

Enabling Multi-scale Science

Claudia Bauzer Medeiros

University of Campinas, Brazil

<http://www.ic.unicamp.br/~cmbm>

Email: cmbm@ic.unicamp.br

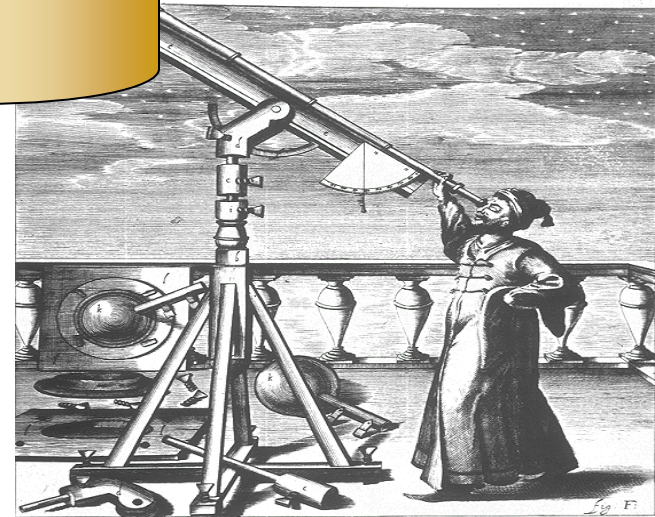
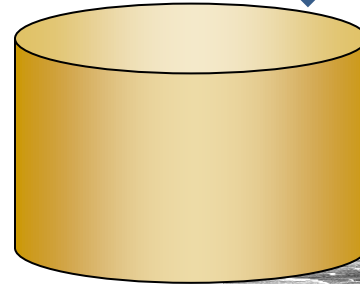
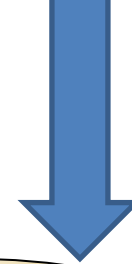
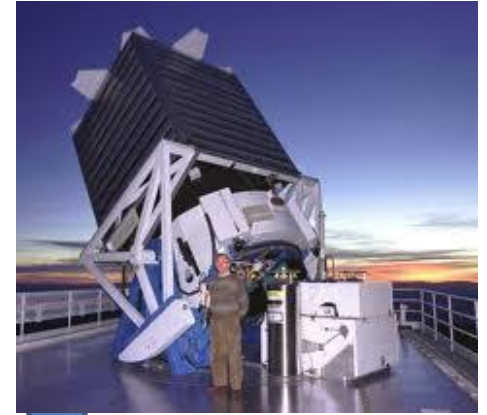
Support:

FAPESP-MSR Virtual Institute (NavSCALES and eFarms projects)

CNPq (MuZOO project and individual grant)

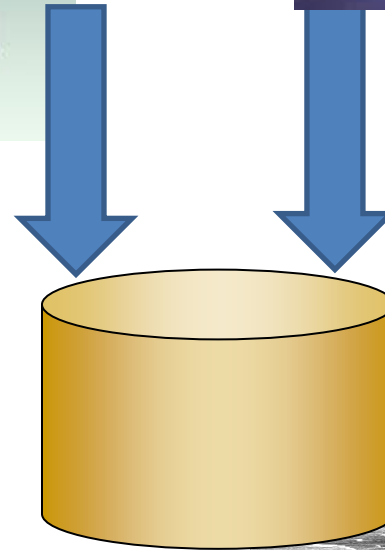
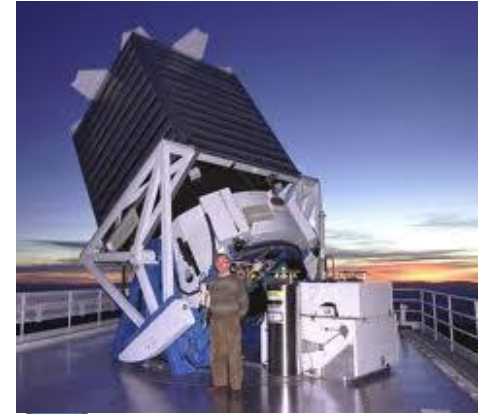
We are
DATASCOPE
engineers

Software is the
device/tool

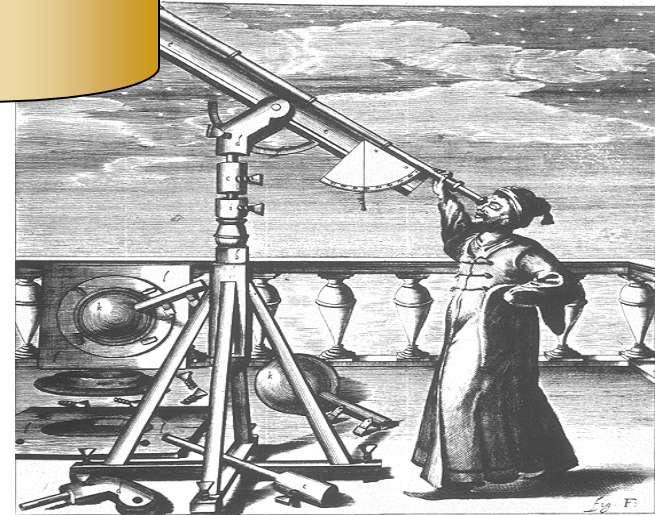


We are
DATASCOPE
engineers

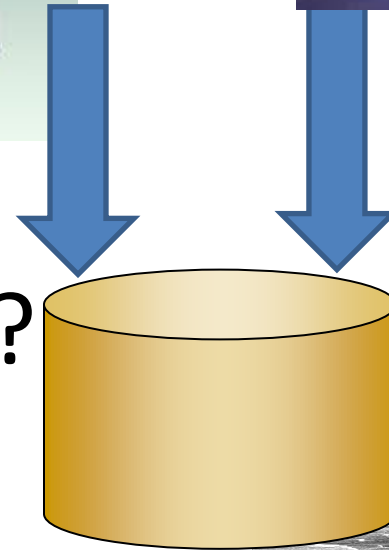
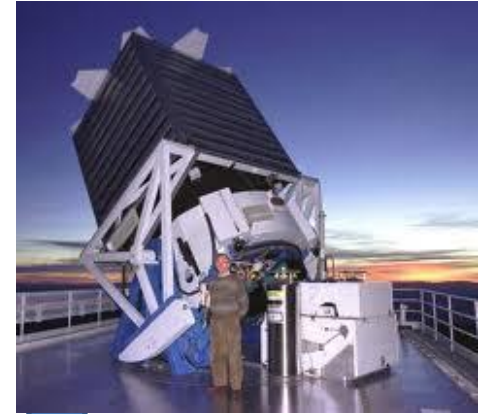
?



**DATA +
ANALYSIS PROCESSES +
VISUALIZATIONS**

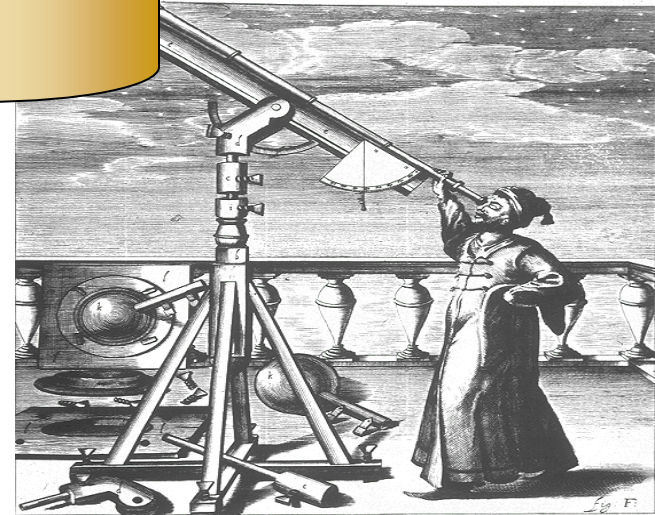


We are
DATASCOPE
engineers

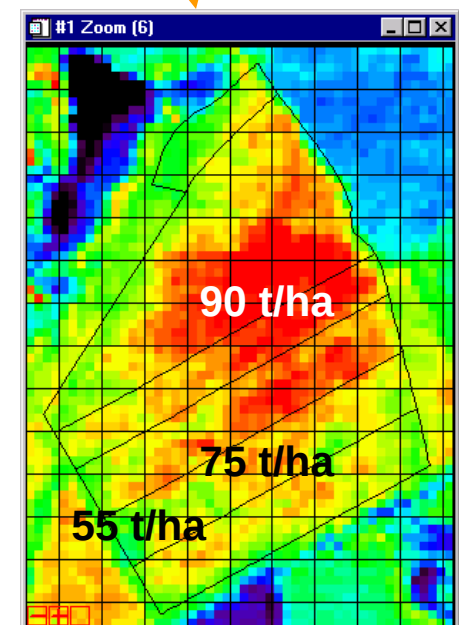
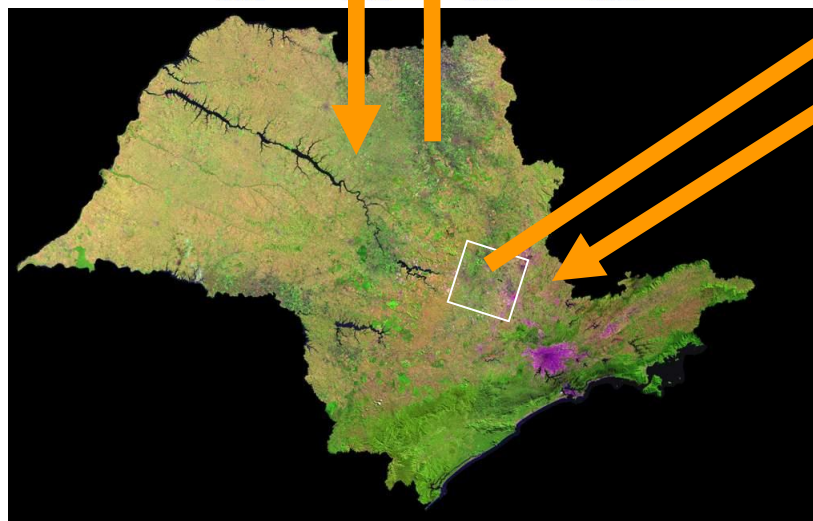
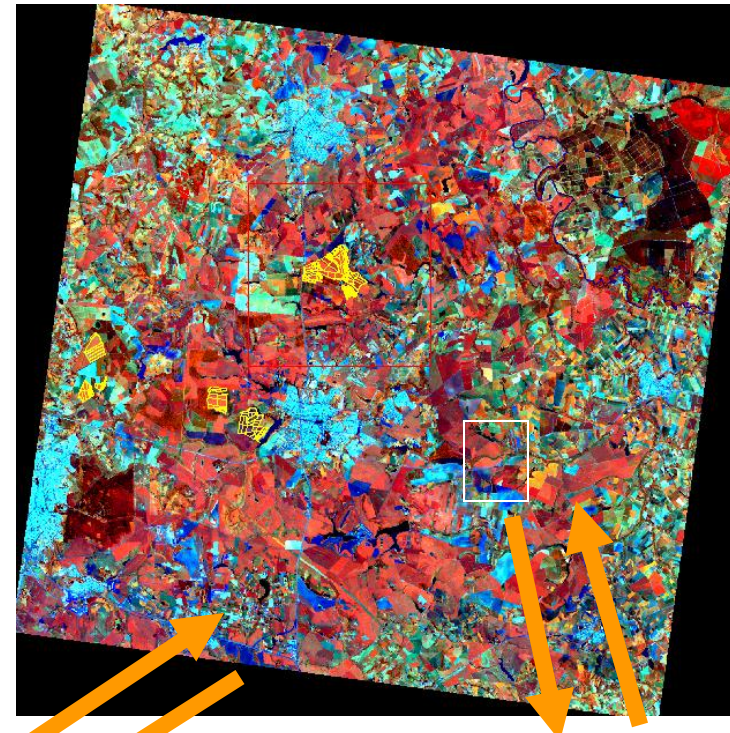
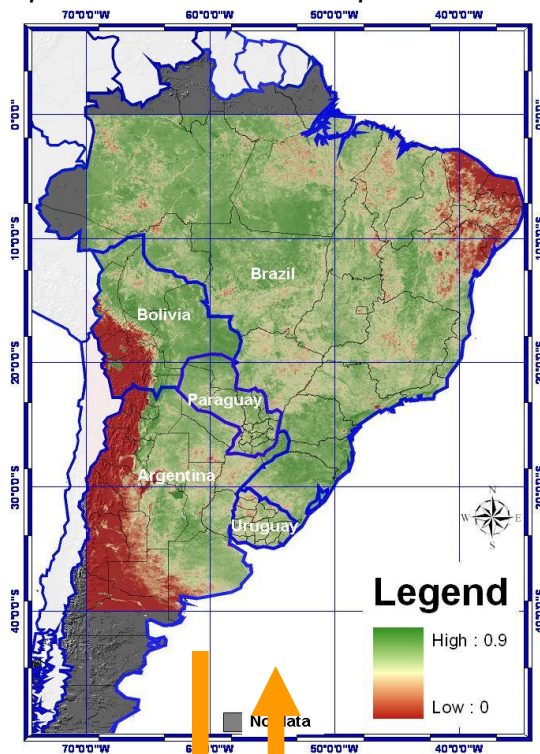


But what
about a SCALEScope?

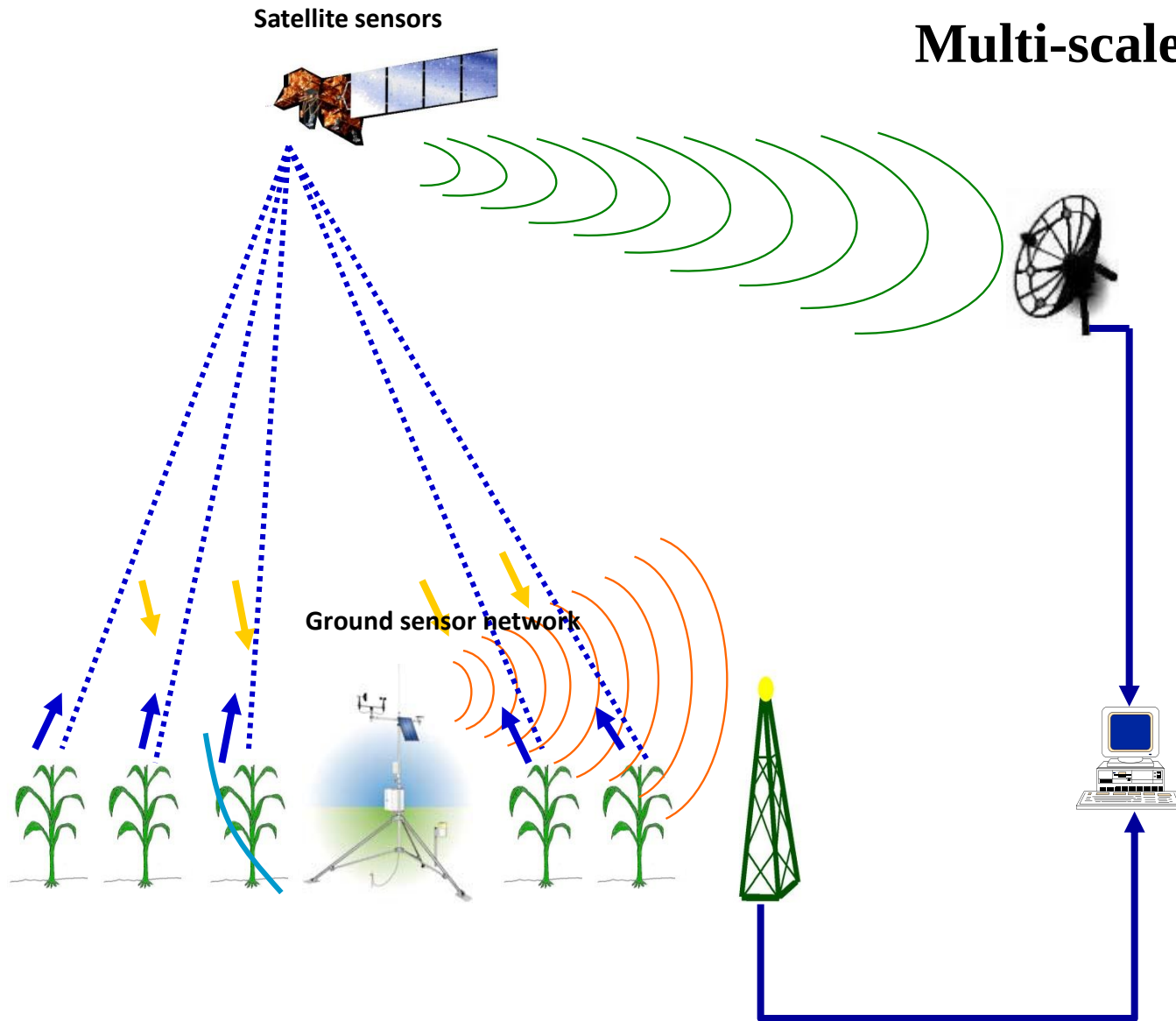
**DATA +
ANALYSIS PROCESSES +
VISUALIZATIONS**

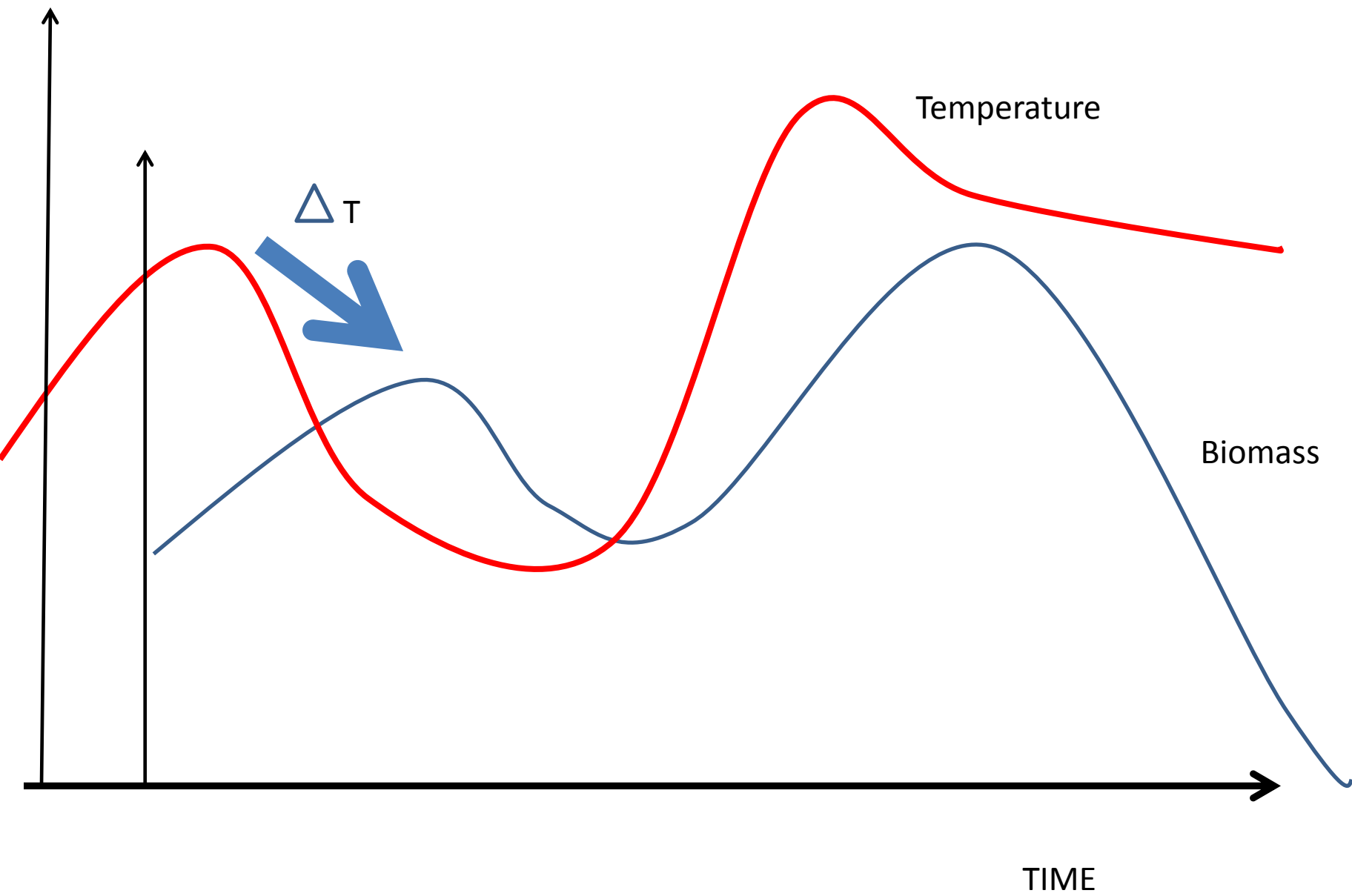


Scale changes



Multi-scale scenario





Recurring multi-scale problems

Data heterogeneity and quality

space

time

-> how to find common denominator (conversion?)
(cleaning?)

-> how to visualize?

Sophisticated series of events

in space

in time

-> how to mine, correlate, visualize?

Recurring multi-scale problems 2

Complex interactions within and across scales

- complex networks

- cause and effect are not synchronous

-> how to model and provide traceability?

Model heterogeneity

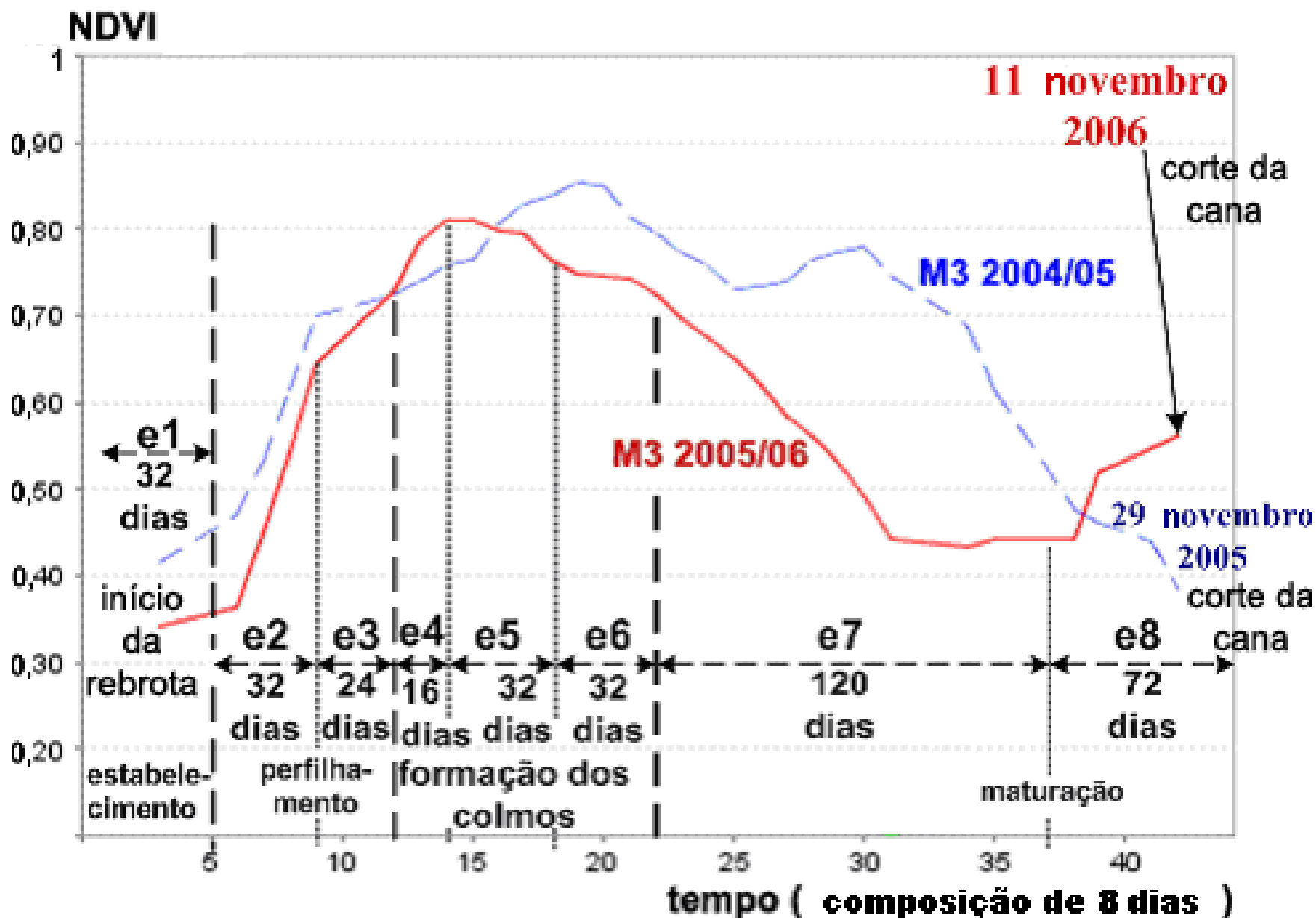
- multiple expertises

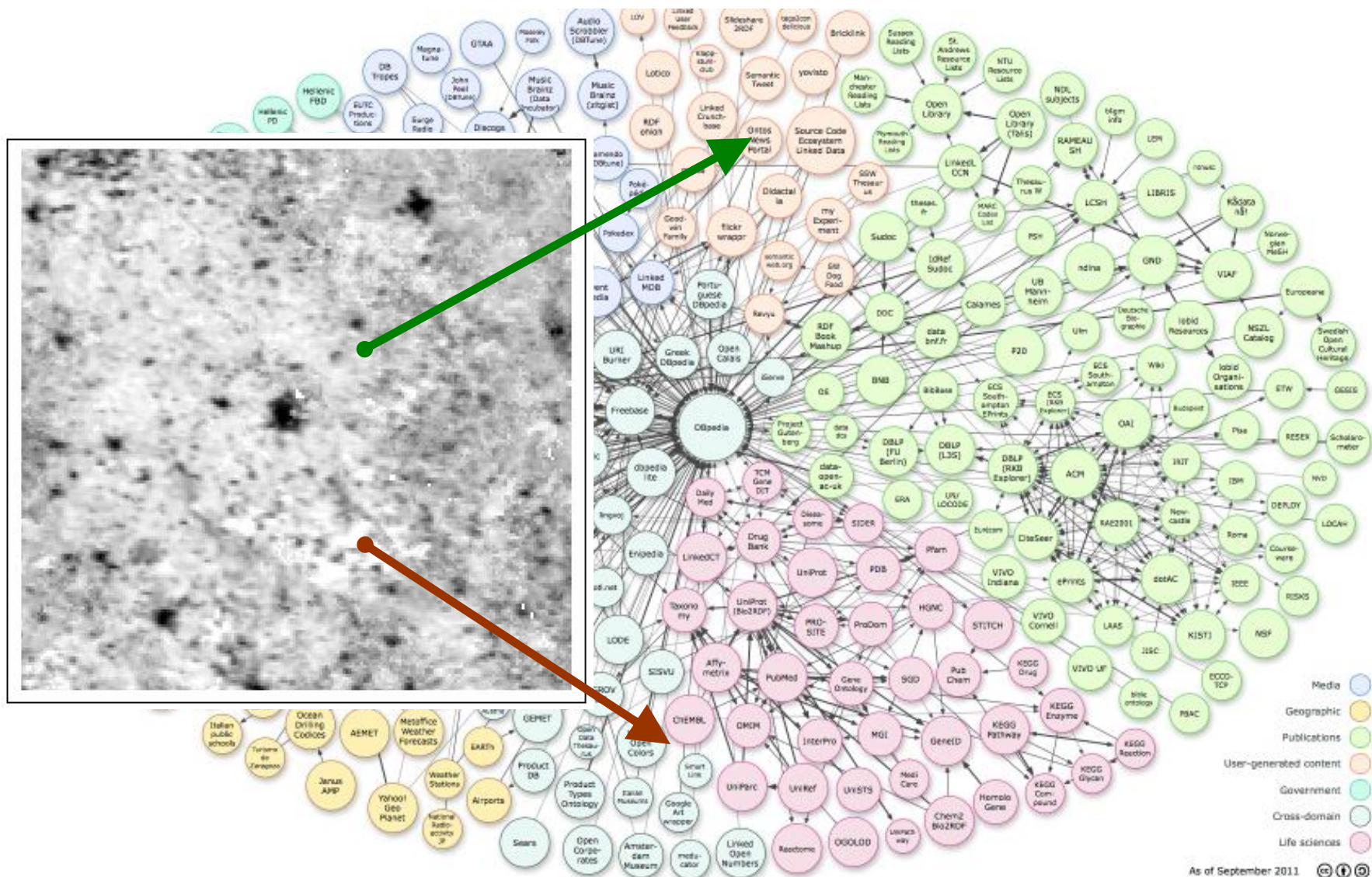
- complementary views of the world

-> how to support model interaction?

A few ideas

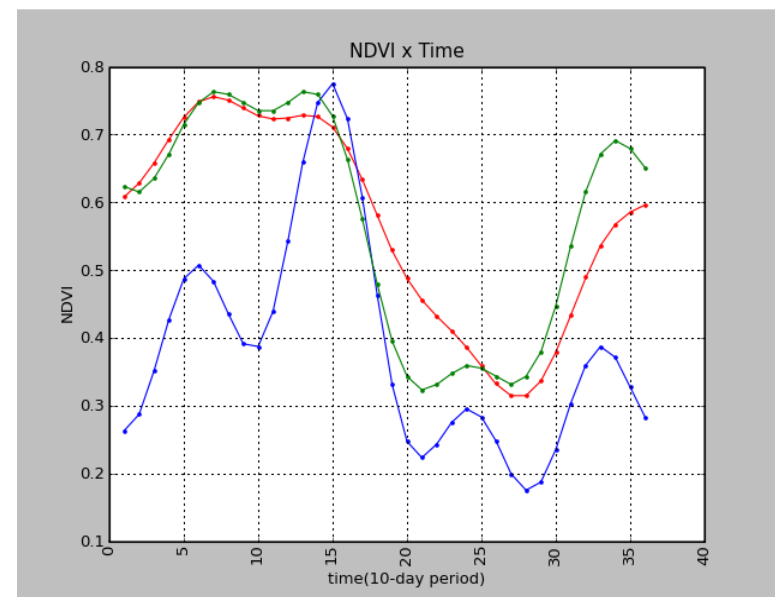
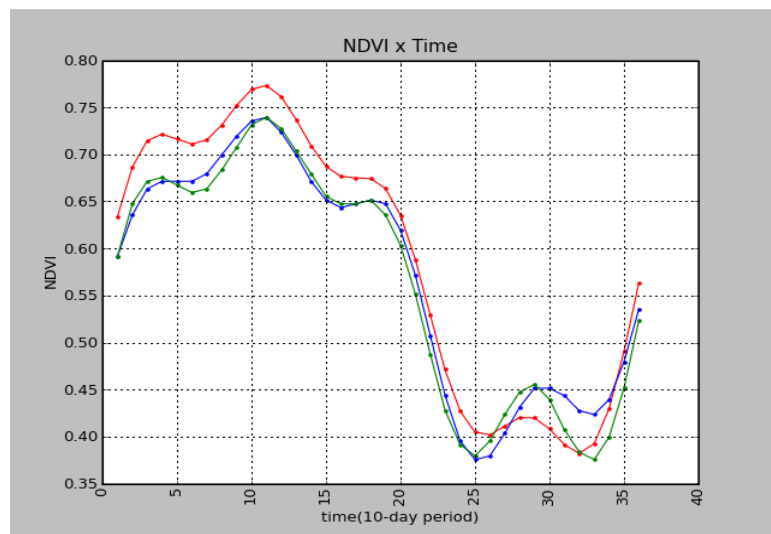
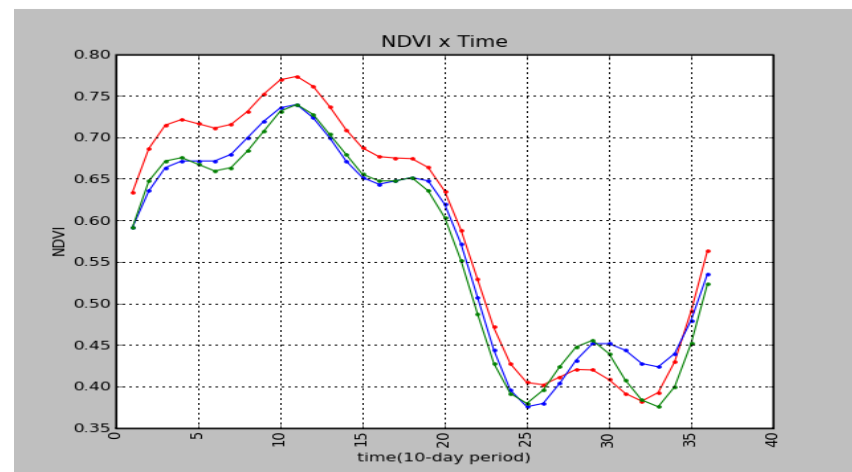
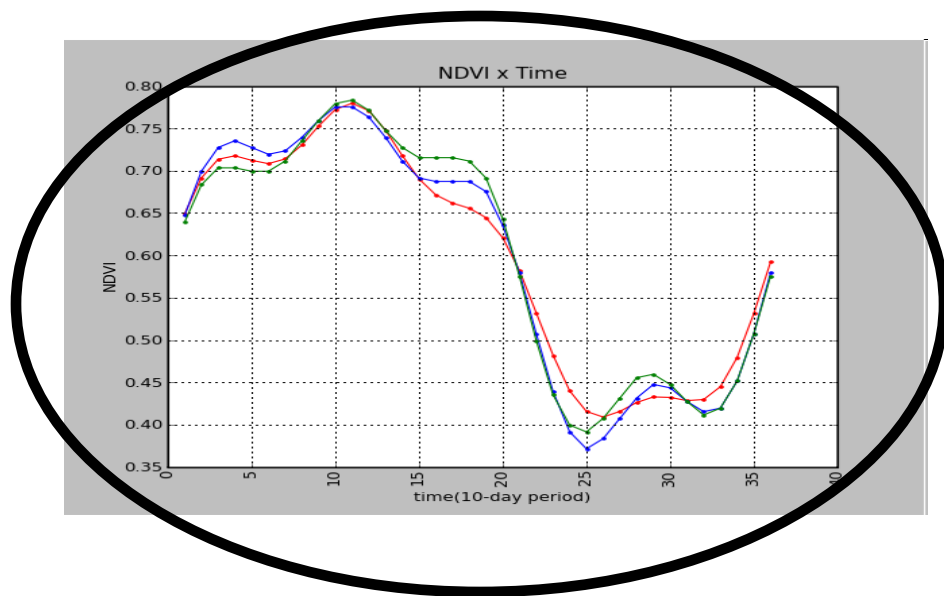
1. Annotations/ontologies





A few ideas

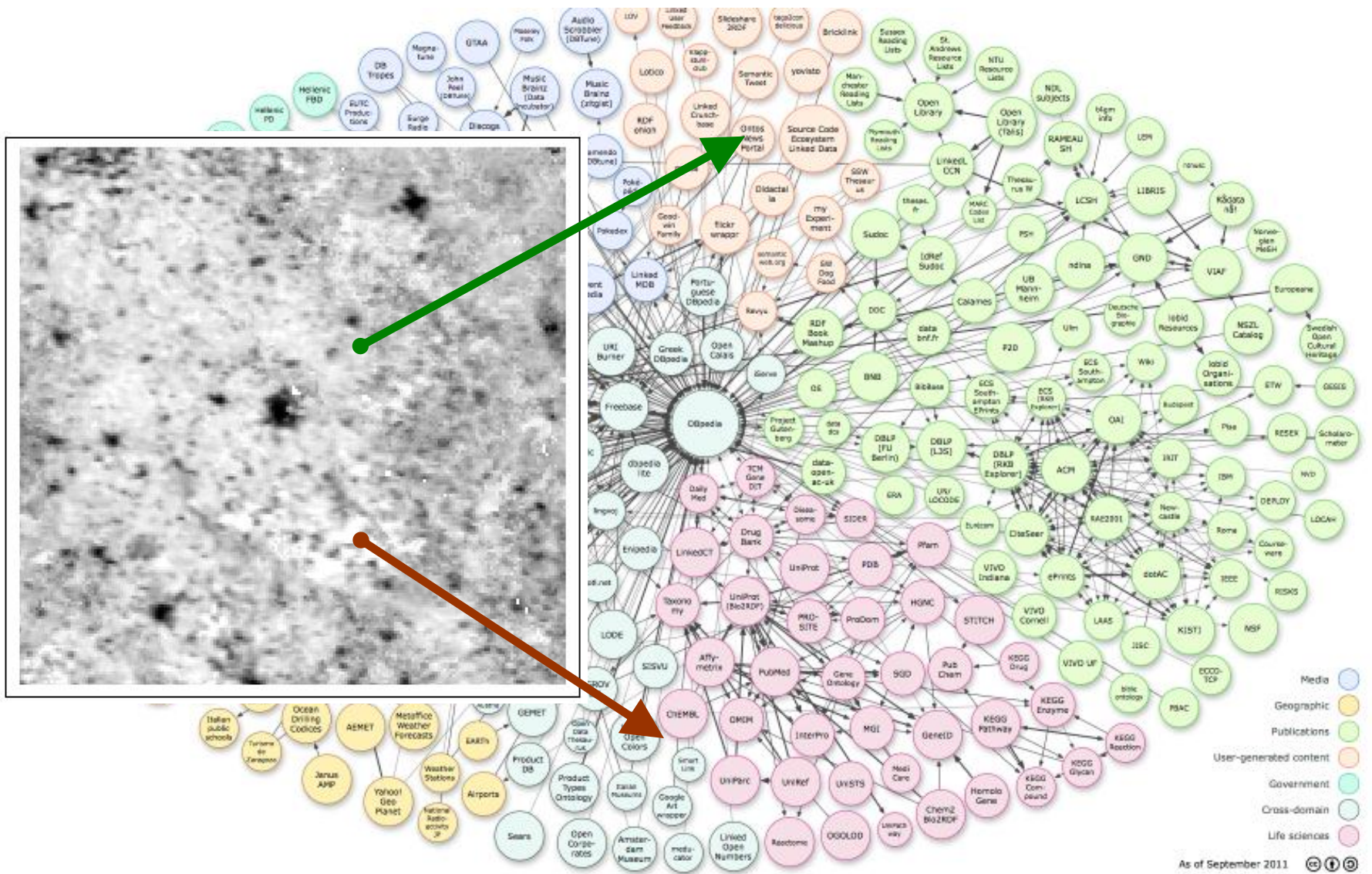
2. Extend series mining

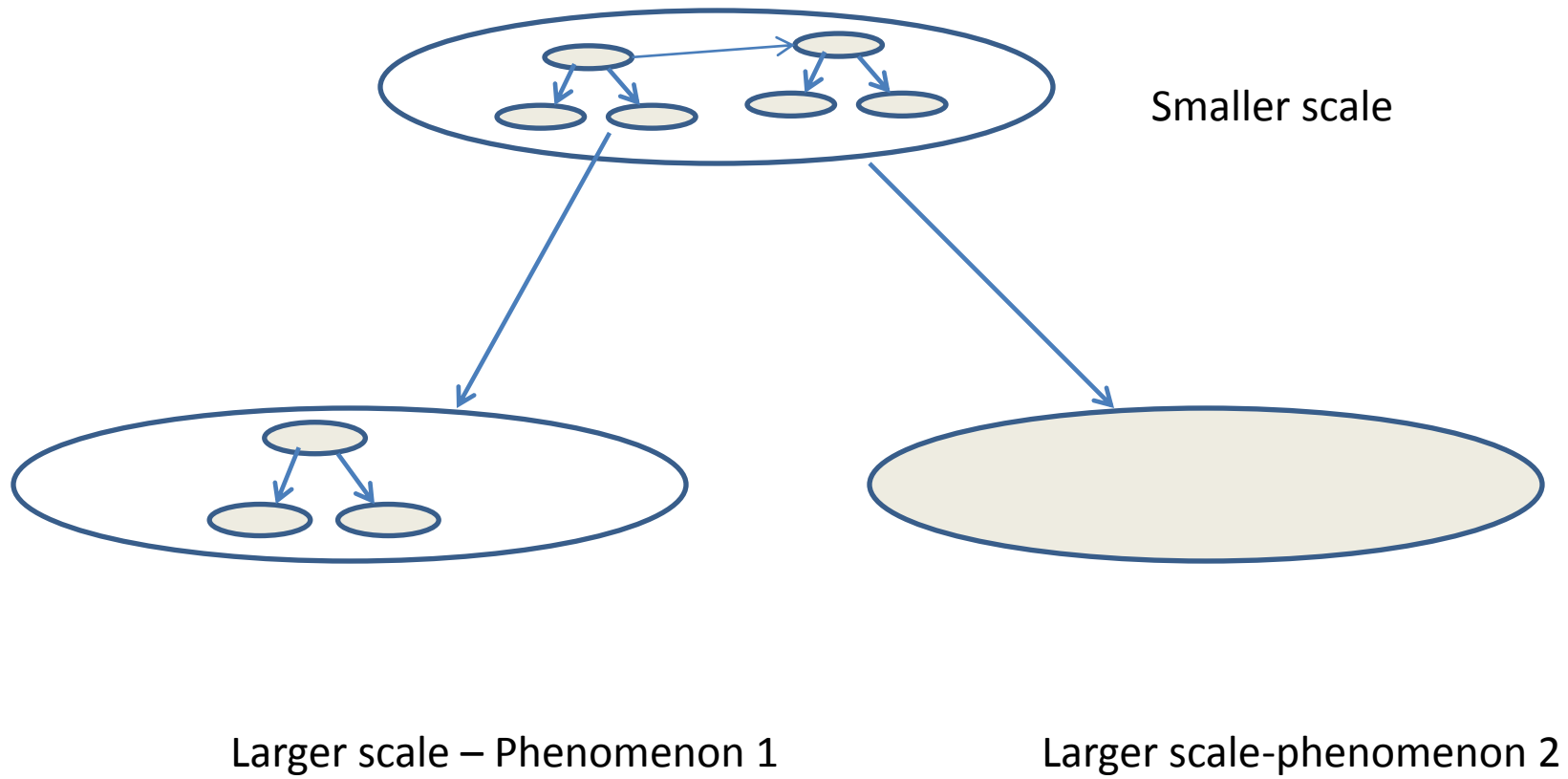


Mining co-evolving series

A few ideas

3. Aggregations, graphs and workflows





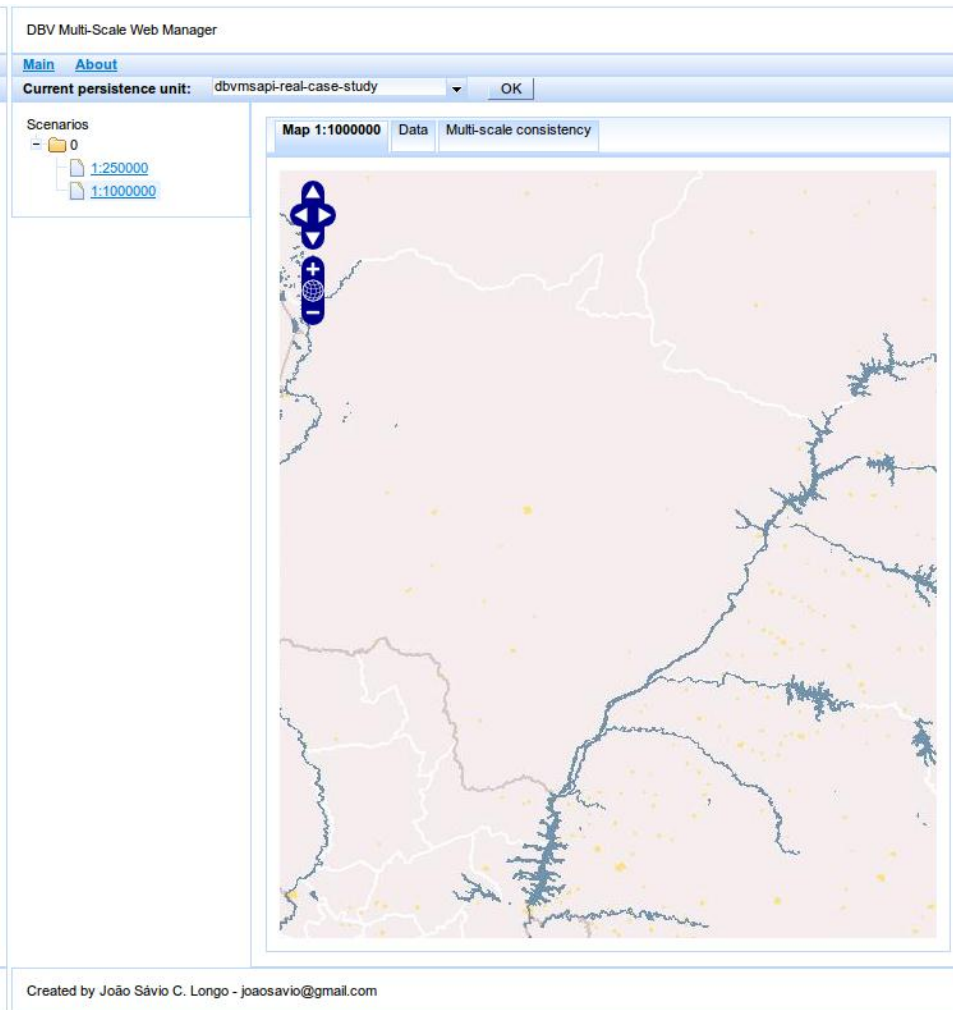
A few ideas

4. Adapt versioning

Scenario 0

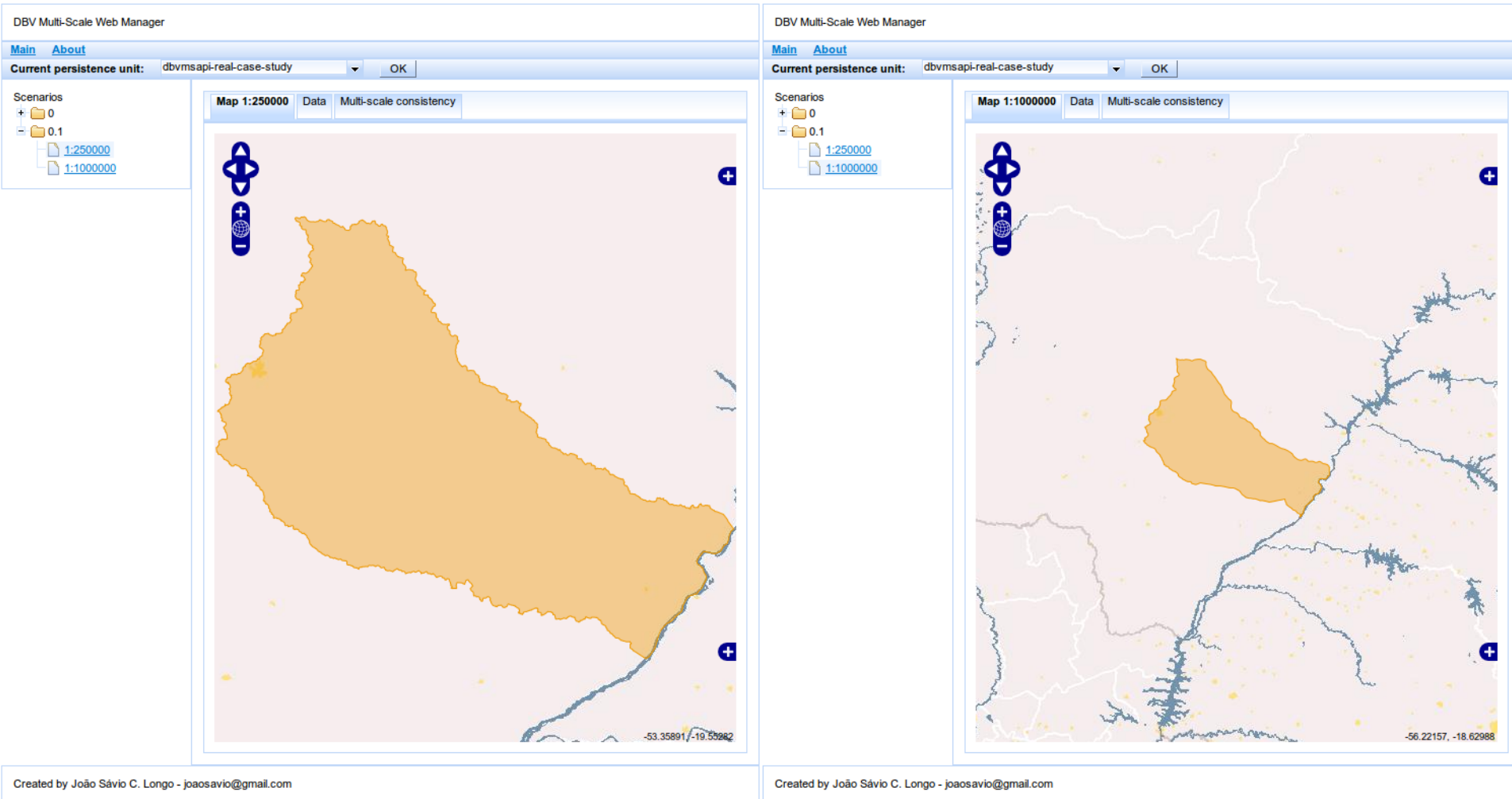


1:250k



1:1M

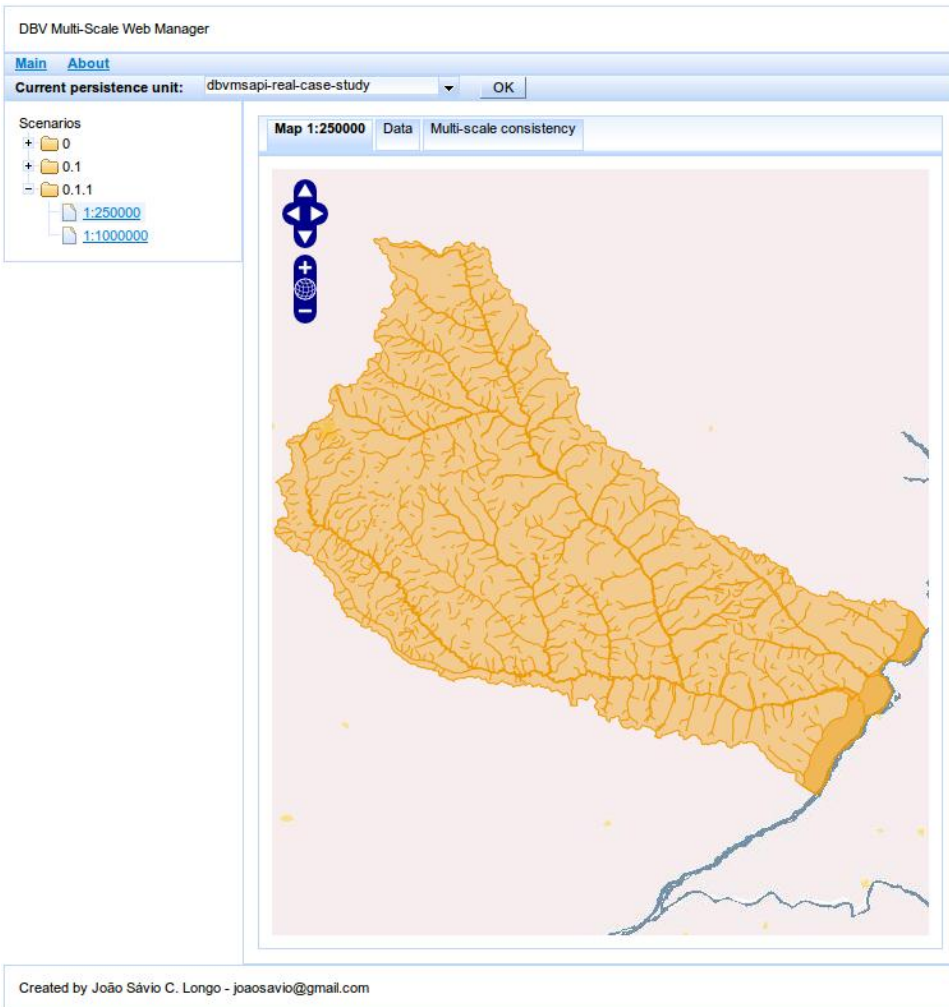
Scenario 0.1



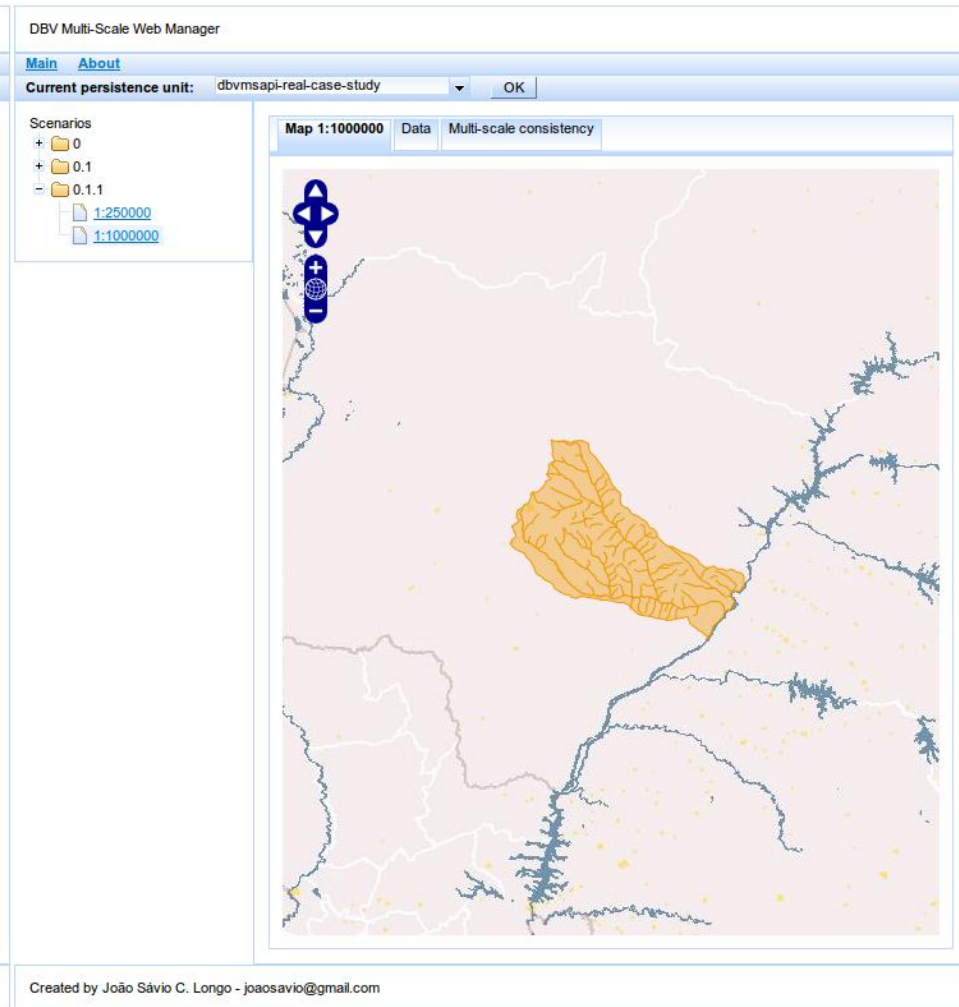
1:250k

1:1M

Scenario 0.1.1

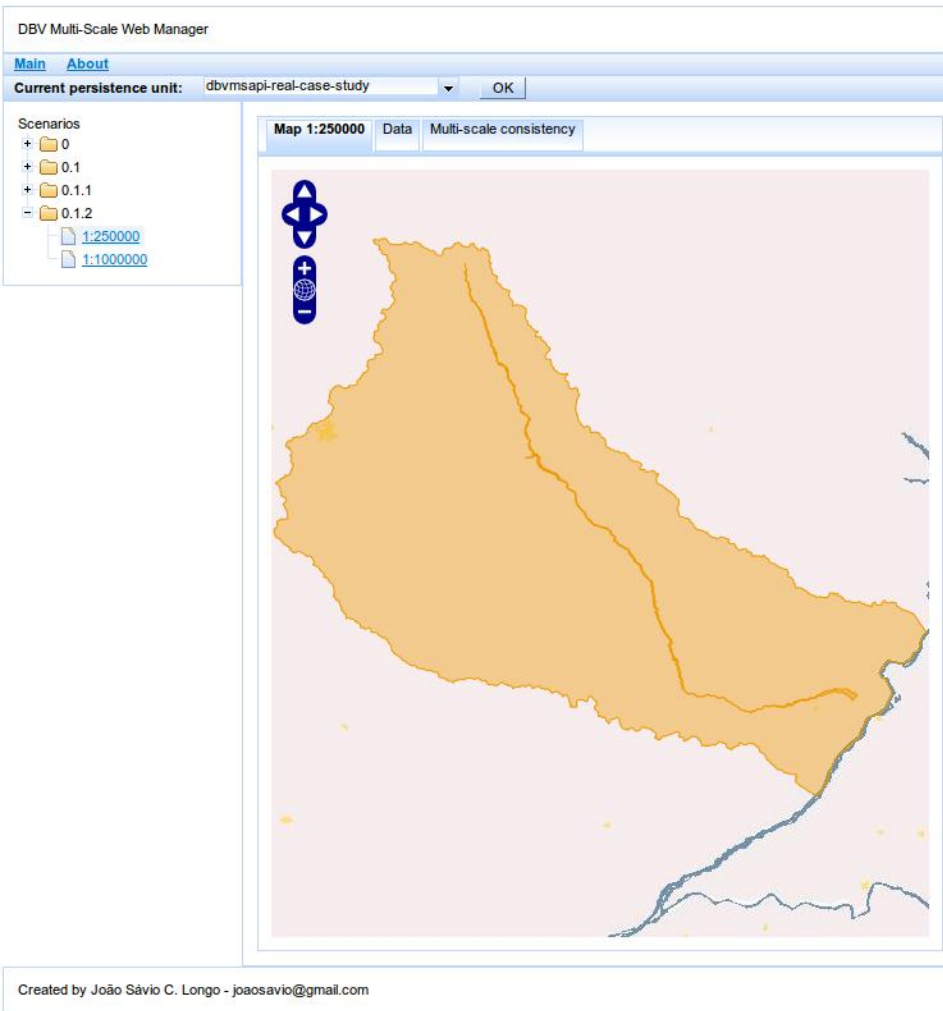


1:250k

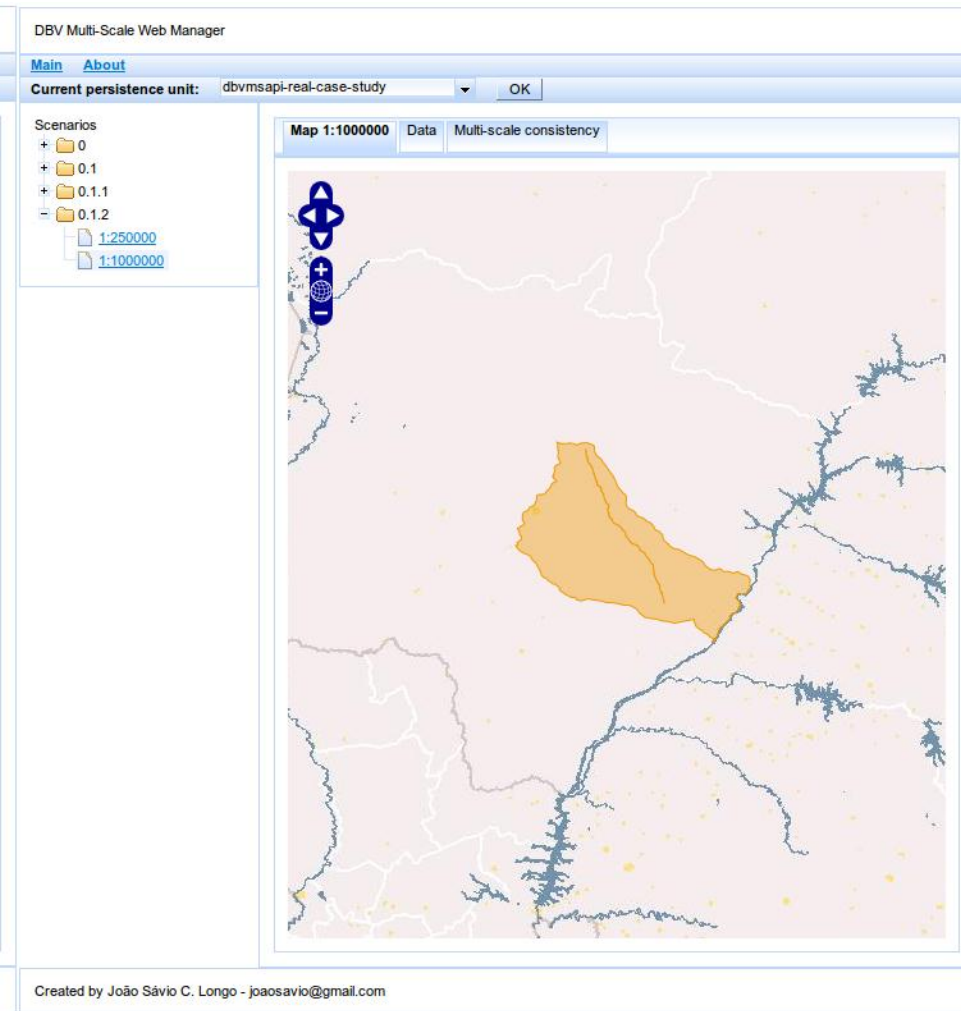


1:1M

Scenario 0.1.2

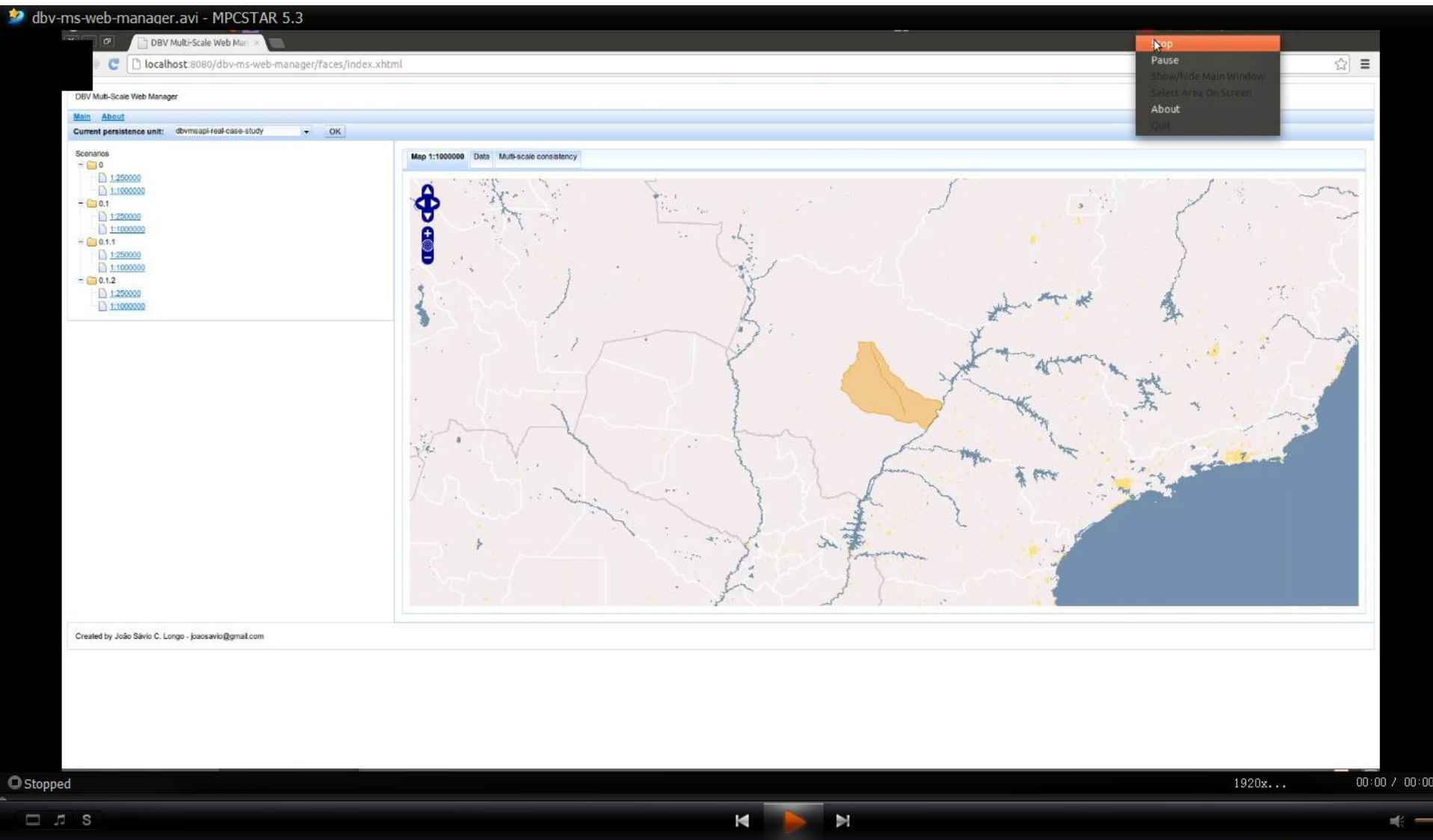


1:250k

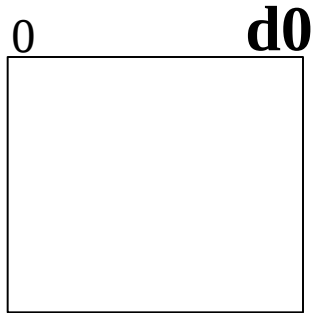


1:1M

A given version and interactions



Example



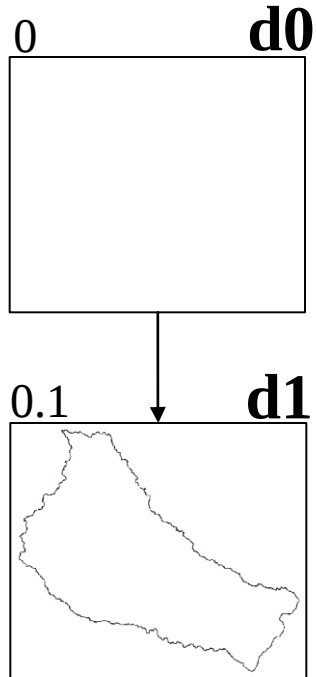
DBV

d0

Data

-

Example



DBV

Data

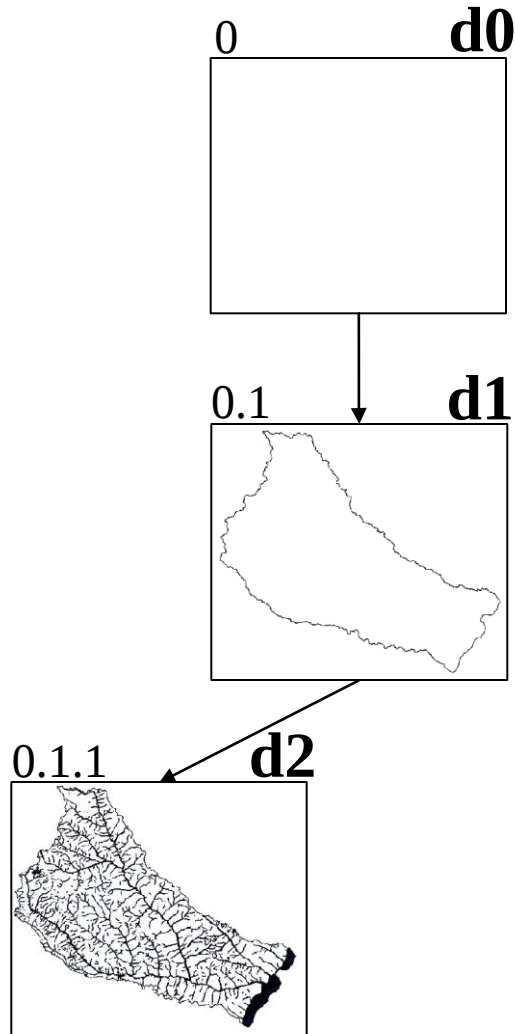
d0

-

d1

- watershed polygons

Example



DBV

d0

d1

d2

Data

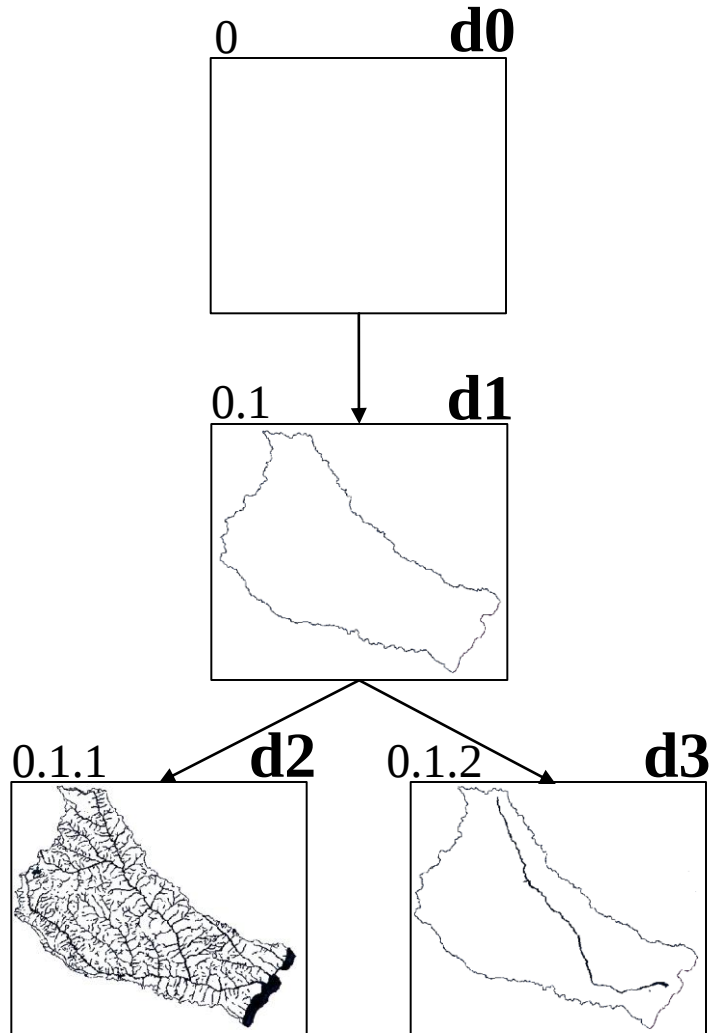
-

- watershed polygons

- watershed polygons

- rivers

Example



DBV

Data

d0

-

d1

- watershed polygons

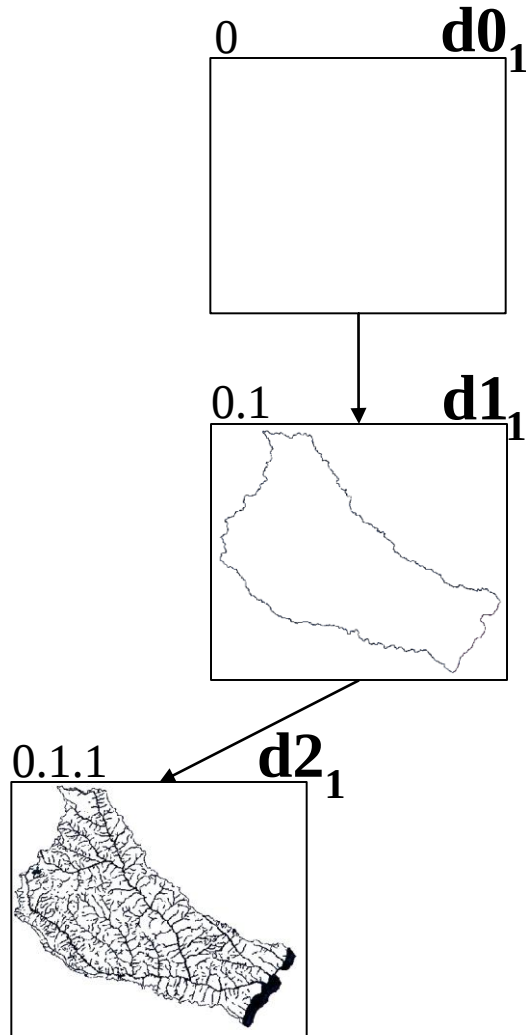
d2

- watershed polygons
- rivers

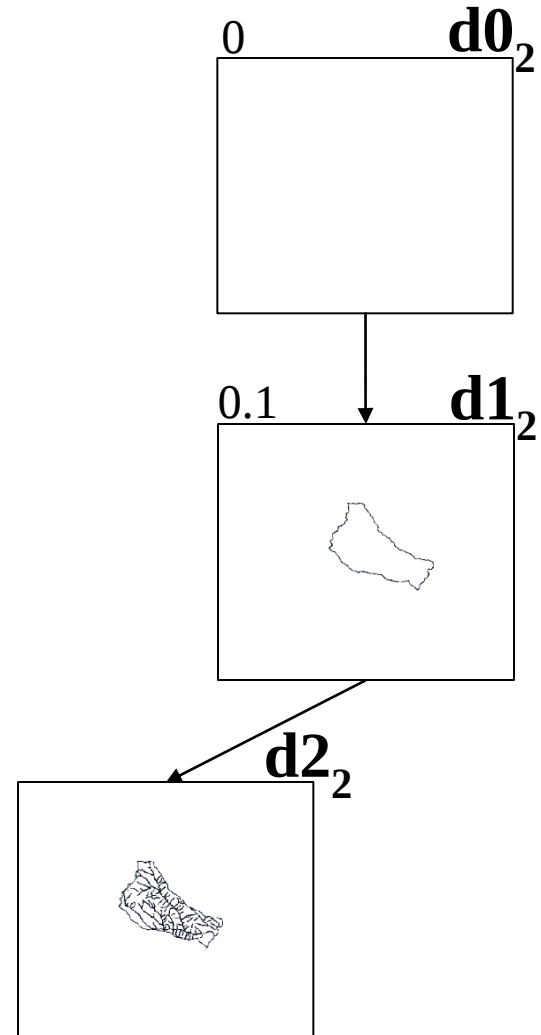
d3

- watershed polygons
- main river

Scenario 0.1.1

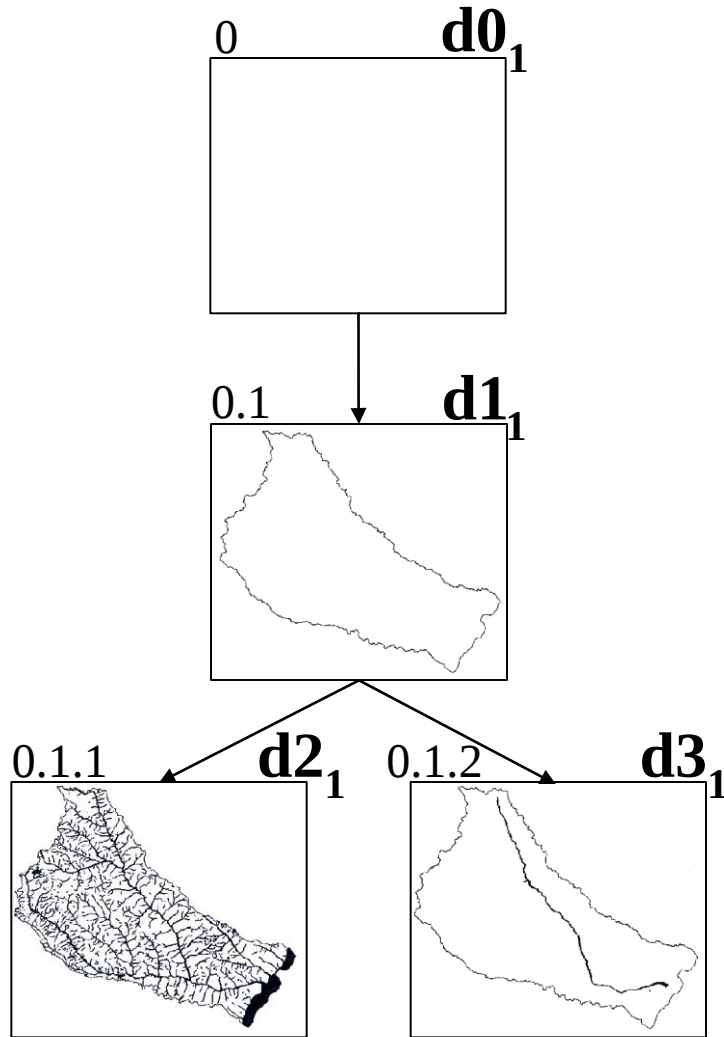


Scale 1:250k

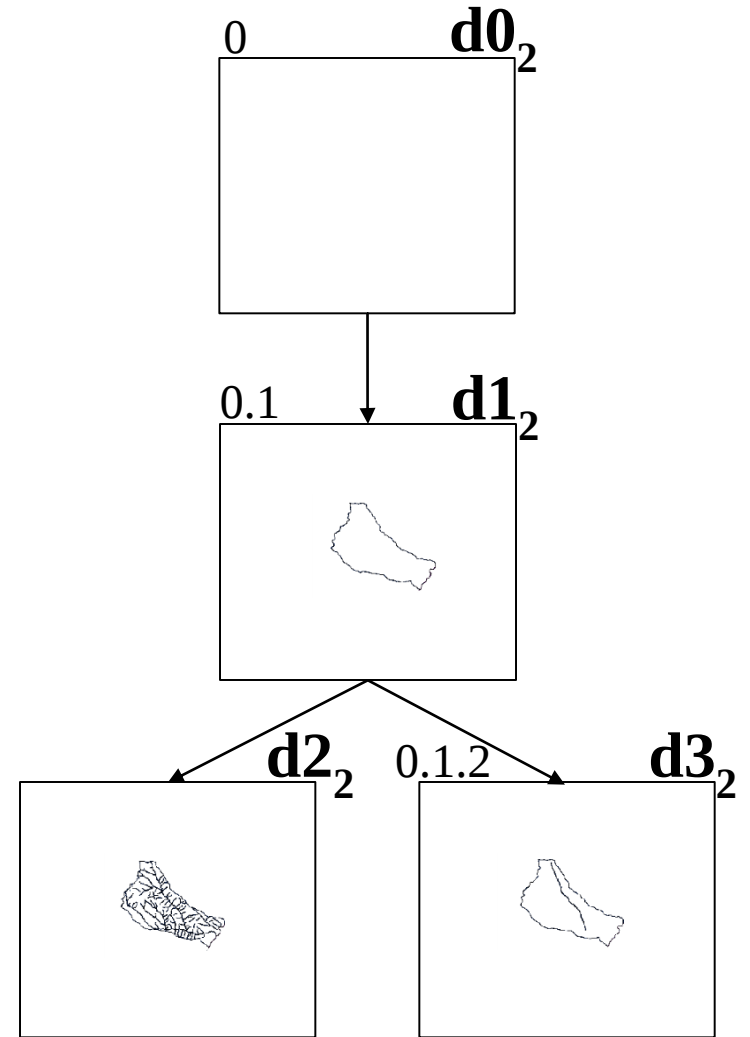


Scale 1:1M

Scenario 0.1.2



Scale 1:250k



Scale 1:1M

A few ideas

5. Profit from visual analytics

Visual analytics

Portrayal of trends as interconnected, annotated curves

Animations

Microsoft's WWT and Layers