

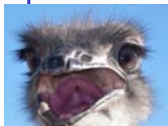
Climate Change, Fire, & Biomass from Space



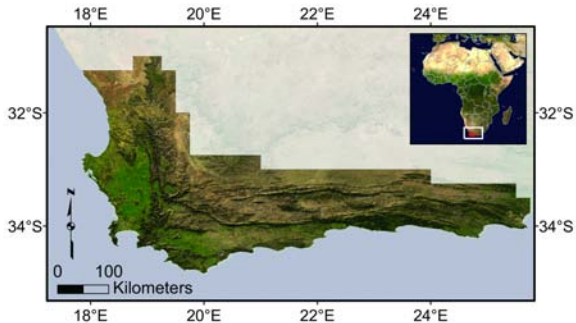
Adam M. Wilson

April 24, 2009

Cape Floristic Region of South Africa

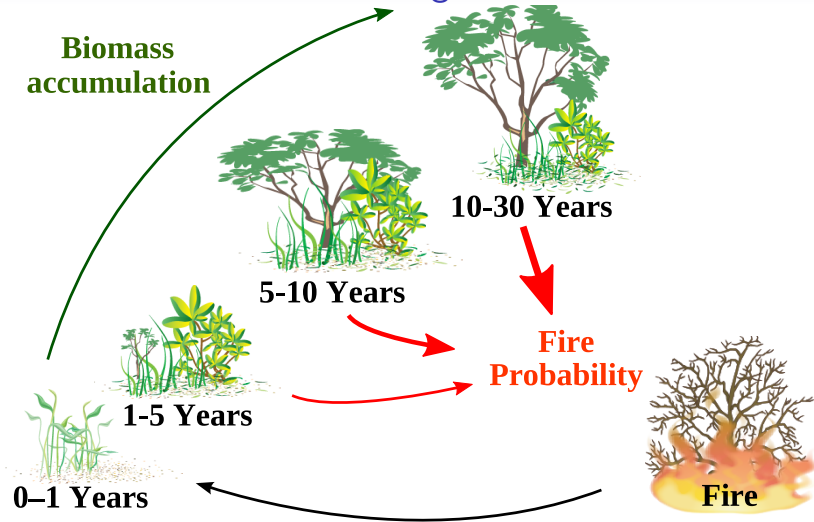


Outstanding Biodiversity



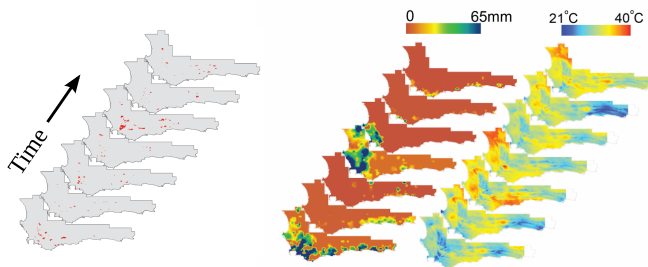
- 78,555km²
150% size of Costa Rica
- ~9,000 plant species
12,000 in Costa Rica
- 6,210 endemic plant species

Climate Change and Fire



A hotter and drier future → more fire?

Analysis of Historical Data: 1950-2000

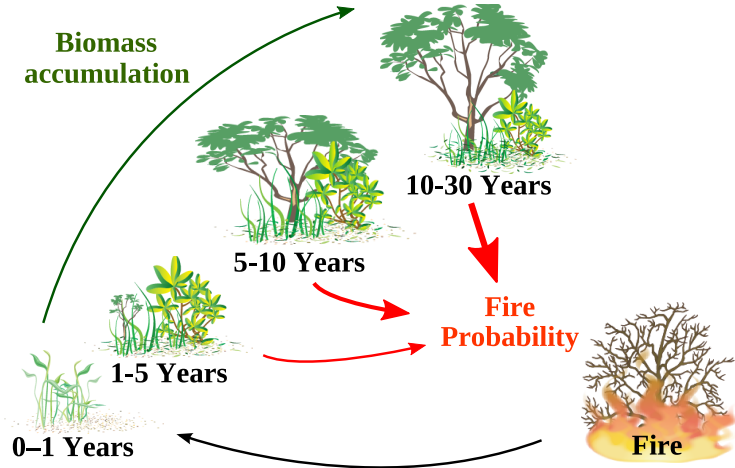


$$P(\text{no Fire}_{t,s} \mid \text{no Fire}_{t-1,s}, \text{Precipitation}_{t,s}, \text{Temperature}_{t,s}, \text{AAO}_t, \epsilon_{t,s})$$

Bayesian spatio-temporal survival analysis (Wilson, *et.al.* in press)

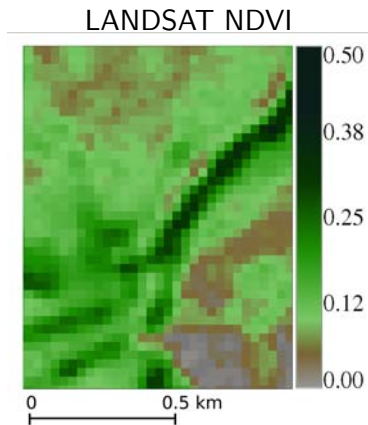
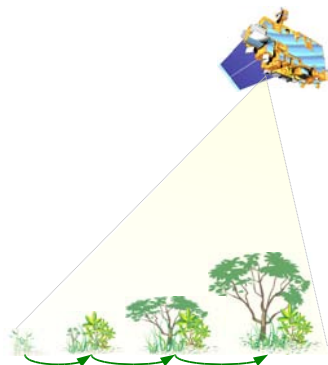
- Enhanced *fire weather* will probably lead to more frequent fires.
- Mean fire return time has decreased
~4 years (17%) over the last 50 years.

Climate and Fire



A hotter and drier future → more fire?

Biomass from remotely sensed data?

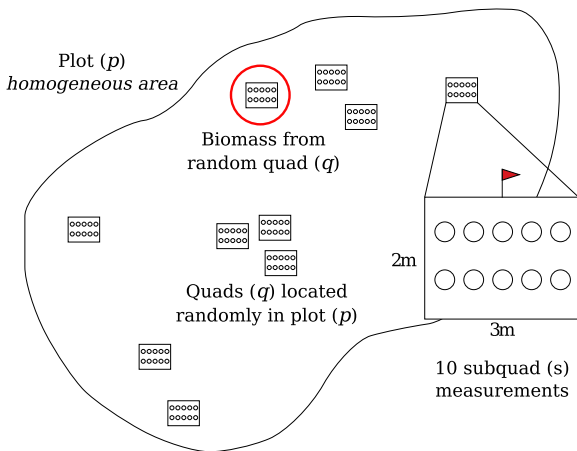


We would like to combine satellite and field data to construct a predictive model to estimate biomass.

Collecting data for an entire landscape?



Field Data



- 3 Regions
- 16 Plots
- 167 Quads
- 1670 Points

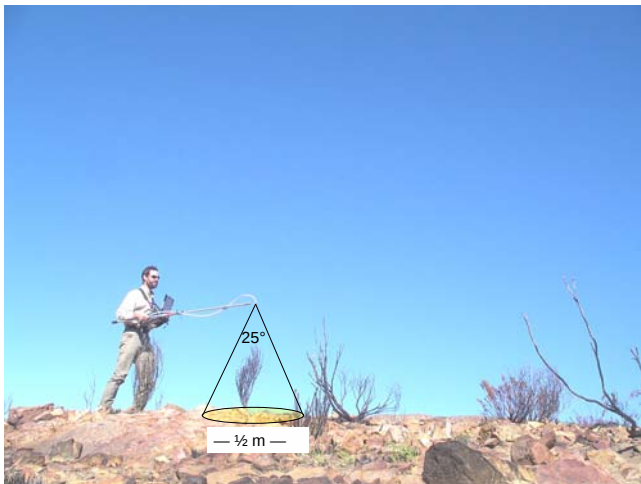


Field Data



Biomass sampling

Field Data



Measuring reflectance

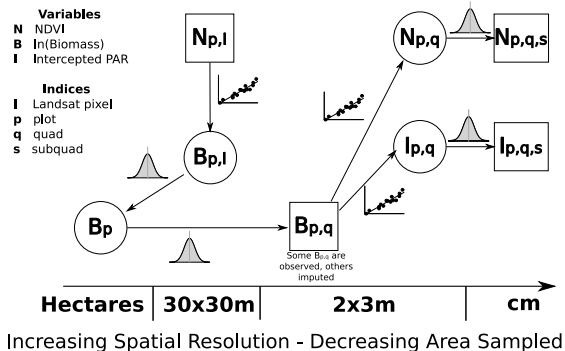
Hierarchical Data

		Field Data	Landsat
scale		cm to m	30 x 30m
Region	1000s Ha		X
Plot	1-5Ha	X	X
Quad	2x3m	X	
Subquad	cm	X	



The data resolution spans from centimeters to hundreds of meters.

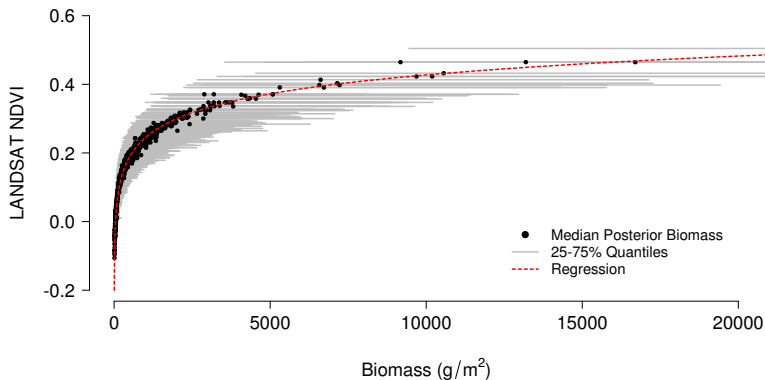
Scaling up



the Reverend Bayes



NDVI vs Biomass at the landsat scale

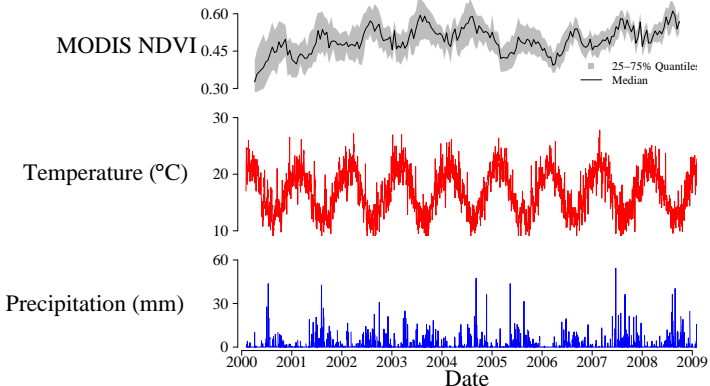


It works!

Where am I going with this?



The satellite record: a treasure chest



Monitor post-fire recovery, biomass accumulation rates, and the effects of weather...

Thanks!

