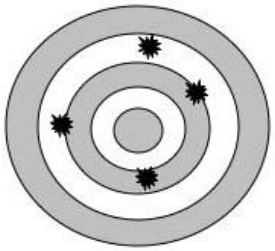
After the browning: Assessment of long term greening trends of Tarim River Basin vegetation based on 1985–2015 satellite data

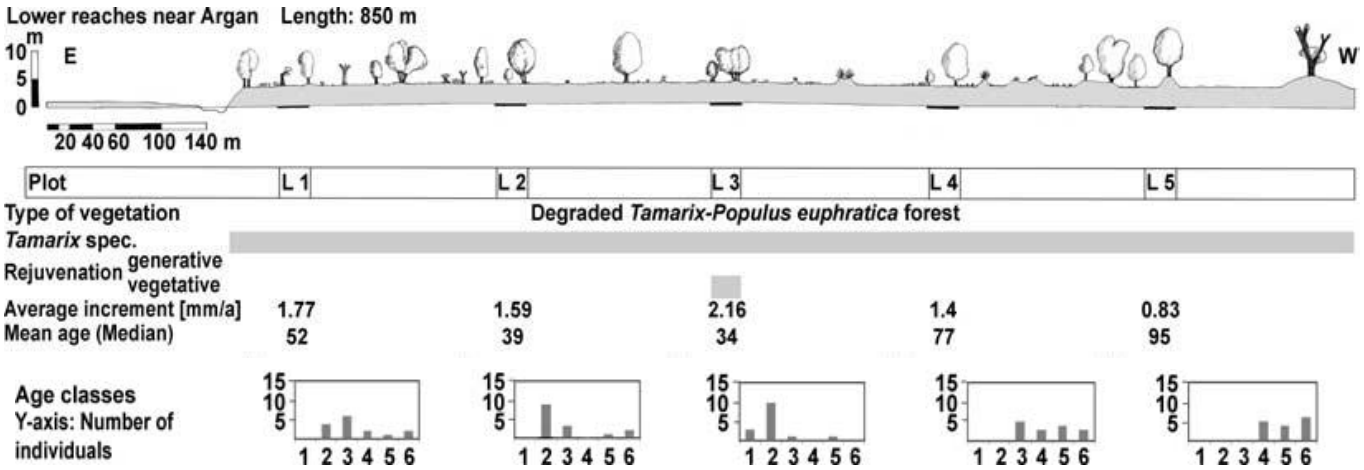
Philipp Gärtner & Birgit Kleinschmit

Field campaign vs. Remote Sensing

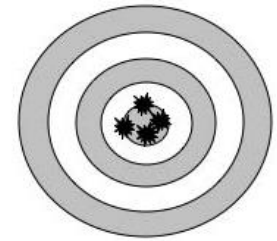


Accurate
Not Precise

WorldView 2
1st Nov. 2012

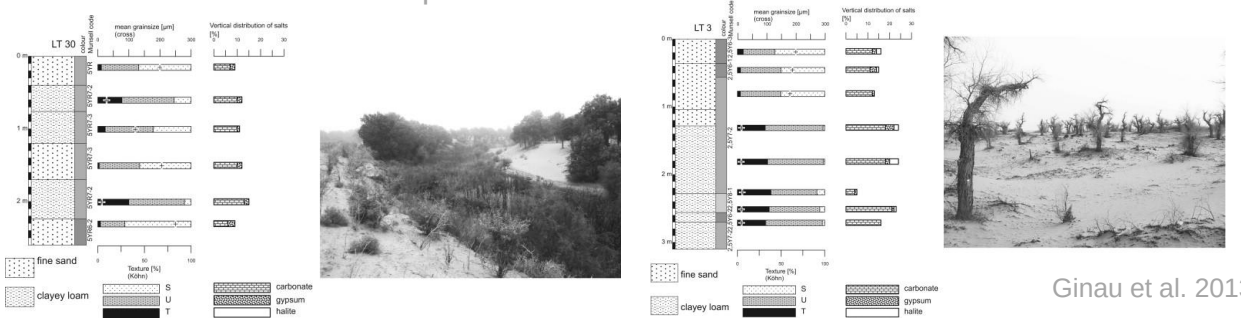


Westermann et al. 2008



Accurate
Precise

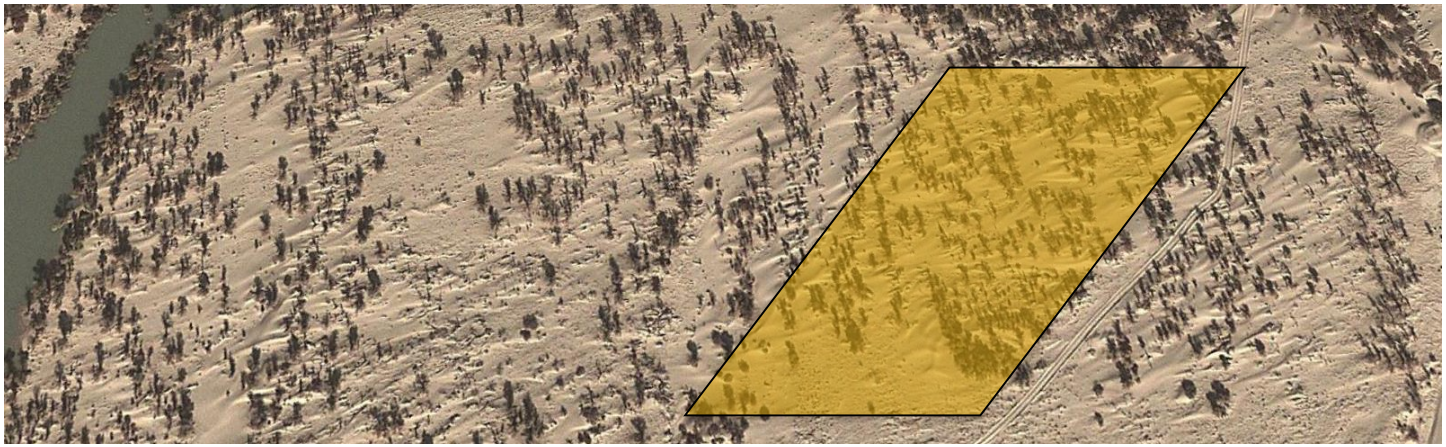
Sediment outcrop

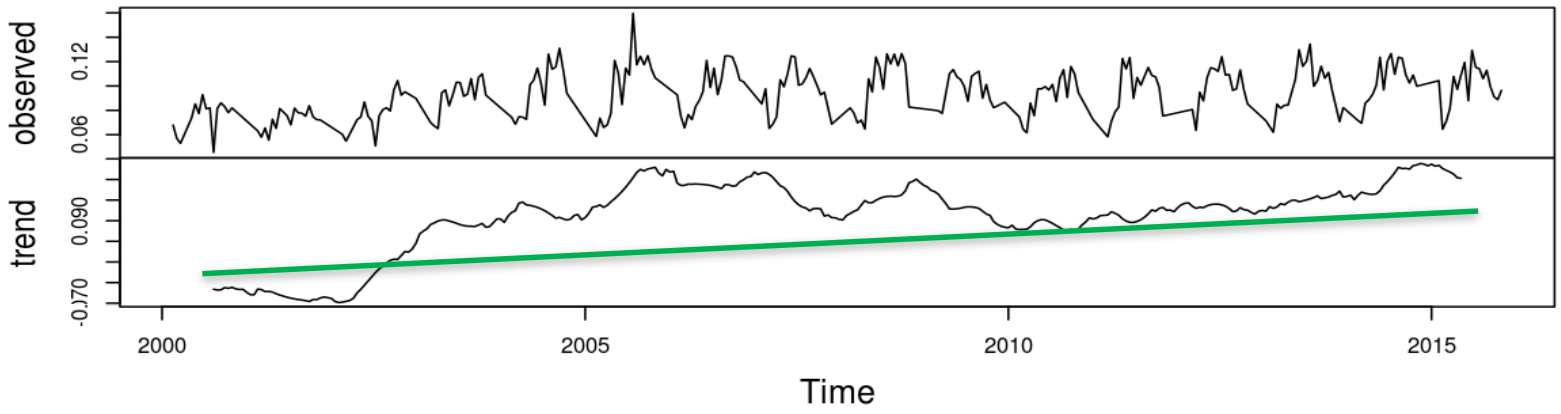


Ginau et al. 2013

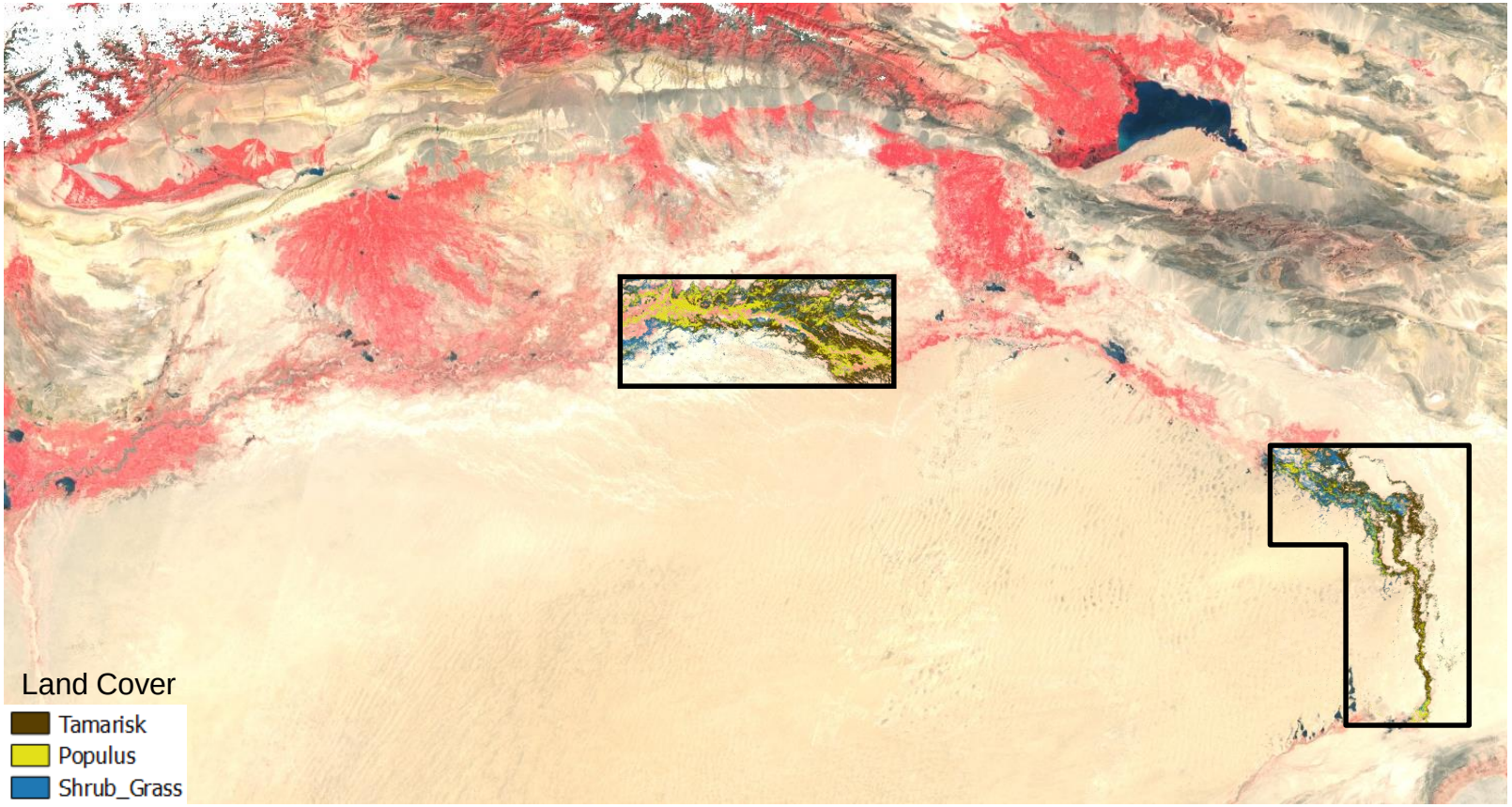
Time Series – Vegetation Index

- MODIS sensor
- 250m resol.
- 16-days
- Poplar trees



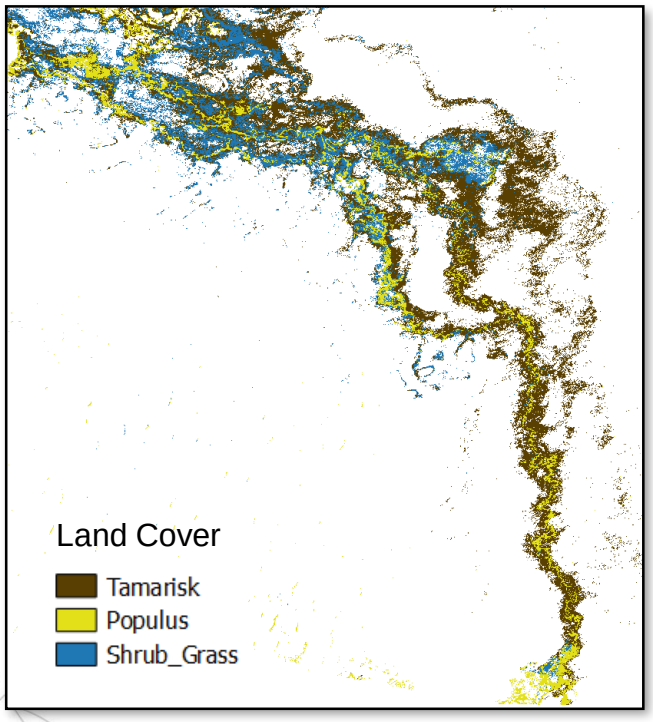


Time Series – Vegetation Index

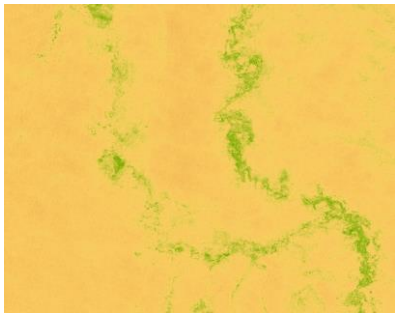


Methods

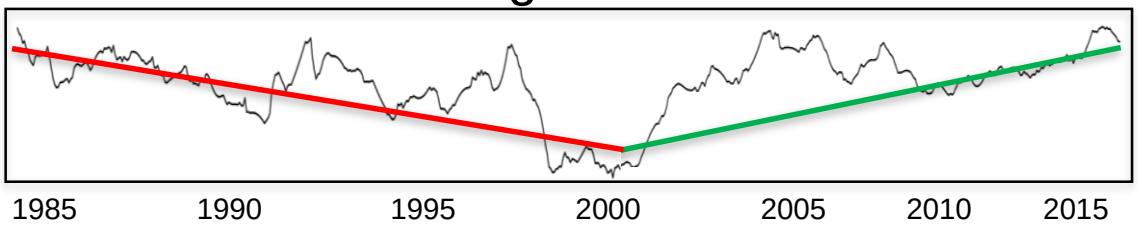
- RandomForest Land Cover Classification
- based on Landsat 8
- ~87 % overall accuracy
- 30 m spatial resolution



- Landsat 5 32-Day NDVI Composite
  - Jan 1, 1985 - Dec 31, 1999
- Landsat 7 32-Day NDVI Composite
  - Jan 1, 2000 - May 19, 2015



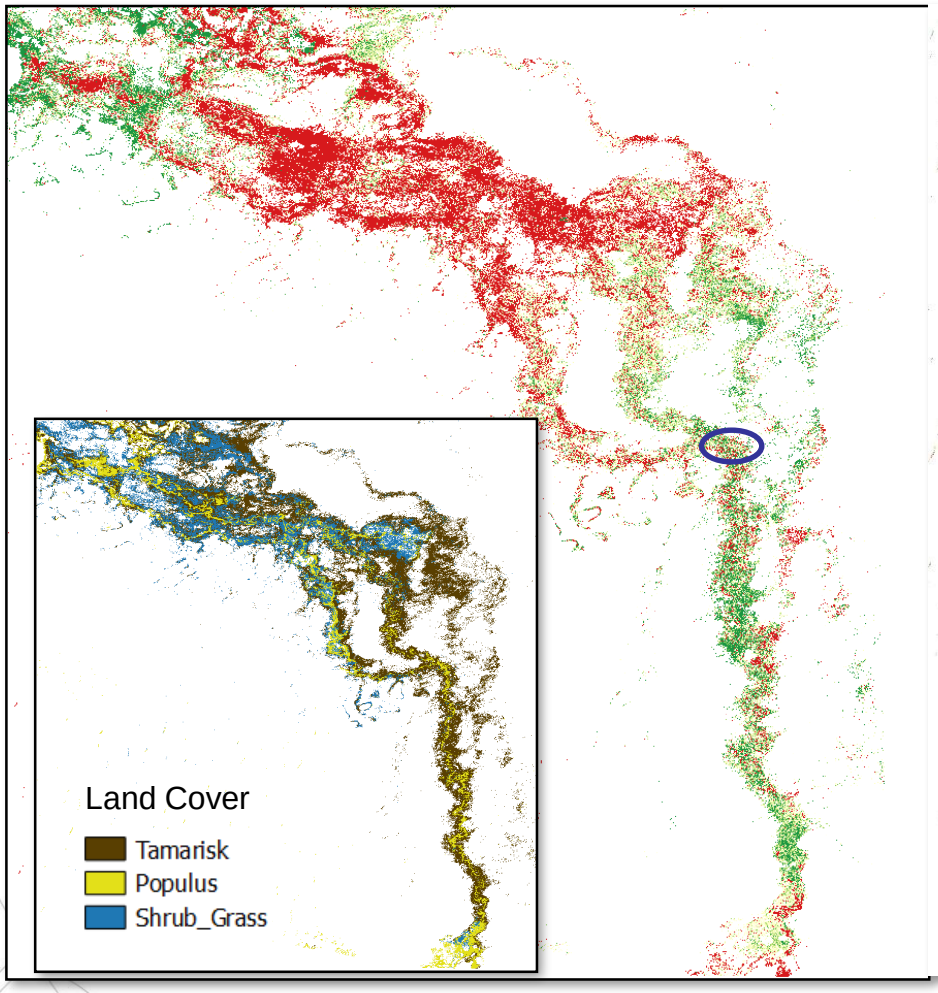
- Linear Long Term Trend

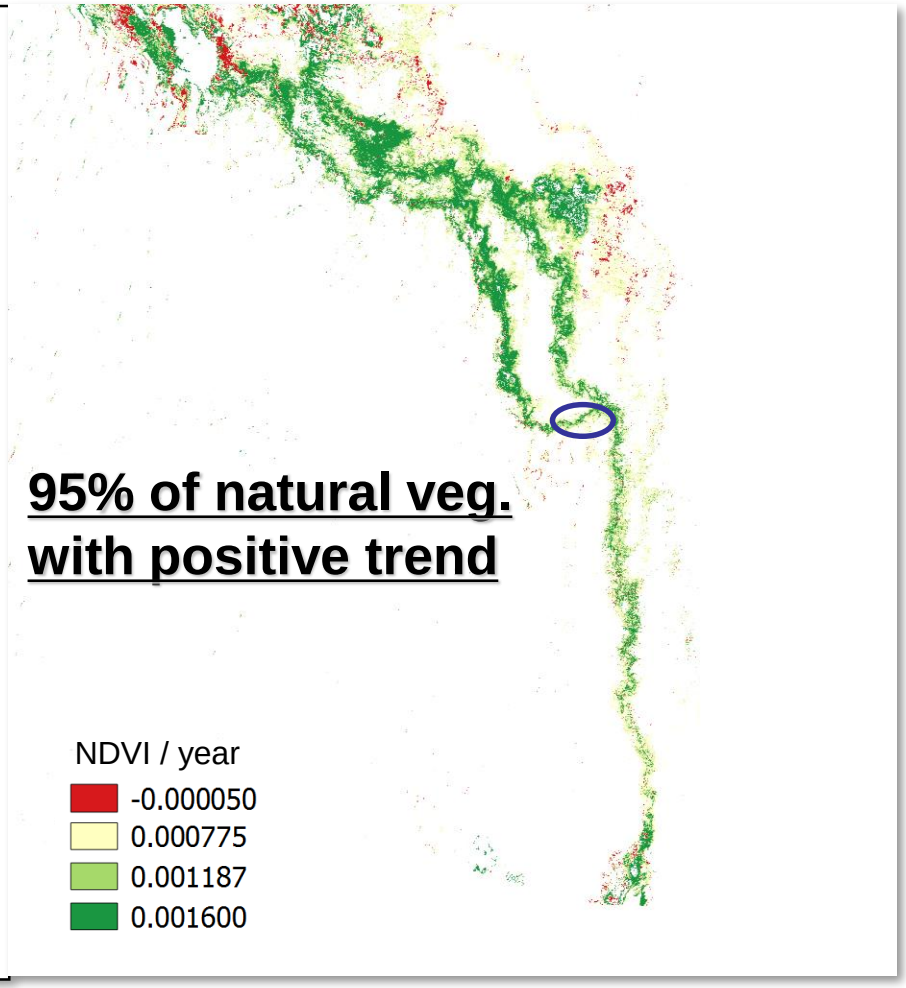


Results – Lower Reaches

Landsat5 1985 – 1999

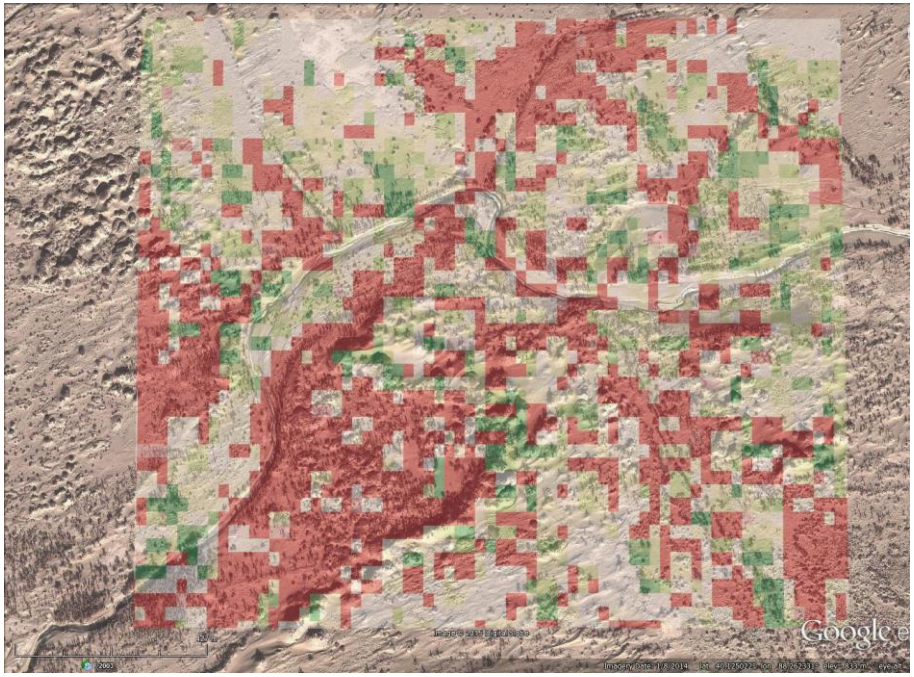
Landsat7 2000-2015



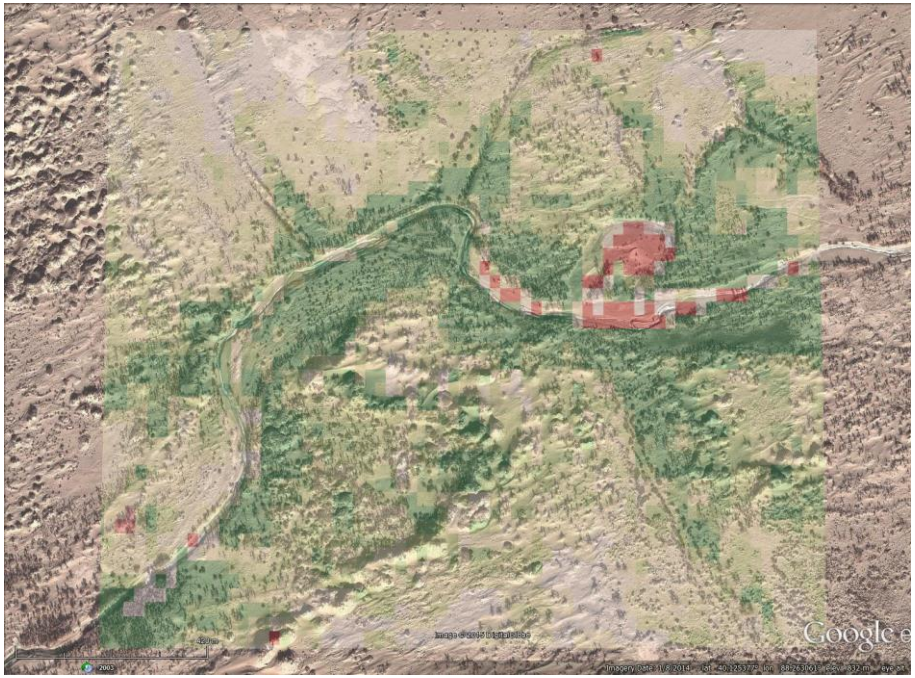


Results – Lower Reaches

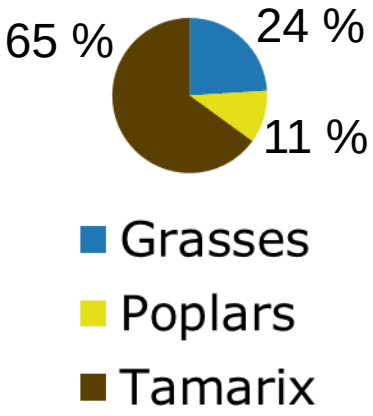
Landsat5 1985 – 1999



Landsat7 2000-2015



Results – Lower Reaches

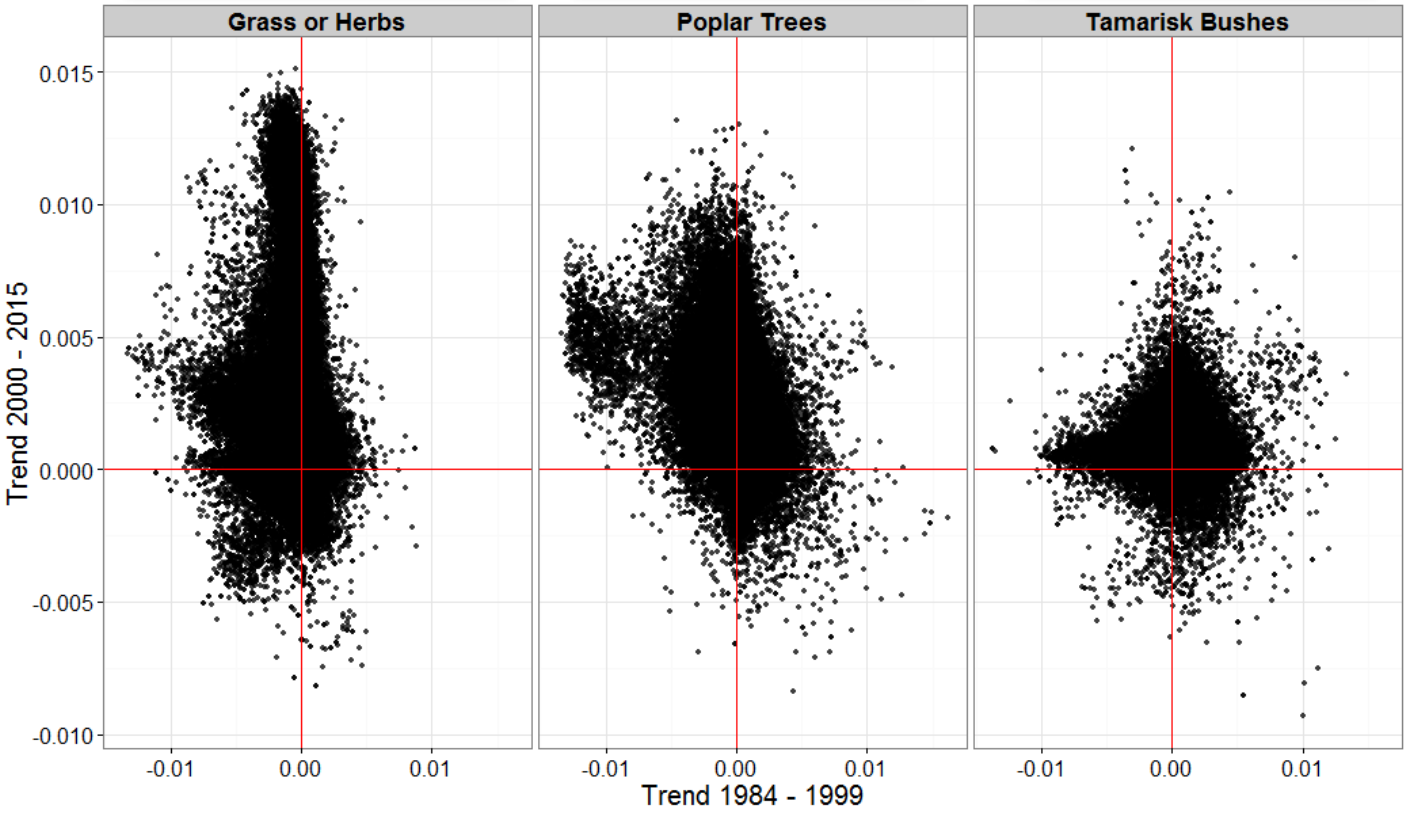


Changes of Negative Trends:

Grass: 60 => 5%

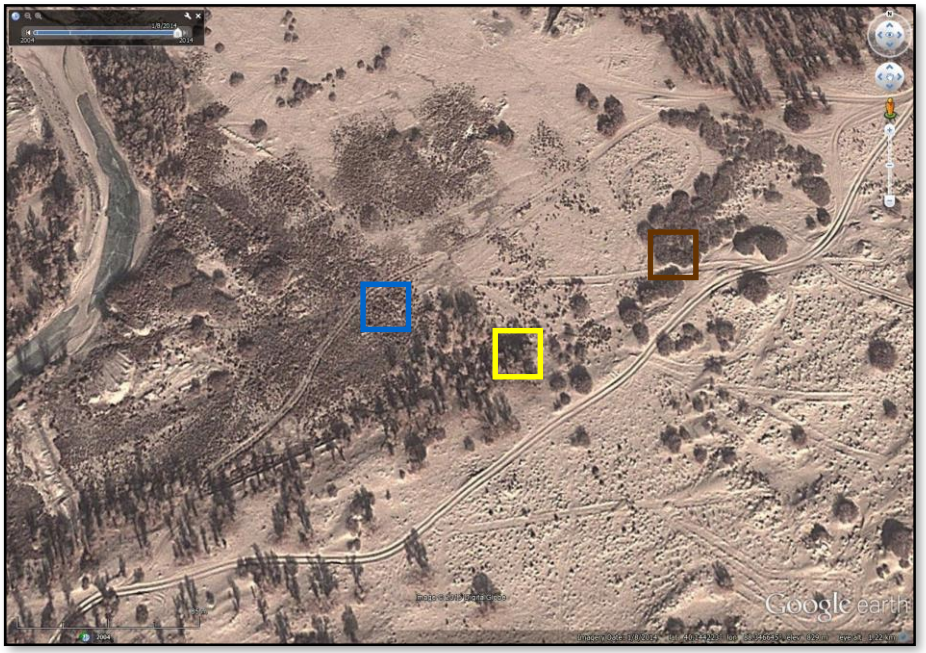
Populus: 40 => 6%

Tamarisk: 23 => 5 %

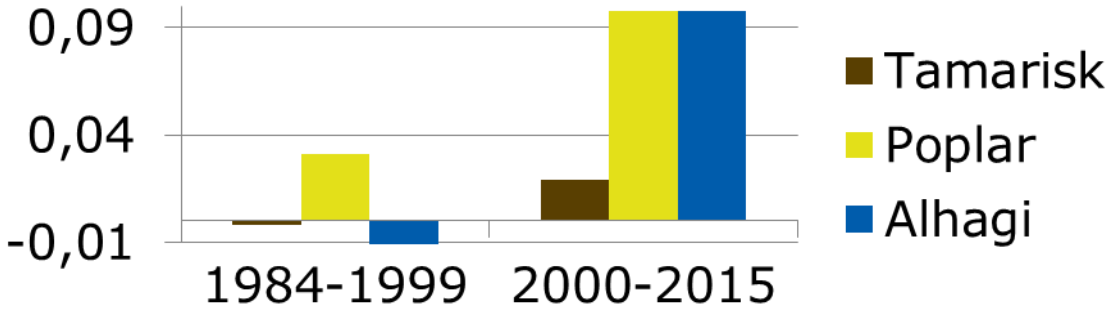


Results – Lower Reaches

- NDVI change over 15 years – example near Arghan

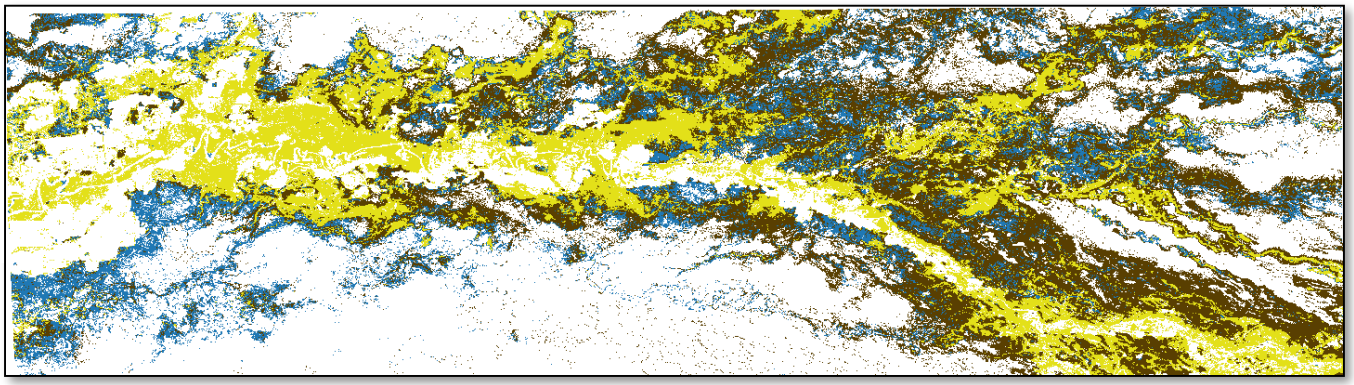


NDVI Range:
-1/1



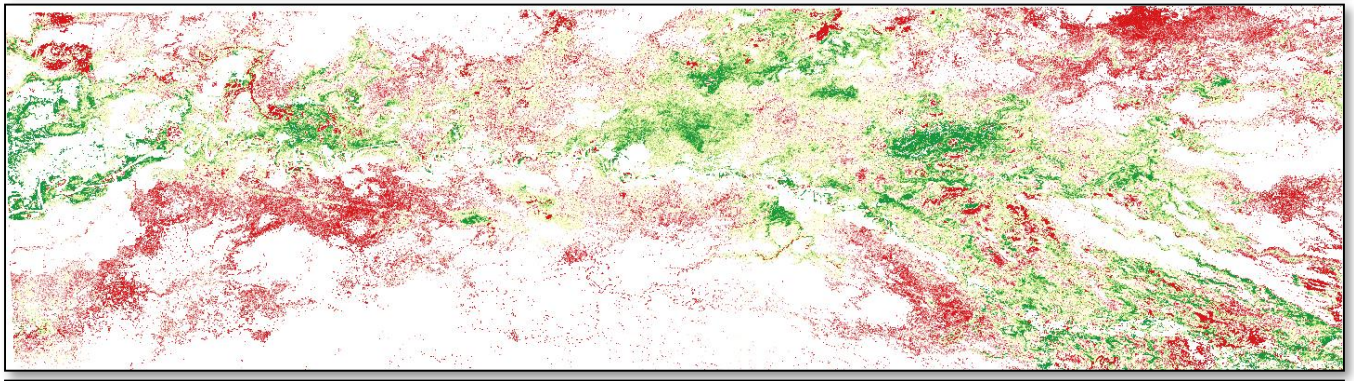
Results – Middle Reaches

Land Cover



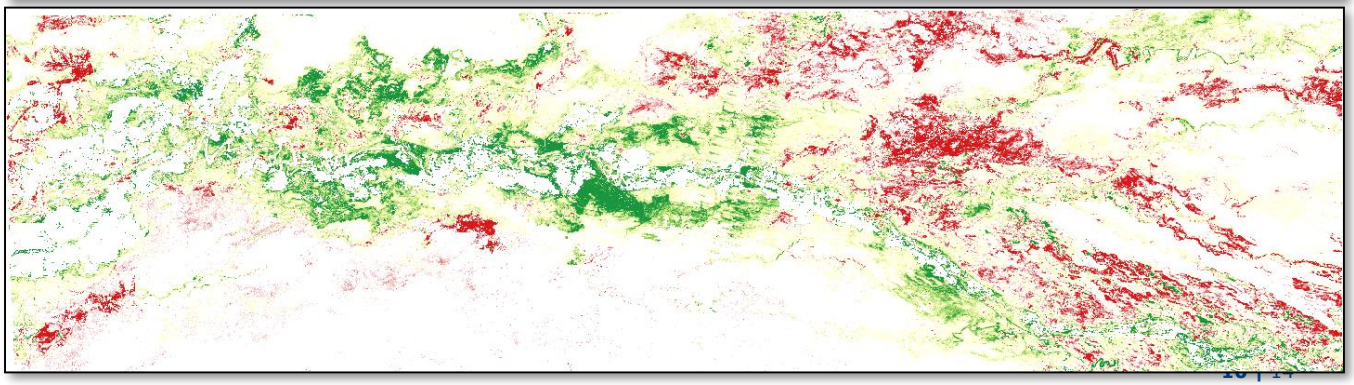
Landsat5

1985 – 1999

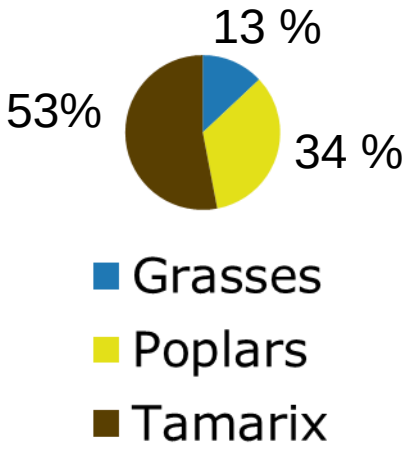


Landsat7

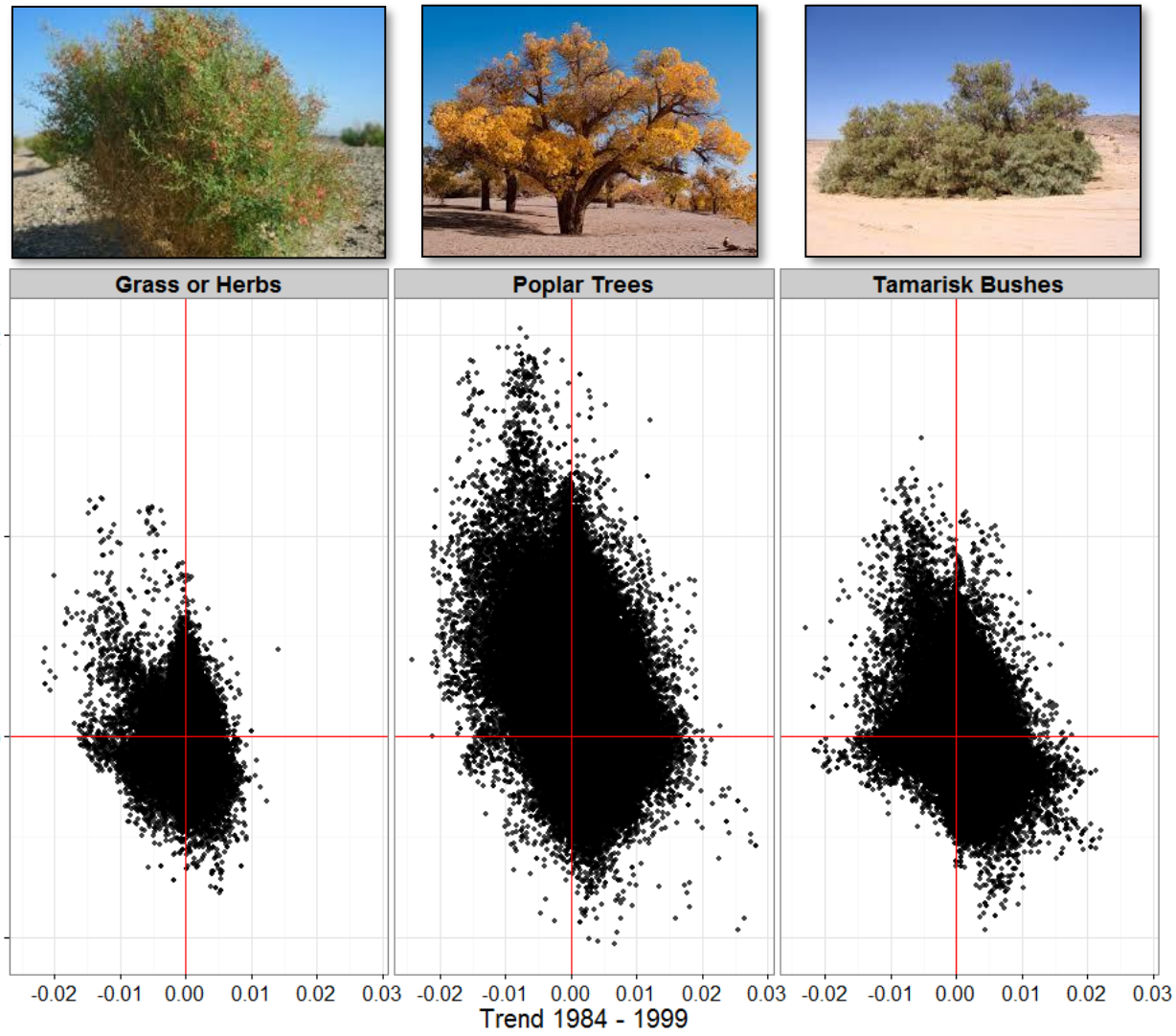
2000-2015



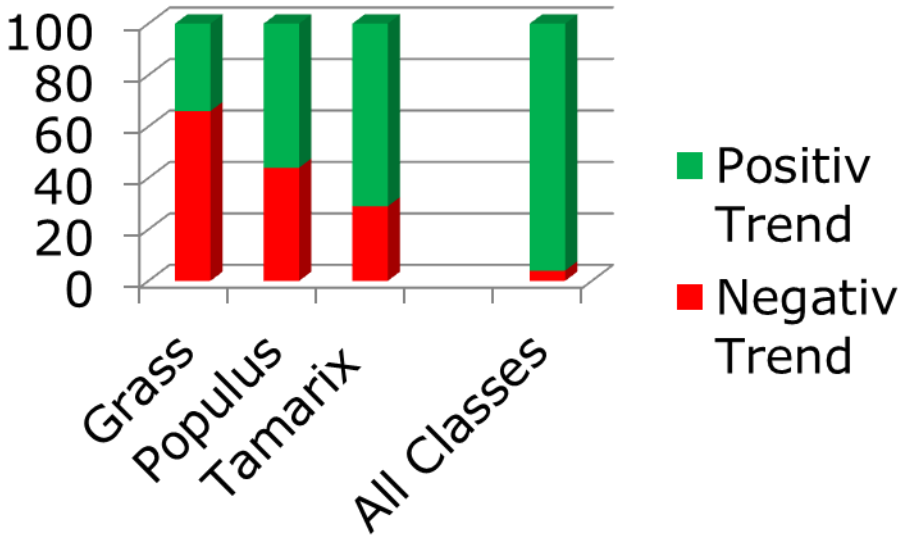
Results – Middle Reaches



- **2/3 of all Populus trees have positive trend from 2000 onwards**



Summary



Lower Reaches

- 95% of natural vegetation with positiv trend after water diversion

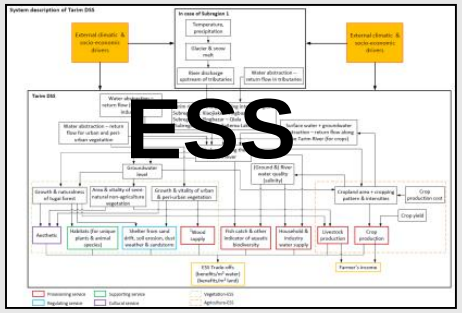
TODO List

- Relationship Long Term Trends vs. Distance to River

Middle Reaches

- Area increase for all natural vegetation classes with positiv trends
- Populus trees show ~50% positiv vs. 50% negativ trend before 2000
- 2/3 of all Populus trees have positive trend from 2000 onwards
- Area of Tamarix with positiv trend increases by ~15%

Research contribution to Ecosystem Services (ESS) in the Tarim Basin and the contribution to the SuMaRiO-Decision Support System (DSS)



- Wood production
- Carbon sequestration
- Drifting dust control by riparian forest

M.Sc. Philipp Gärtner

GEOINFORMATION

in der Umweltplanung | Environmental Planning

Technische Universität Berlin

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Thank you. Any Questions?