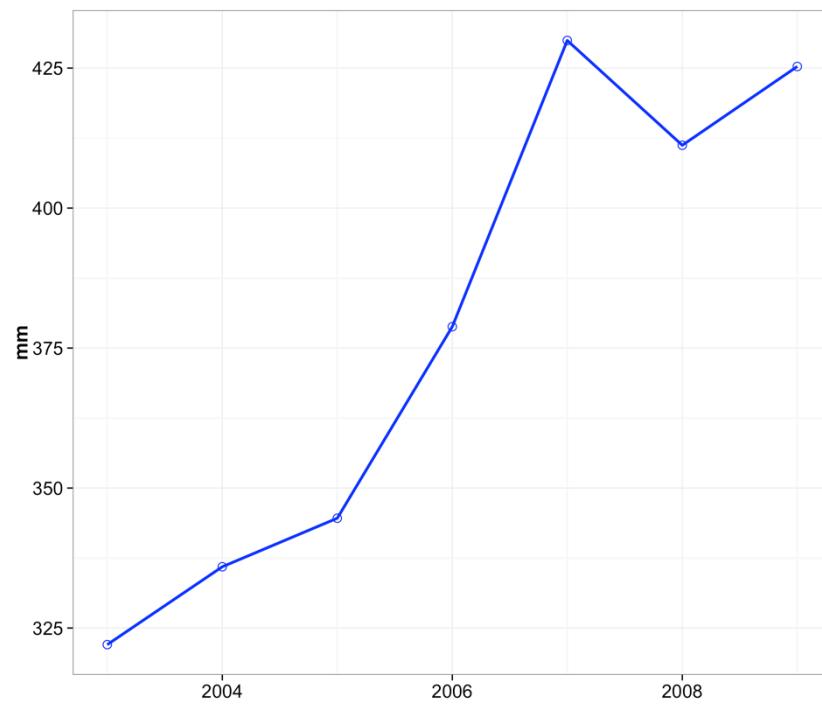
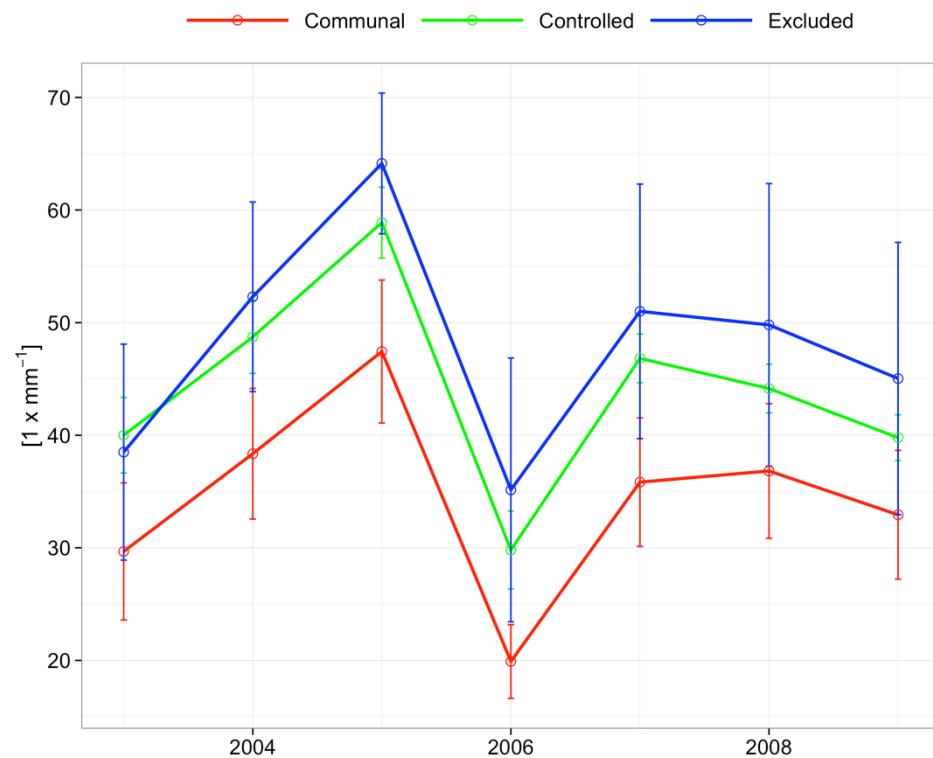


Are rainfall-vegetation relationships temporally linear?

- Shifting regression
- Cyclic fraction NDVI (MODIS MOD13Q1), 2000-2012
- Annual rainfall (ARC2), 2000-2012
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Coefficient Time Series



Conclusions

- Temporally consistent linearity between rainfall and vegetation (productivity) hardly ever achievable
- Several variables governing the relationship:
 - rainfall patterns,
 - land use,
 - plant functional types,
 - input data