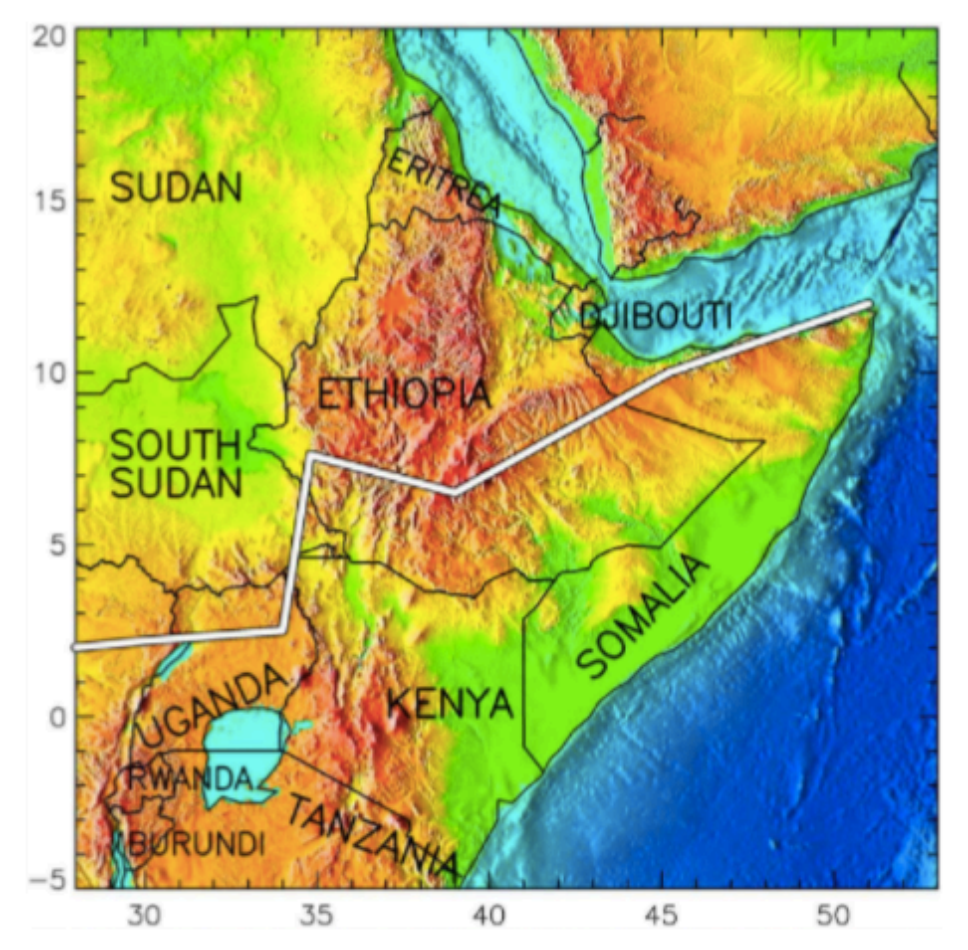
Monitoring **Droughts** in East Africa

A modest PhD proposal

Overview

1. What am I looking at?
2. What do I want from you?
3. Why is this an interesting problem?
4. What do I want to do?
5. What do I want to get out of the PhD?

What am I looking at?



What do I **want from you**?

Why will this **not** work?

'Have you considered …'

'You have completely misunderstood x'

'I have experience in x, and it was …'

Can we **work together**?

Why this is an interesting problem?

- Droughts **damage** people and societies.
- **Machine Learning** provides tools to select and interpret patterns in data.
- **Monitoring** and **forecasting** would help **improve outcomes.**

What do I want to do?

1. Develop drought indices for monitoring drought onset and spread.
2. Global Teleconnections with Drought in East Africa.
3. Quantify the economic impacts of Drought.
4. Developing a new Evapo-transpiration dataset using a Land Surface Model (HOLAPS)
5. Quantify the important thresholds beyond which damage occurs.

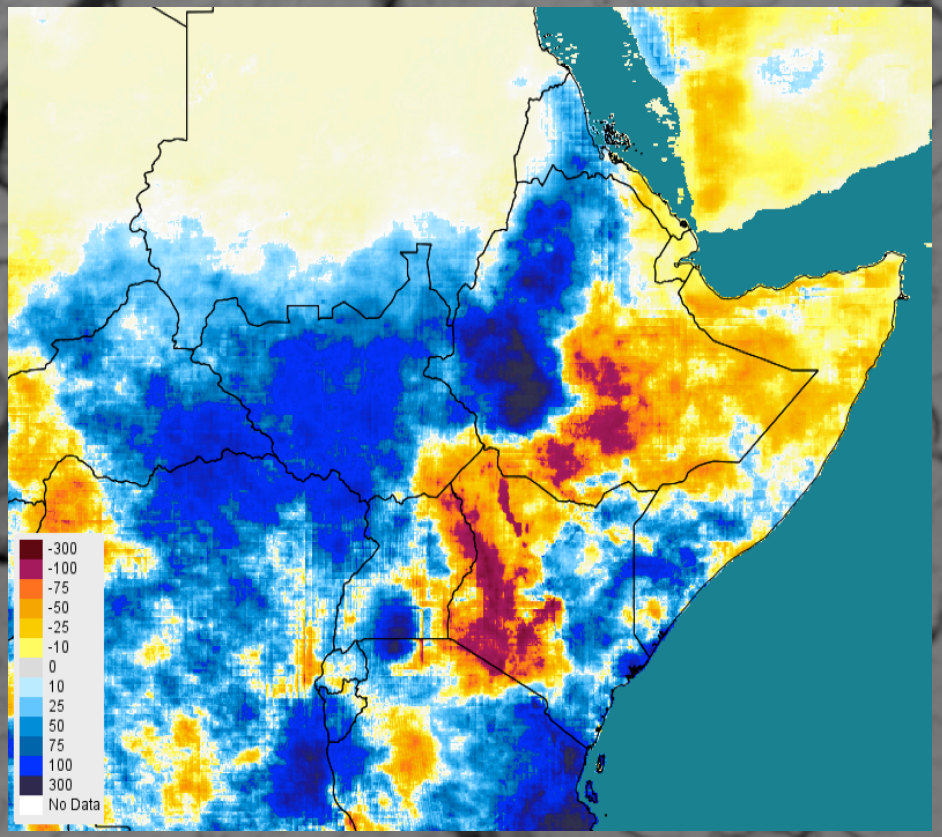
What do I want **to do**?

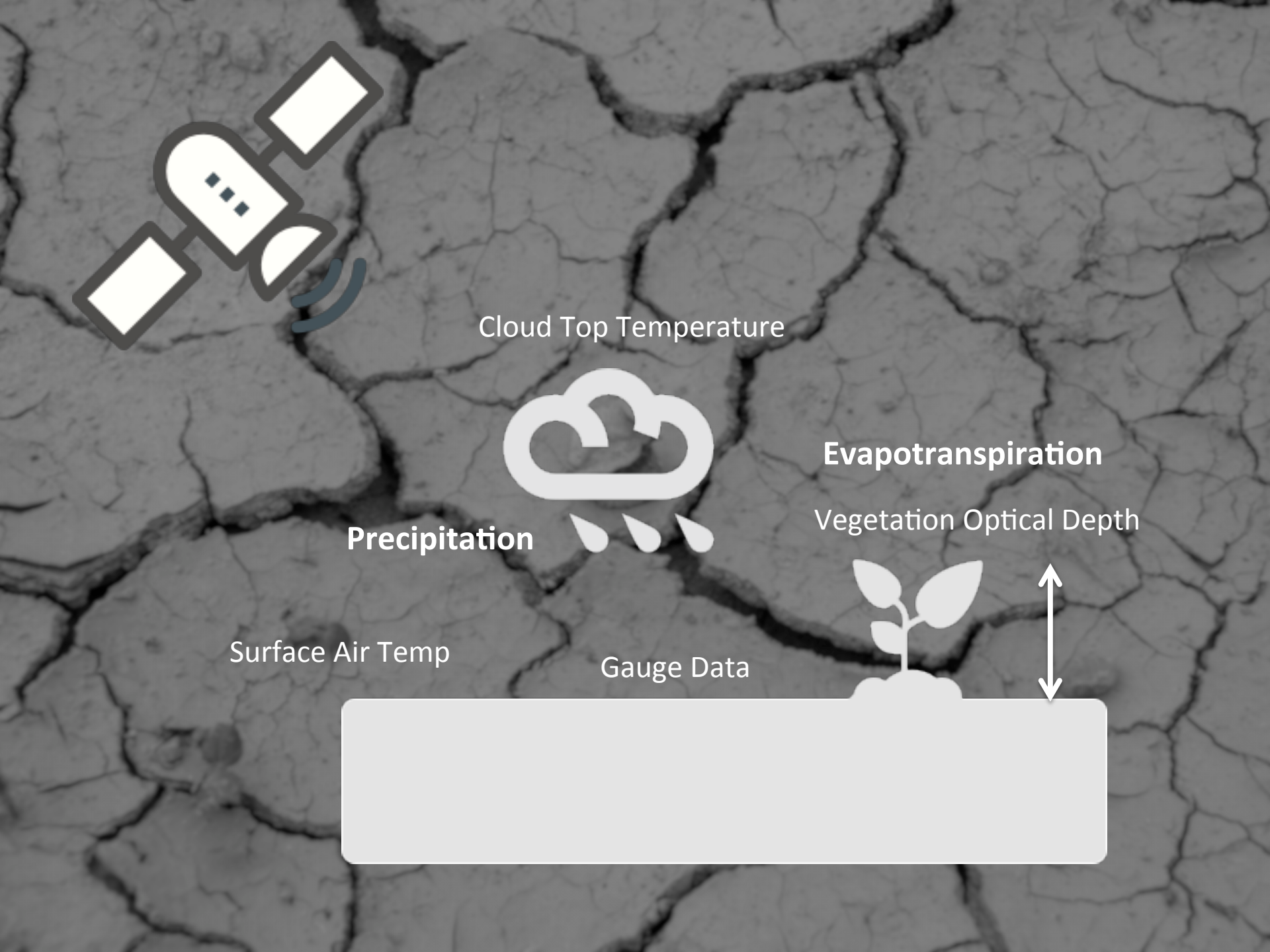
- Drought **index** development
- Global Teleconnections of drought
- Quantify the **impacts** of drought
- Develop evapo-transpiration dataset
- Quantify important **thresholds**

1

Develop drought

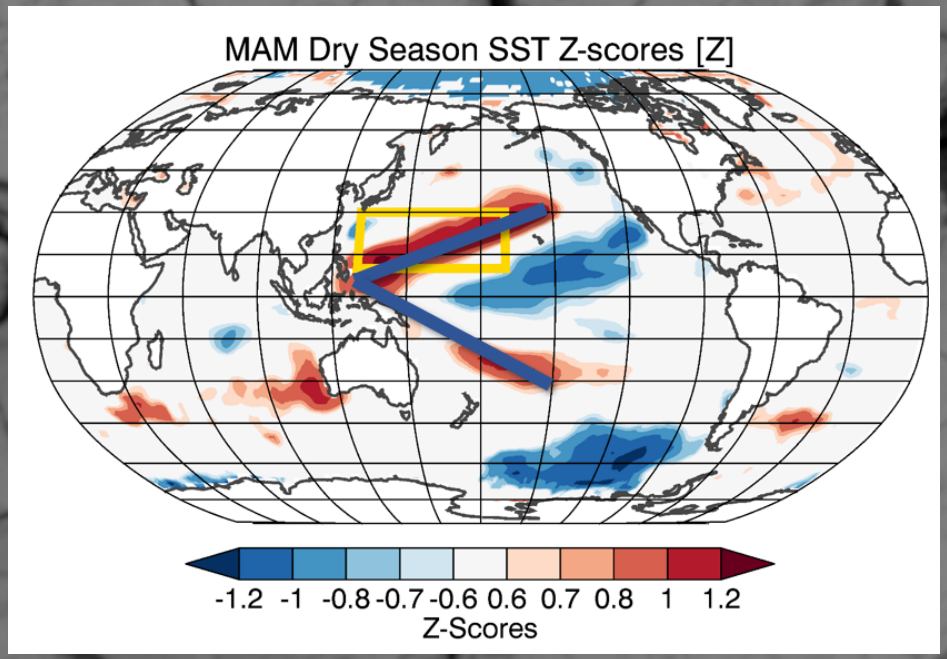
indices




Cloud Top Temperature
Evapotranspiration
Vegetation Optical Depth
Precipitation
Surface Air Temp
Gauge Data

2

Measure
Teleconnections



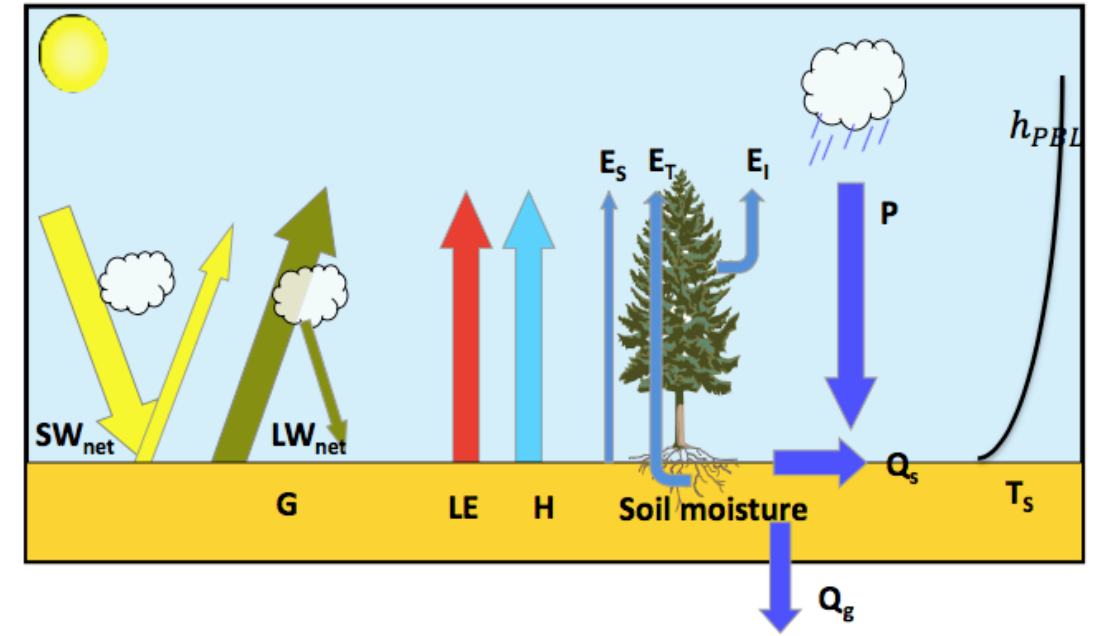
3

Quantify

impacts

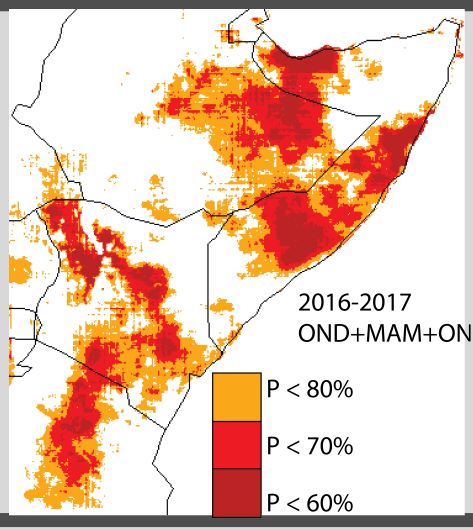
4

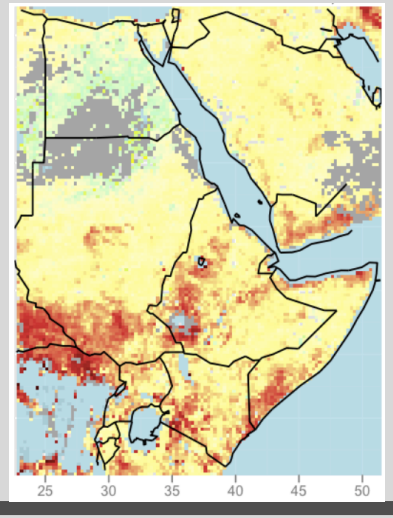
Develop a new Evapo-Transpiration dataset



5

Define critical **thresholds**

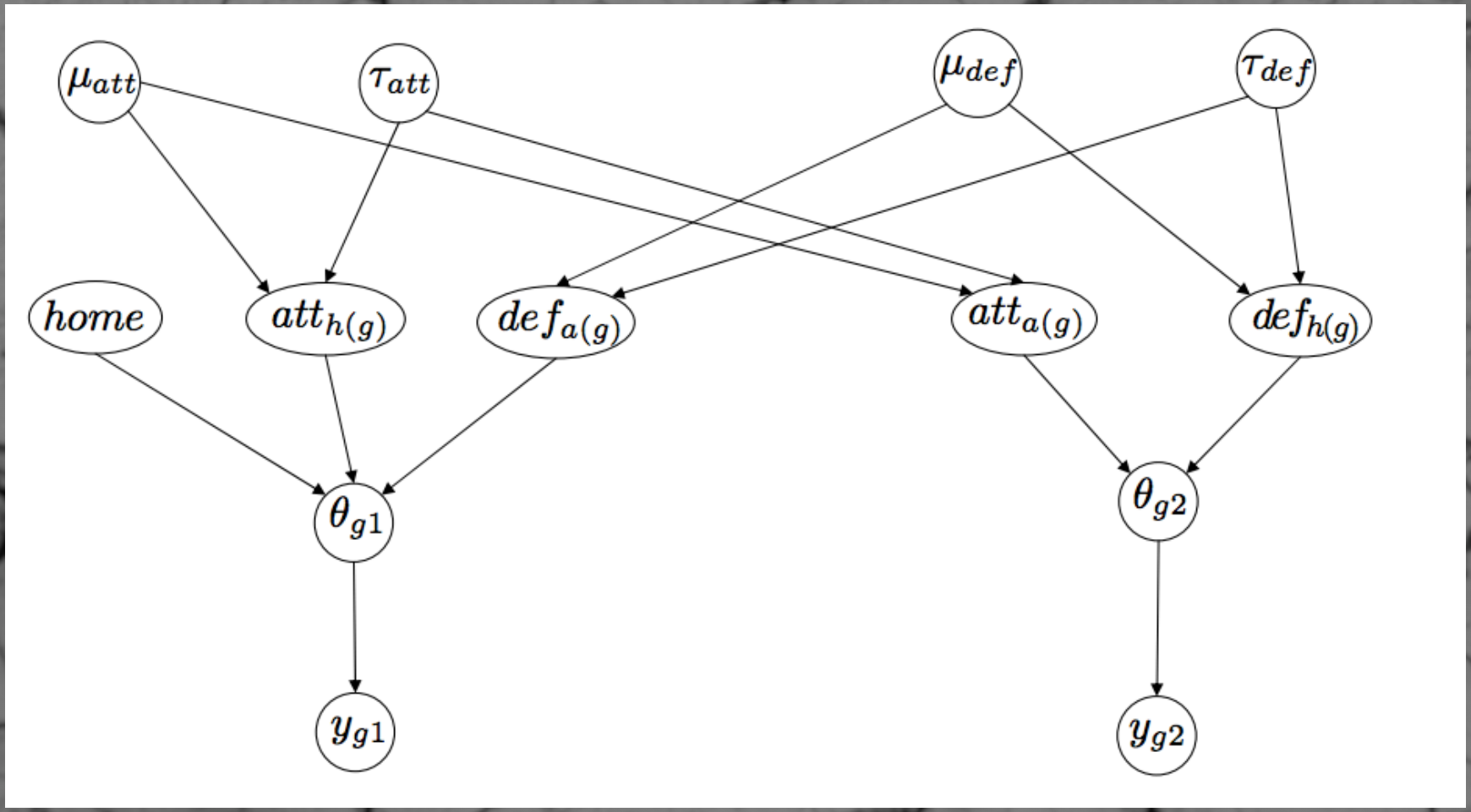


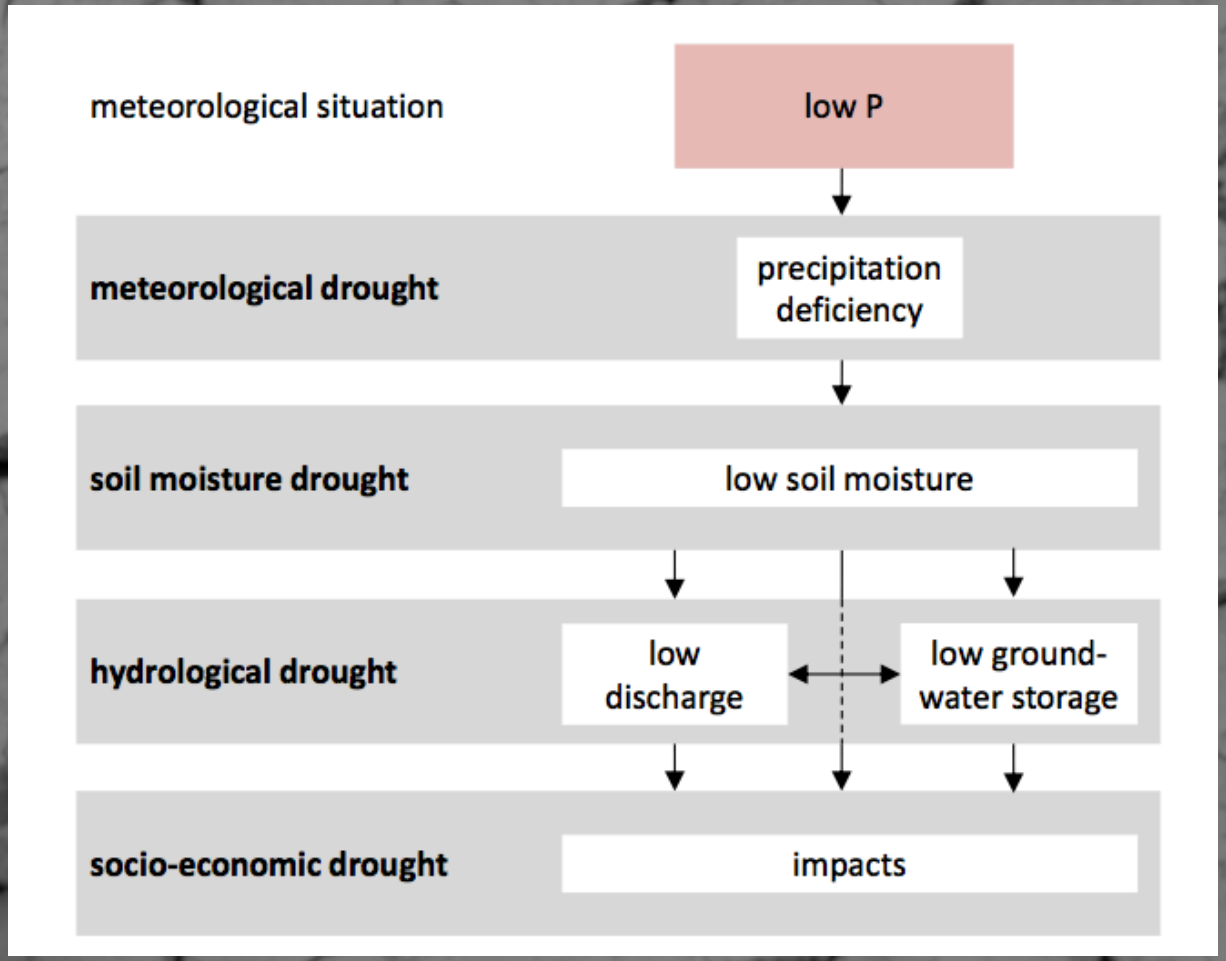


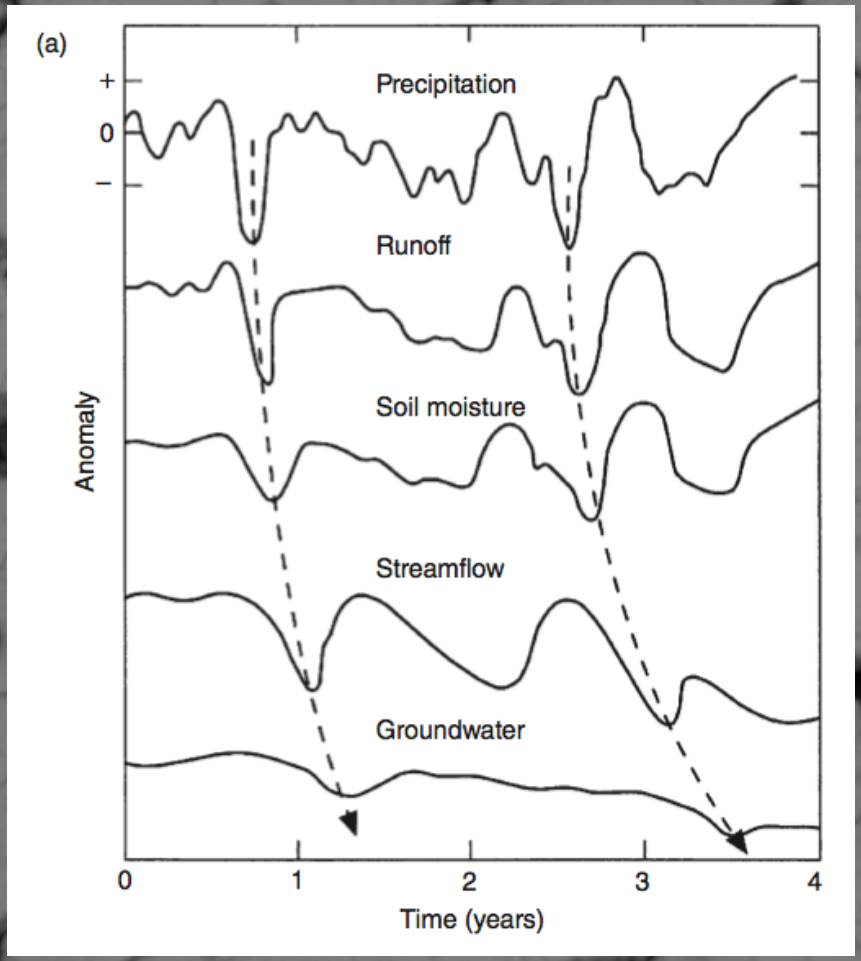

My goals for the PhD


Collect, **analyse**
and **interpret** data
Explain complexity in
an accessible and intuitive
manner
Python, **Programming** &
Machine Learning

And in my spare time …




meteorological situation
low P
meteorological drought
precipitation deficiency
soil moisture drought
low soil moisture
hydrological drought
low discharge
low ground-water storage
socio-economic drought
impacts


(a)
+
0
–
Precipitation
Runoff
Soil moisture
Streamflow
Groundwater
Anomaly
0
1
2
3
4
Time (years)

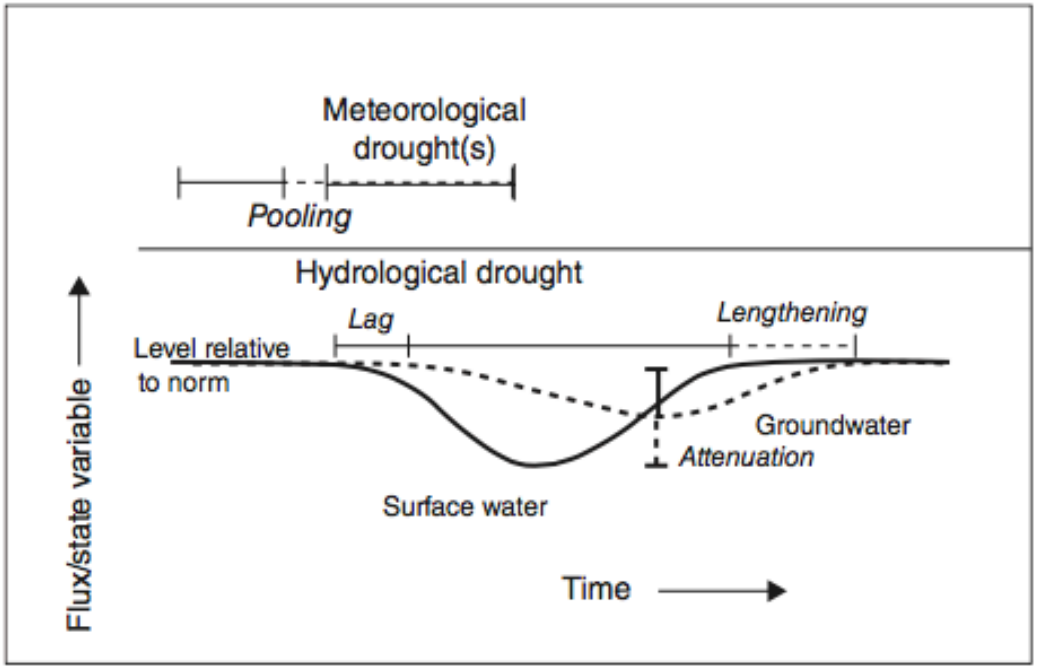
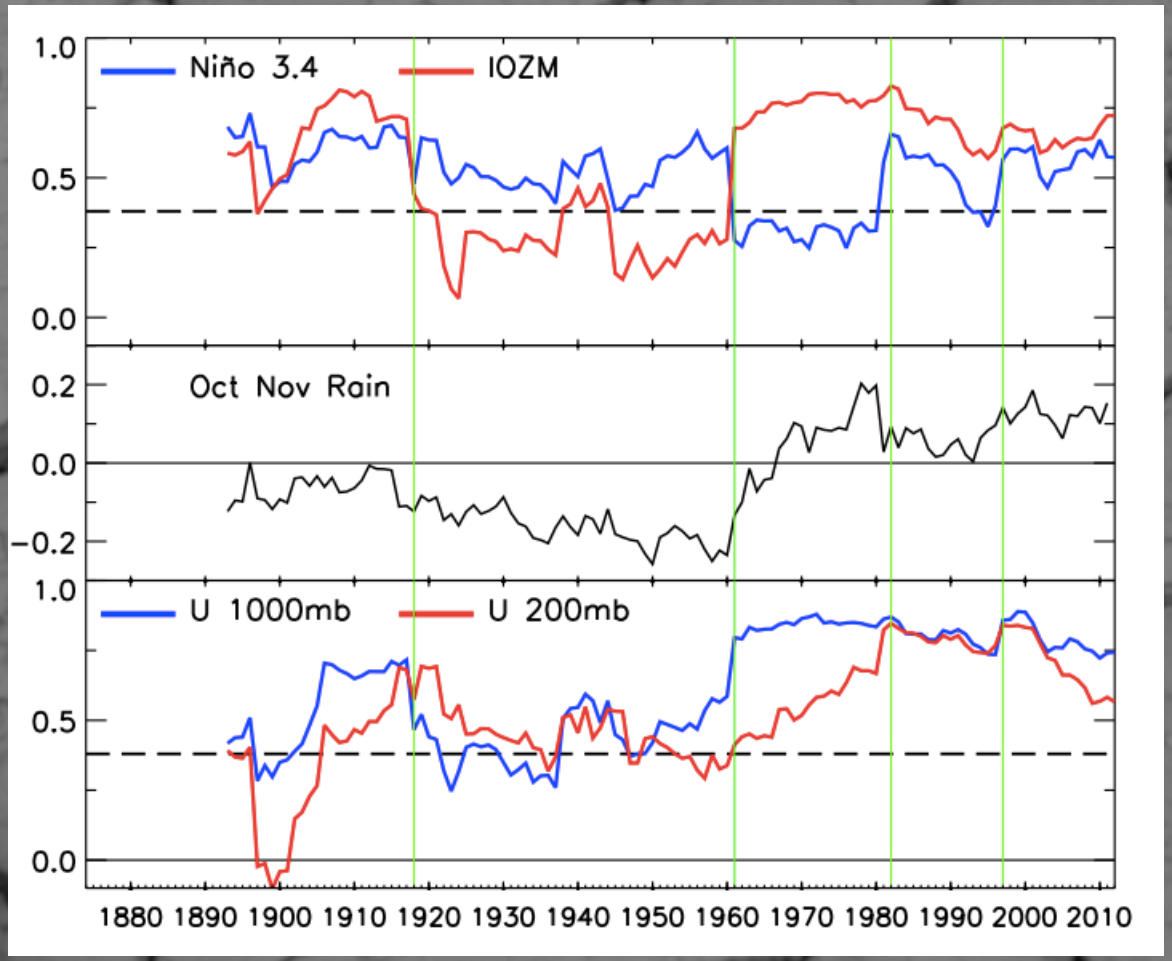


FIGURE 4 | Features characterizing the propagation of meteorological drought(s) to hydrological drought: pooling, lag, attenuation, and lengthening. (Reprinted with permission from Hisdal and Tallaksen[109])


Niño 3.4
IOZM
Oct Nov Rain
U 1000mb
U 200mb
1.0
0.5
0.0
0.2
0.0
-0.2
1.0
0.5
0.0
1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010

Dataset	Temporal Resolution	Spatial Resolution	Link
Precipitation			
MSWEP	1979–2016, 3 hourly	Global, 10km^2	http://www.gloh2o.org
CHIRPS	1981-present, 6 hourly	Africa, 5km^2	http://chg.geog.ucsb.edu/data/chirps/
In Situ measurements	As available	TBC	TBC
Potential Evapotranspiration			
GLEAM	1980-2016, Daily	Global, 25km^2	https://www.gleam.eu