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Joint Research Centre

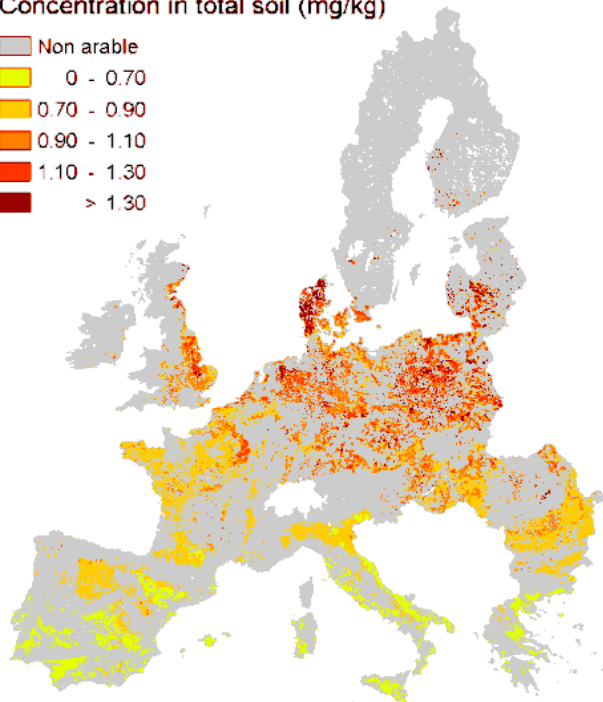
Landscape and climate parameters for the mapping of pesticide ERA

Alberto Pistocchi

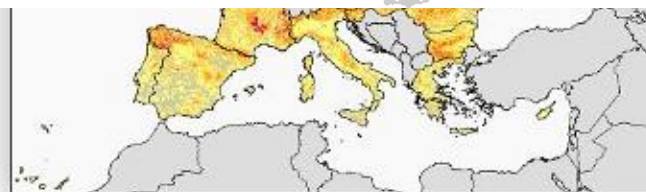
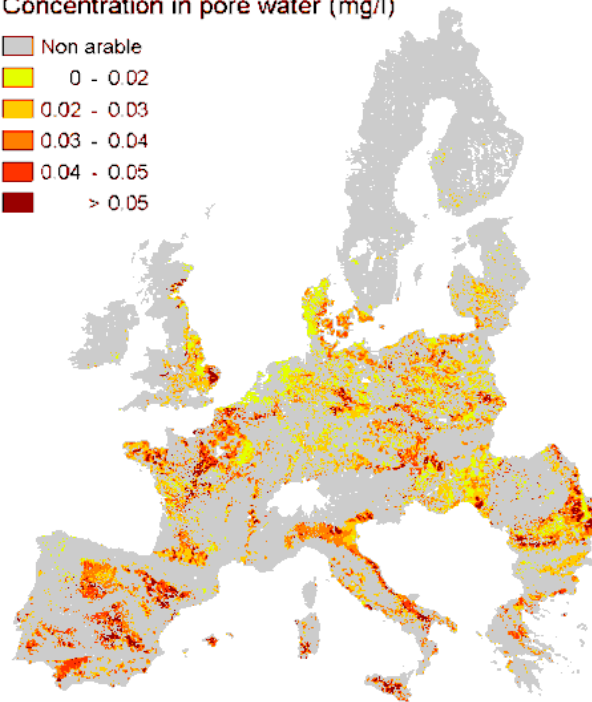
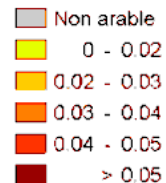


PERSAM

Substance P3: DegT50 = 200 d; $K_{om} = 1000$ L/kg
Concentration in total soil (mg/kg)



Substance P3: DegT50 = 200 d; $K_{om} = 1000$ L/kg
Concentration in pore water (mg/l)

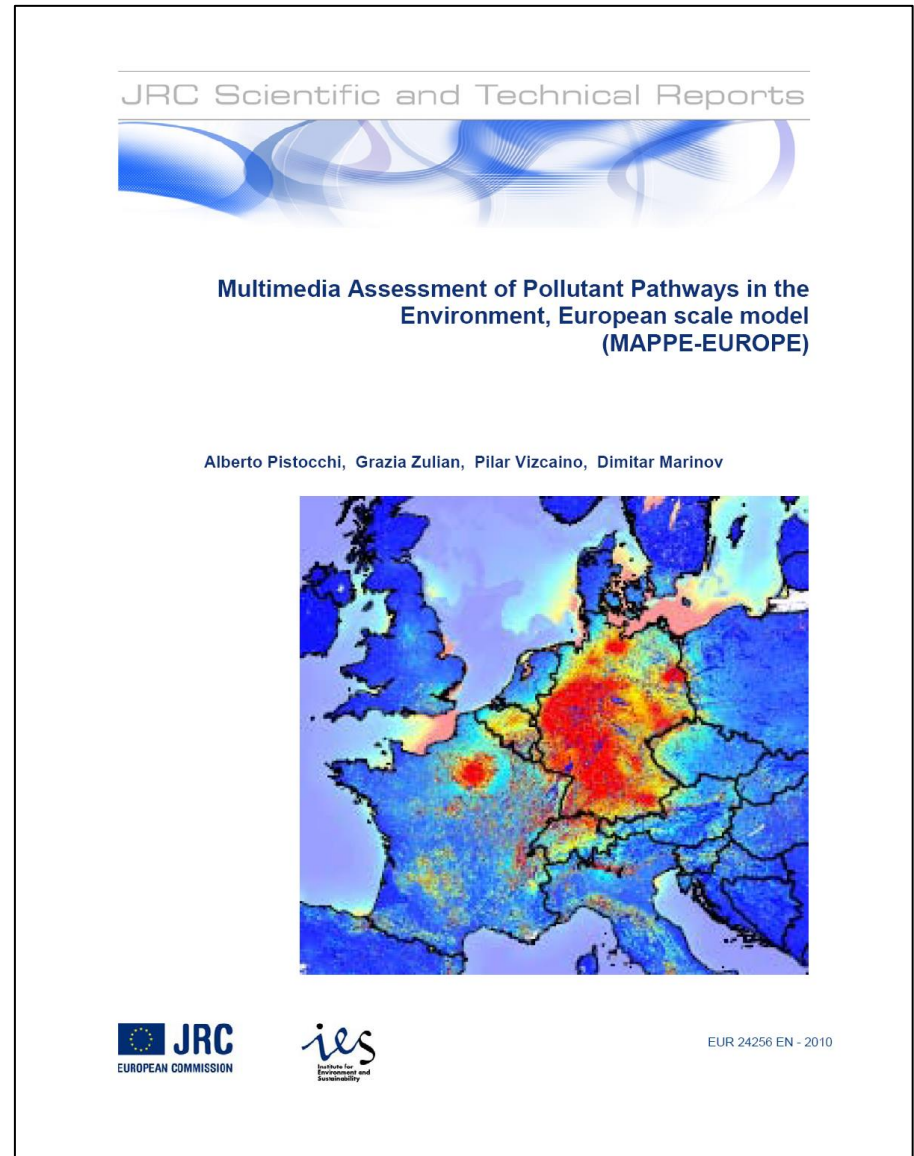


Continental scale modelling of pesticides: MAPPE model

Variability of landscape/climate
& complexity of environmental
processes

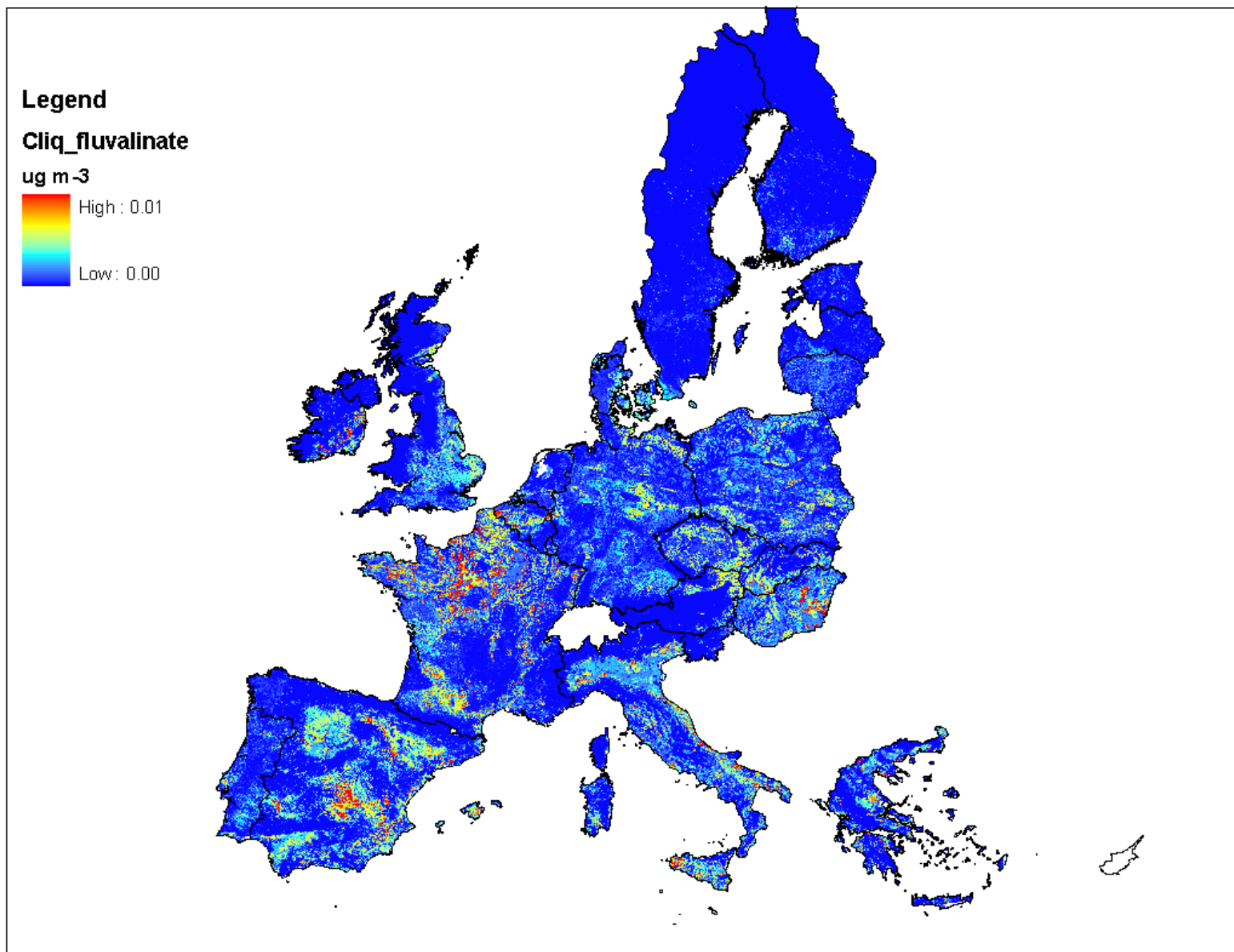
Simple models

- may perform as good as complex models
- easier to integrate in silo-breaking frameworks
- Transparency (hidden assumptions), communicability



<http://publications.jrc.ec.europa.eu/repository/handle/JRC56335>

Example – pyrethroids



Pistocchi et al., 2009:
<http://dx.doi.org/10.1016/j.jenvman.2009.05.020>

All the pesticides in the world...

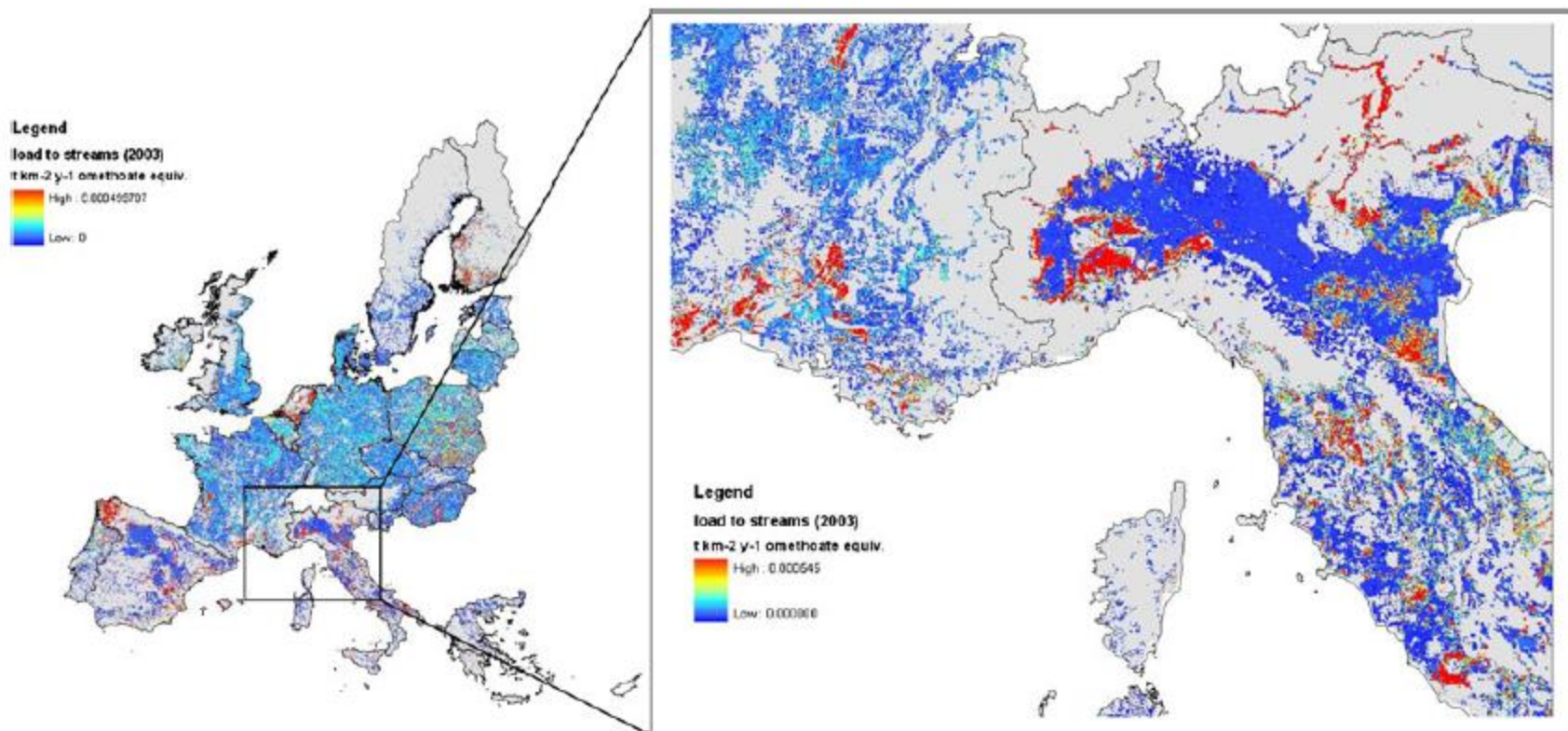


Fig. 1 Example map of load equivalent (criterion, 21 days NOEC aquatic invertebrates)

10

17

18

19

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Outline

- Data & spatial ERA
- Options and gaps
- Implications for spatial variability of exposure
- Implications for impacts of multiple chemicals
- Suggestions for data development
- Complex or simple models?

data & spatial ERA

Objective:

- Exposure varies significantly in space
- Combinations of multiple chemicals

Product:

Exposure scenarios: meaningful combinations of variables in a given "reference landscape"

Environmental scenarios: meaningful "reference landscapes"

Baselines : meaningful spatial distribution of stressors

Input:

Soils, weather/climate, crops

Morphology, land use patterns, hydrography

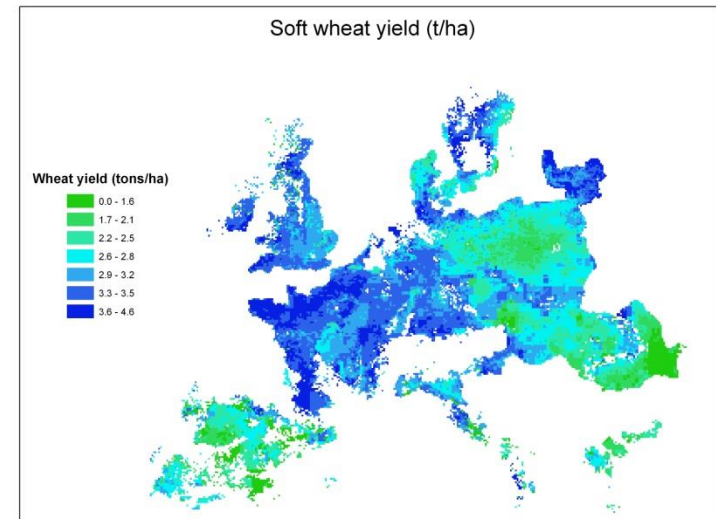
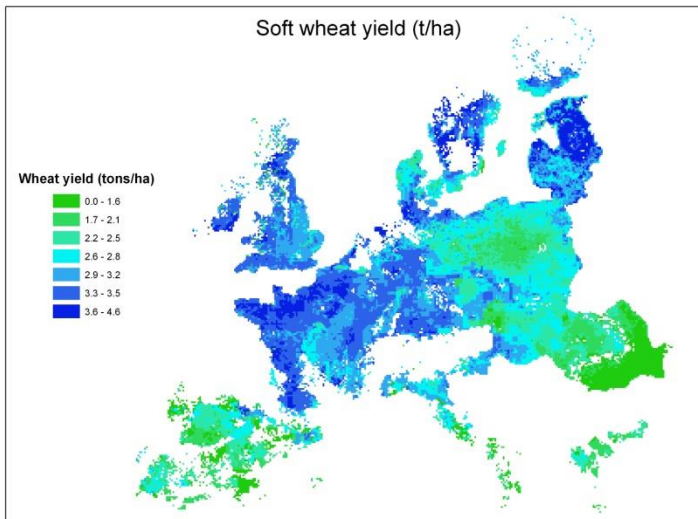
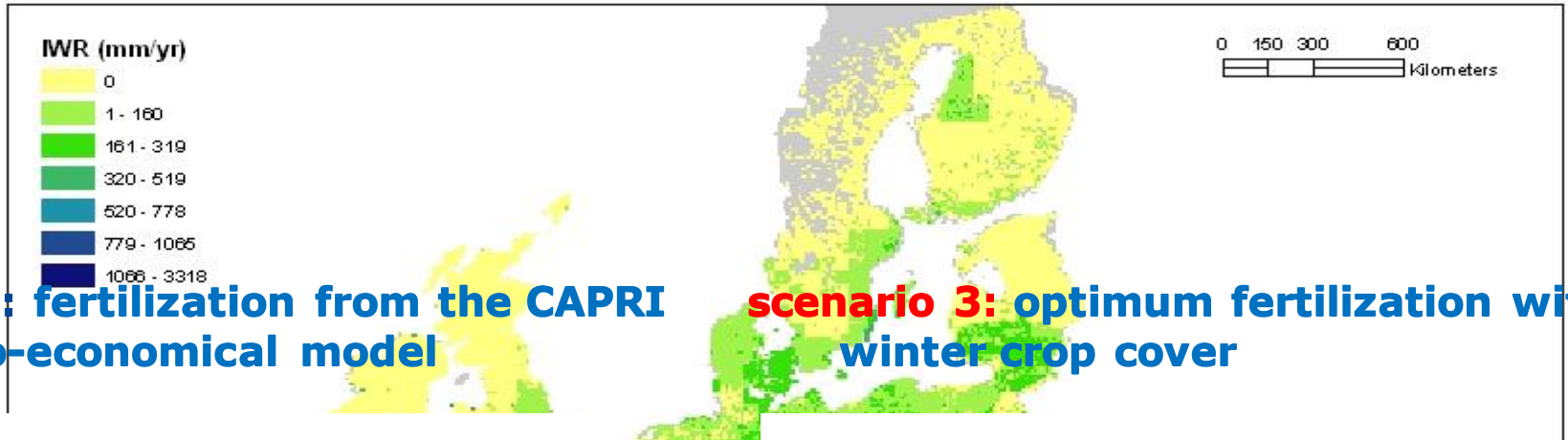
Emissions, management, catchment scale processes

Requirements

Spatiotemporal distribution of environmental concentrations

- [Emissions, management practices]
- Field scale processes
- Advection
- Degradation
- Phase partitioning

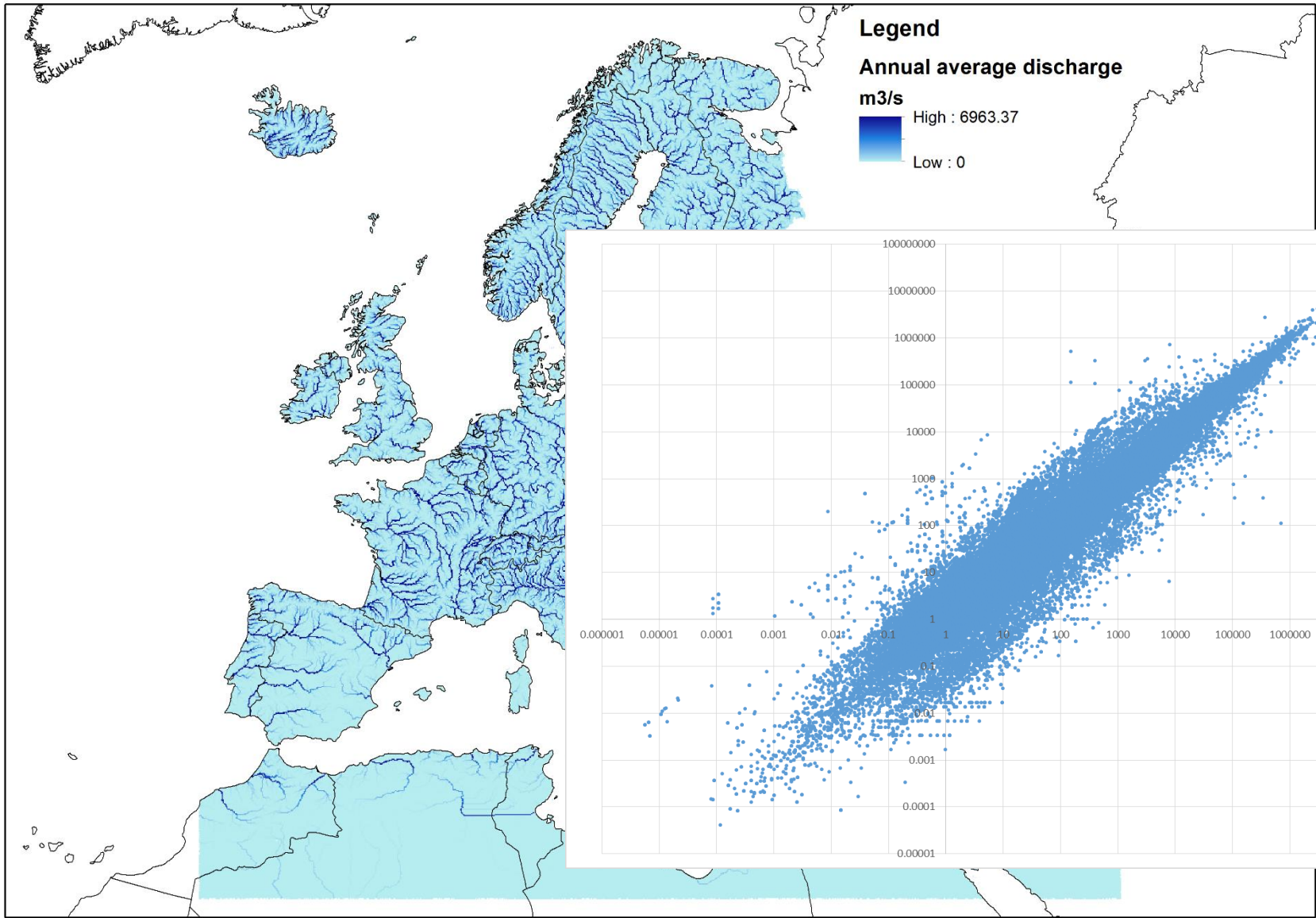
Field scale: EPIC



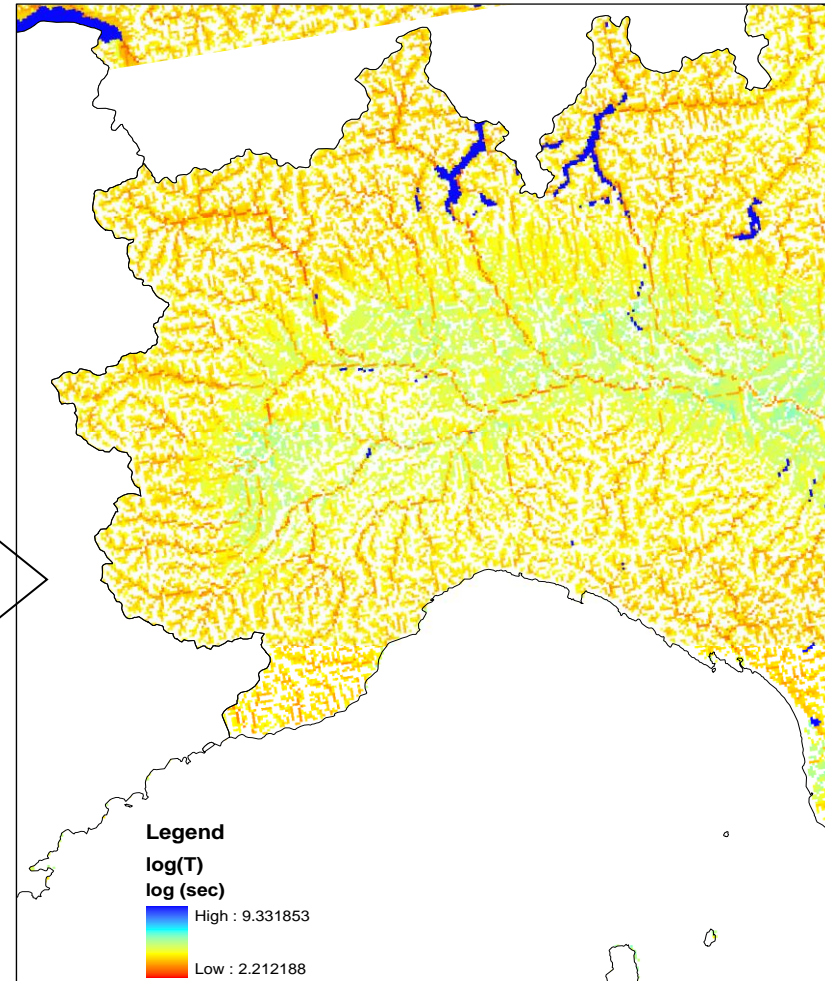
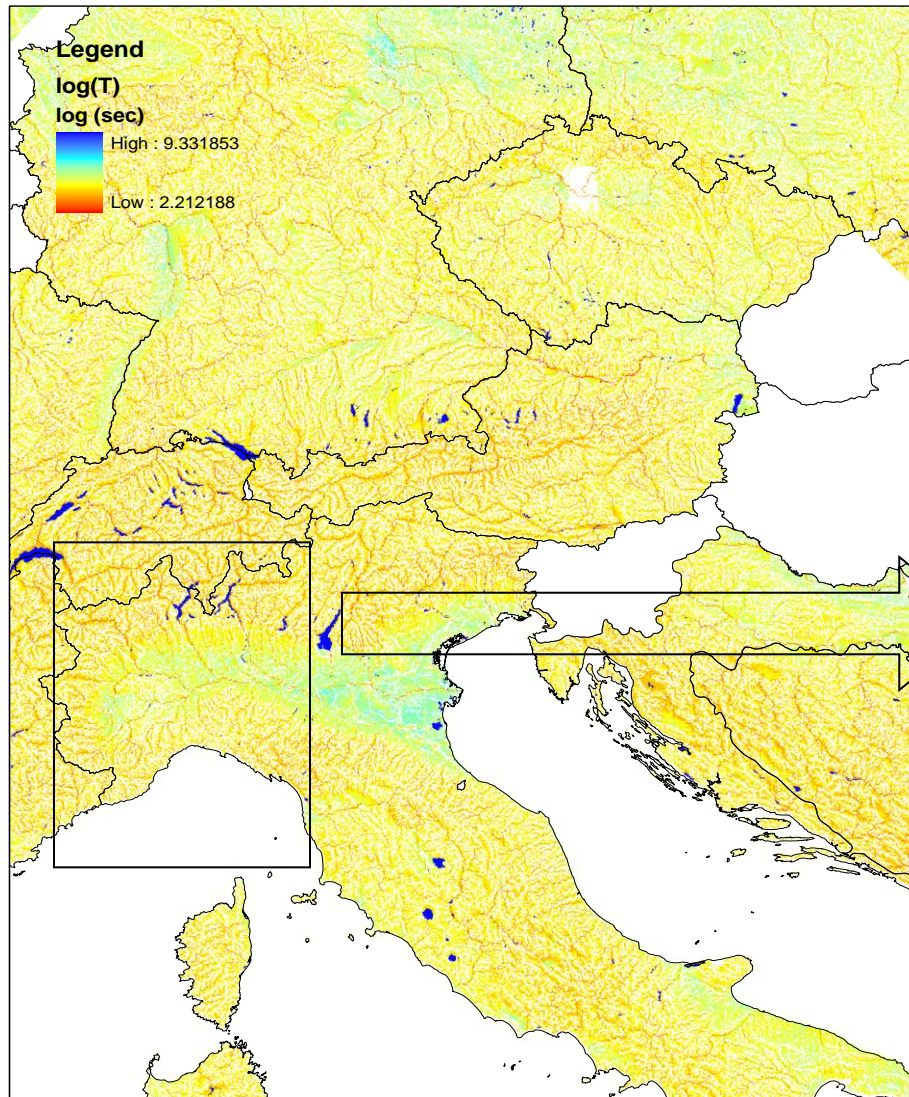
Advection - Water flows

Discharges : LISFLOOD model

Velocity and depth: "hydraulic geometries" to real water body morphology



Residence time



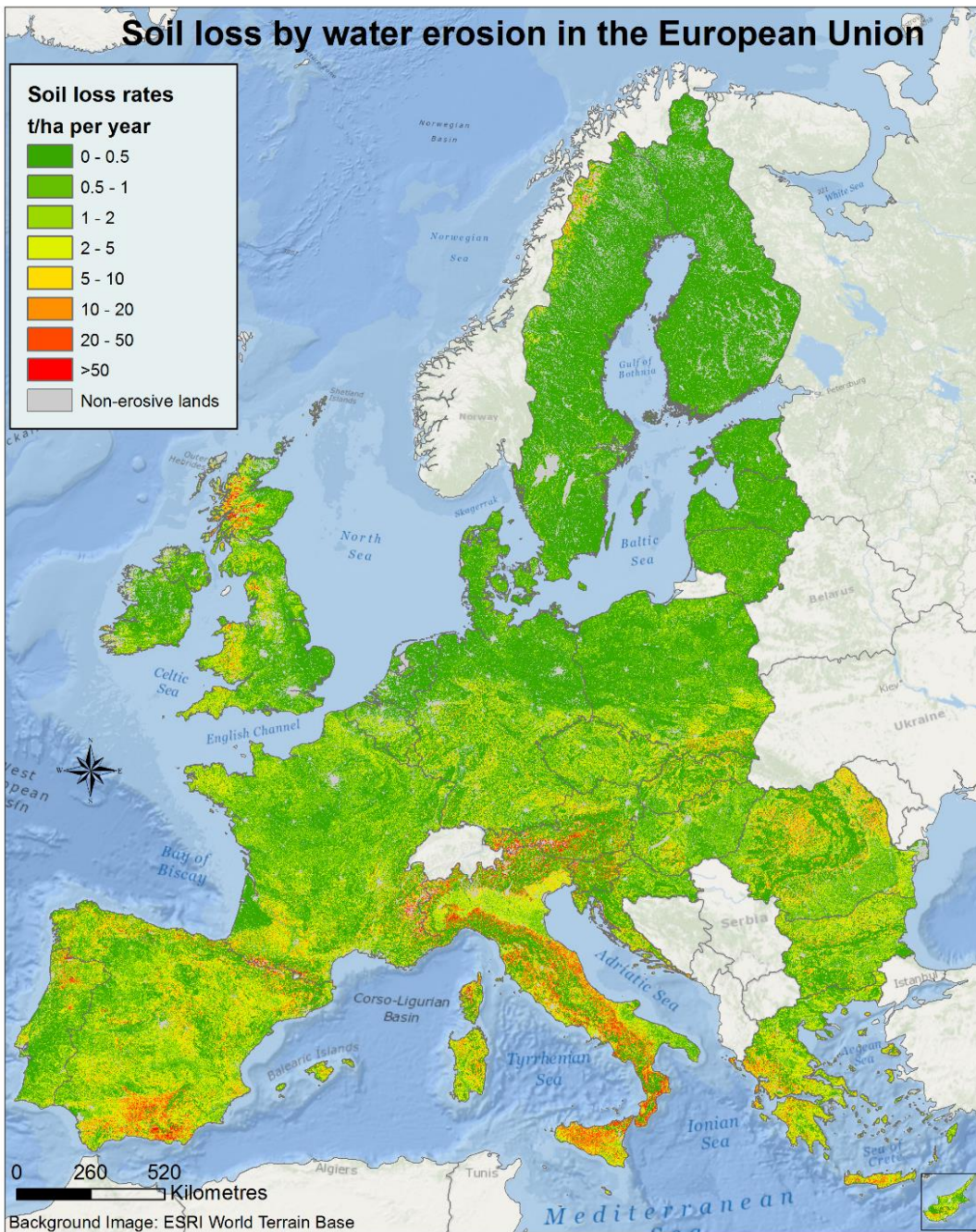
Advection - Sediment flows

European erosion maps

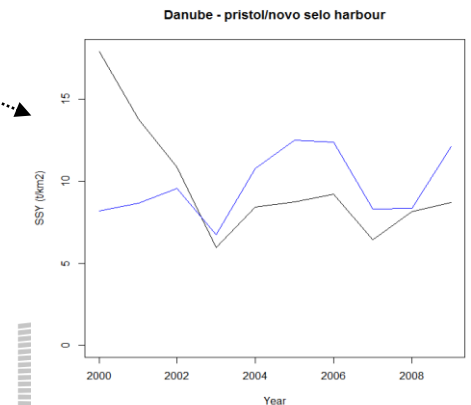
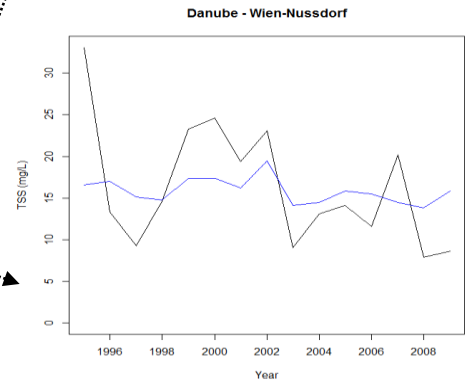
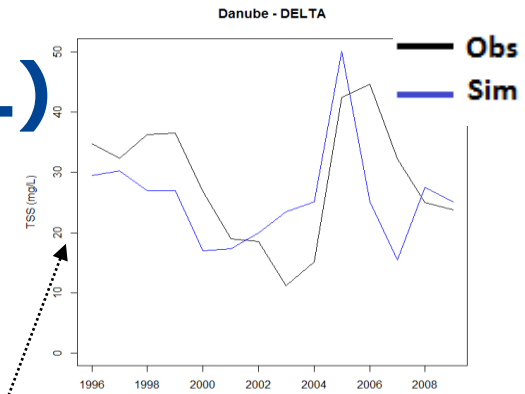
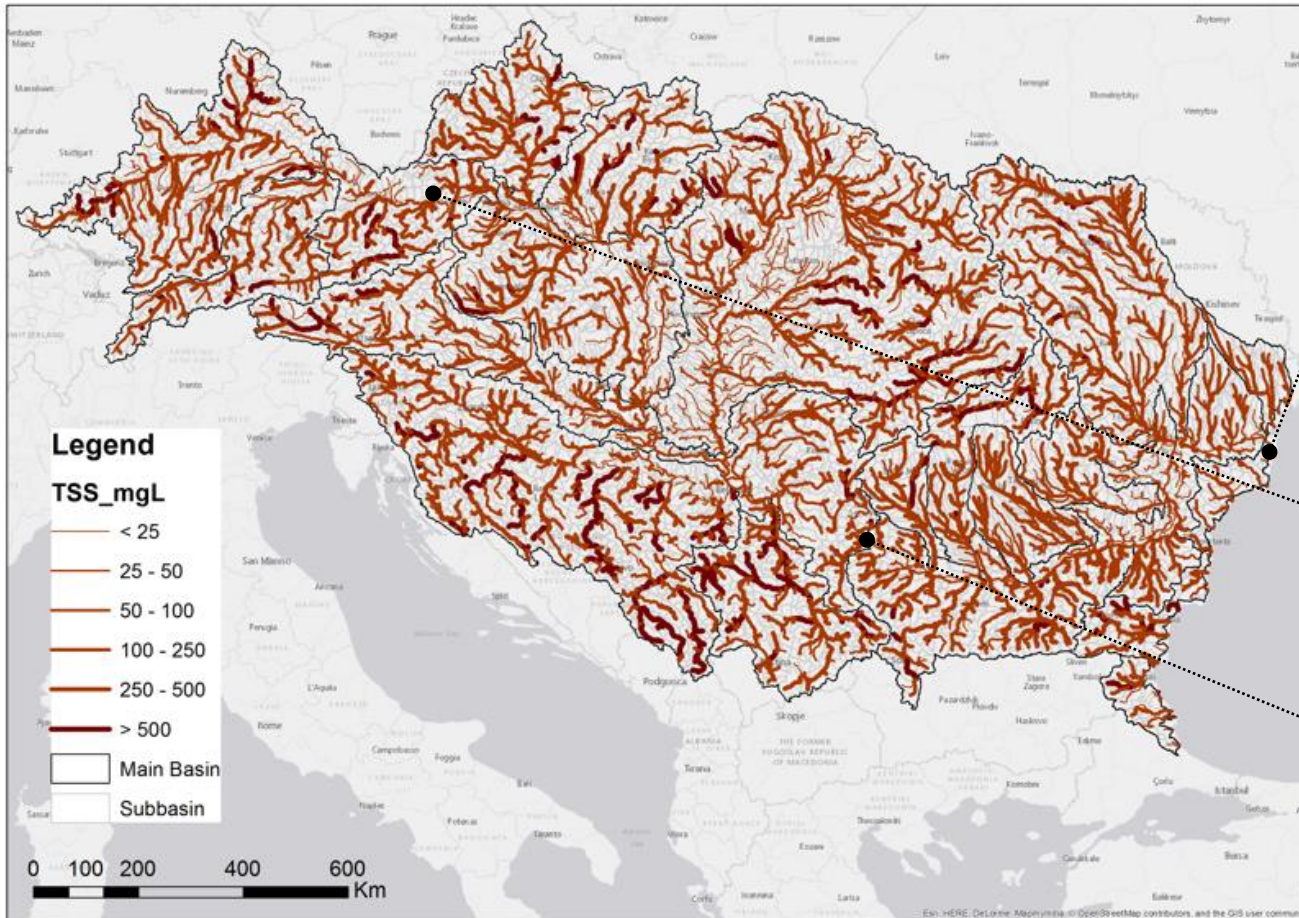
Sediment dynamics

Sediment balances

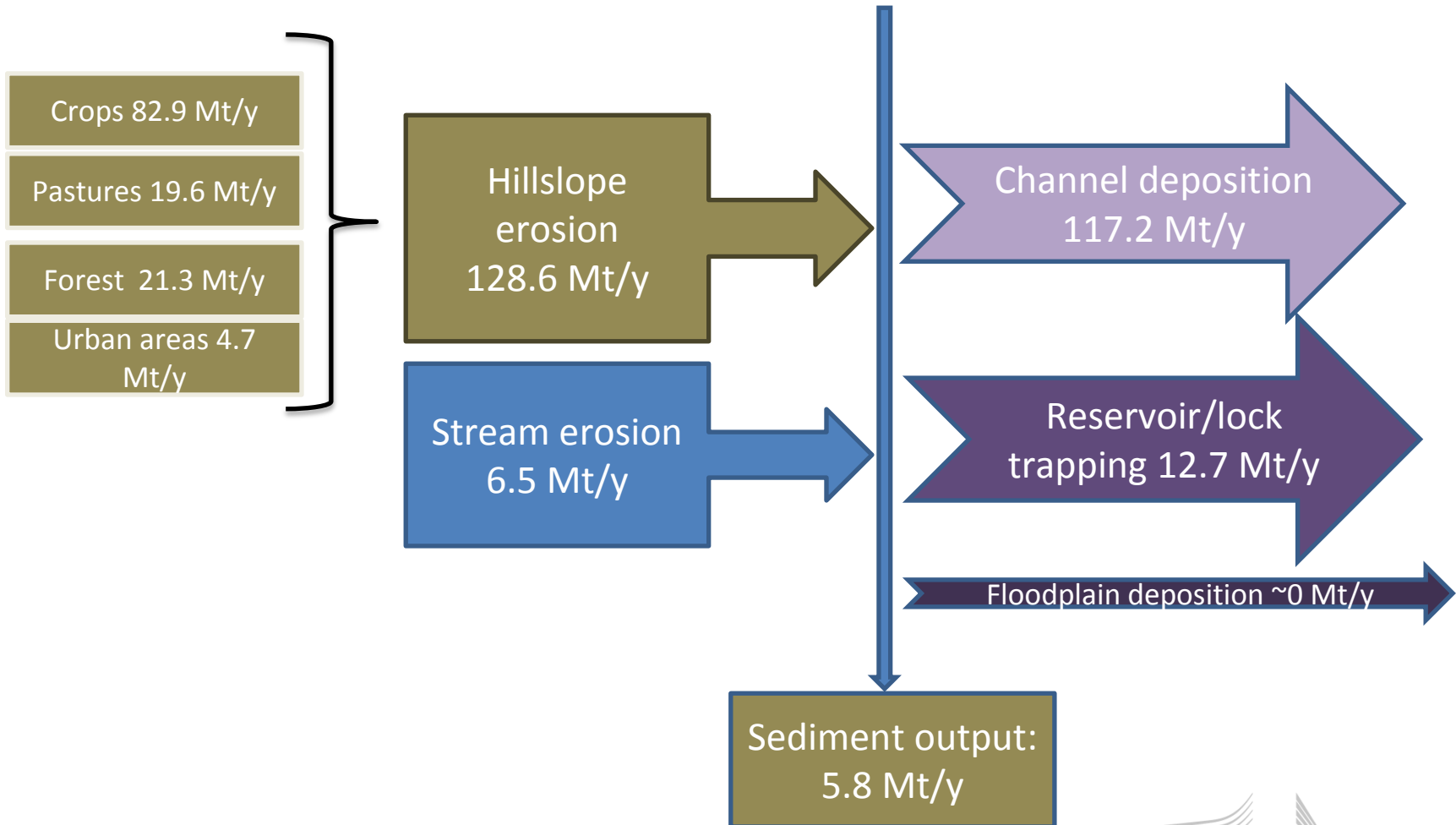
Soil loss by water erosion in the European Union



Sediment concentrations (mg/L)



Sediment budget (Mt/y)



Degradation

“Despite a large body of pesticide degradation data from regulatory testing and decades of pesticide research, it remains difficult to anticipate the extent and pathways of pesticide degradation under specific field conditions”

Fenner et al 2013

Phase partitioning

Soil OC, moisture, pH...

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eusoils.jrc.ec.europa.eu

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RESOURCES TYPE

DATASETS

MAPS & DOCUMENTS

APPLICATIONS & SERVICES

RESOURCE BY

THEMES

NETWORKS & COOPERATIONS

PROJECTS

UPCOMING EVENTS

20/Nov/2016 IUSS Inter-Congress to Meeting 2016
25/Nov/2016

21/Nov/2016 Ecosystem Services for to SDGs in Africa
25/Nov/2016

HIGHLIGHTS

2 Nov 2016 Soil erosion modelling workshop in Ispra (Italy), 20-22 March 2017. In case of interest, please send the pre-registration form. This workshop will discuss mainly issues how the local and

About ESDAC

Atlases

Welcome to the New European Soil Data Centre Portal

The **European Soil Data Centre (ESDAC)** is the thematic centre for soil related data in Europe. Its ambition is to be the single reference point for and to host all relevant soil data and information at European level. It contains a number of resources that are organized and presented in various ways: datasets, services/applications, maps, documents, events, projects and external links. We hope you can find your way in this site. When in doubt or for any question, you may contact esdac@jrc.ec.europa.eu

Dataset Highlights

Maps of preservation capacity of cultural artefacts and buried materials in soils in the EU

The European Commission Joint Research Centre performed a **study** that identifies factors affecting the fate of buried objects in soil and develops a method for assessing where preservation of different materials and stratigraphic evidence is

Applications & Services

A number of mapping services have been developed in order to serve the public user. One Important component of European Soil Data Centre is the **Map Viewer** which is a web-based application that allows the user to... [Read more](#)

Scientific-Technical Reports

The Remediated sites and brownfields-Success stories in Europe

This document is published at the initiative of the Elionet National Reference Centres for Soil, which established in 2015 an ad-hoc working group... [Read more](#)

More Reports

8:18 PM
11/14/2016

Implications

Spatial variability of exposure:

How reasonable are our “reasonable worst cases”?

What are the reasons for underprotection?

(Knaebel et al., 2012, 2014)

Suspect 1: emissions & management (particularly cumulative emissions)

Suspect 2: short-duration extremes

Multiple chemicals:

Need to cumulate different exposures

→ Temporal/spatial distribution of emissions *crucial*

More realism on fine-grained landscapes

Landscape patterns

- Crops
- Non-crop vegetation
- Water bodies
- Topography, soils...

Event-based hydrology:

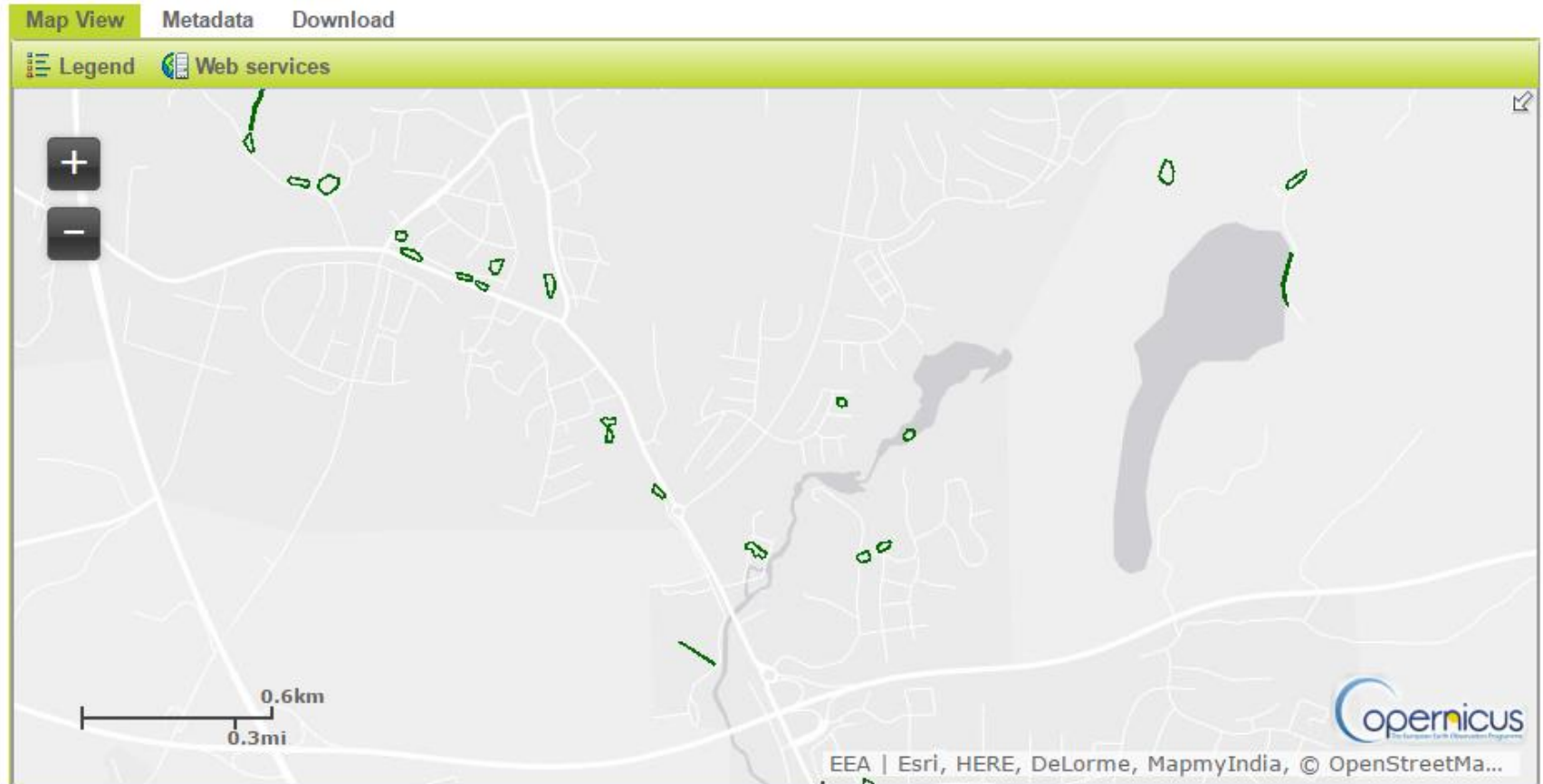
- Flow
- Sediments

Critical role of emissions and management

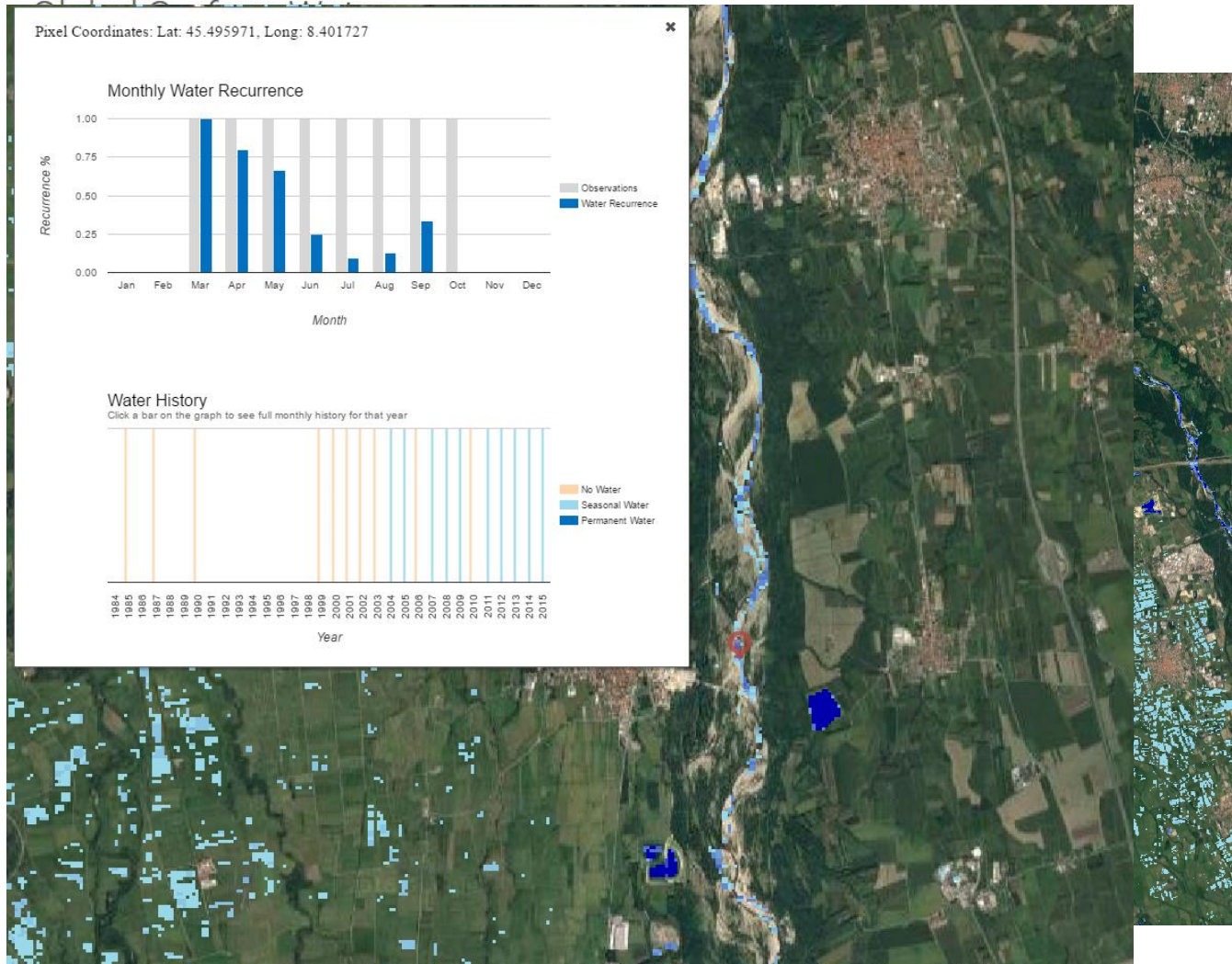
Riparian zones

Green Linear Elements **Partially validated product; summary results available in the technical library**

Print



<http://land.copernicus.eu/local/riparian-zones/riparian-zones-delineation>



bal

Opportunities

- Regulatory ERA synergistic with baseline modelling
 - Pesticide Regulation / WFD
- GIS-based model for exposure
 - Building on PERSAM & MAPPE
 - To be linked with ecological assessment
- Spatial and temporal details essential
 - Capitalize on Google Earth Engine, Copernicus etc ...
- Emission data and management practices
 - Role of use statistics collection under the SUD

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