

Experiences in the definition of guidelines for Hazard Mapping in Trentino

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Segantini - Mezzogiorno sulle Alpi

Danube FloodRisk Project,
Trento, October 4, 2011

Outline

- What is a guide line ?
- Hazard and Risk
 - Liquid and solid hazards
 - Return period (is dead ?)
 - Scale of analysis
 - Processes
- Fit it in three colors
- Models (the experience of USDA)
- Interaction and participation
 - Who does it ?

guideline |'gīd,līn|

noun

a general rule, principle, or piece of advice.

... for solving a problem

In this case the problem is to prevent **natural hazards**, and, as a consequence, something that is crucial to **prioritizing** what to do **where** in river catchments

what is related to **civil protection issuing alarms to population, urban and regional planning**, plan and design defense work, allocate public resources, and producing sensible **laws and regulations**

EU projects

Are full of guidelines that nobody really read, except, maybe those who prepared them.

Why ?

One problem is that the **where** is also important. Once you have design the method, you realize that using it requires itself **resources**.

Therefore someone has to say where to apply the method in the region first

Prioritizing and financial investment is needed also for the studies, and not only for the final outcomes

While it is proven

that each euro invested in these studies is worthwhile. This become evident usually after a disaster has occurred, and if the disaster is avoided is usually not evident to many.

This is paradoxical and causes an endemic low financial support to this kind of initiatives and studies, especially at the very local scale where the danger is usually not particularly felt.

Lesson learned

Guidelines remains unread because there is not the correct information and perception of what natural hazards can do in a given place. And because to apply them require resources.

Guidelines need to become part of a participative process of learning about the environment which involve institutions and people

Prioritizing

the studies require to cope with the perception of **risk**, beside **hazard**, even if risk depends directly on hazards.

Guidelines for hazard prevention

require a criterion for getting a first guess of hazard and risk

This is why gave to the province of Trento guidelines for hazard mapping “a scalar structure”, and different level of analysis.

First,

large scale, coarse grained, rules are used to choose where to study

and hazards are mapped in large, low resolution maps, using qualitative, historic, and soft information

Land use is crossed with these maps for a first guess of the **risk**, and hazards studies are made on these zone.

Nothing excludes that other methods

for making this choice should be applicable

For instance:

- urban expansion plans should include hazard assessment
- citizens and/or association could request the studies
- norms and laws could require it in certain conditions
- legal conflicts

But we must be very realistic

As a few convener told

No money, no party: there is, in this economic recession phase a great need to fully justify any single euro used in this field.

Back to the Physics

Flood in plans

The River Berounka, Czech Republic, 2002



Da Wikipedia

Water (with mud)

Flood in mountain

Torrente Chieppena, Villa, 4 November 1966

Cortesia, Prof. A. Armanini

Water, sediments, and debris

Flood in mountain

Torrente Chieppena, Villa, 4 November 1966

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Water, sediments, and debris

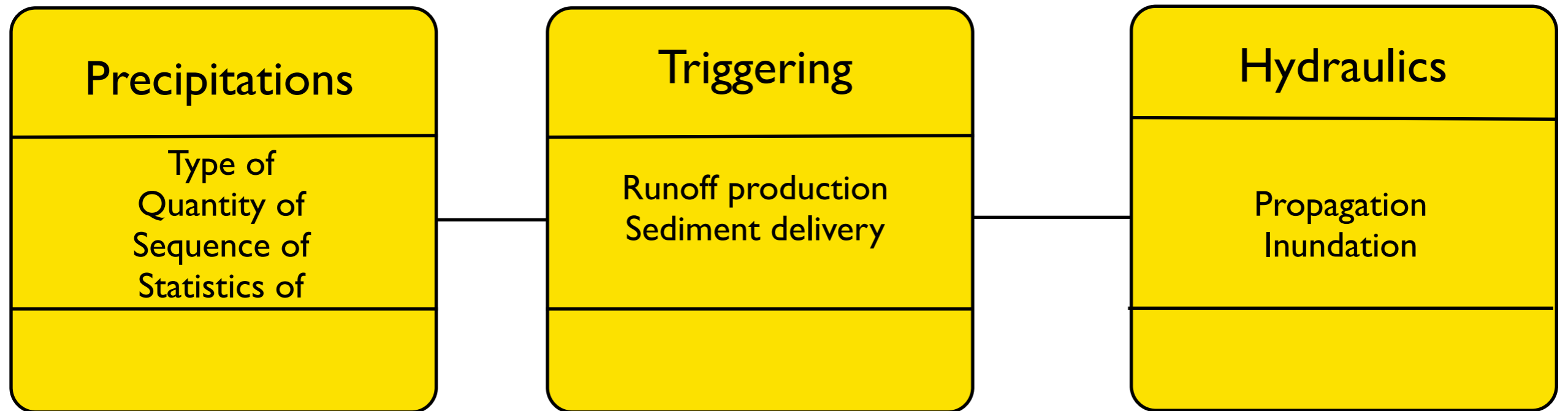
Flood in mountain

Cortesia, Prof. A. Armanini

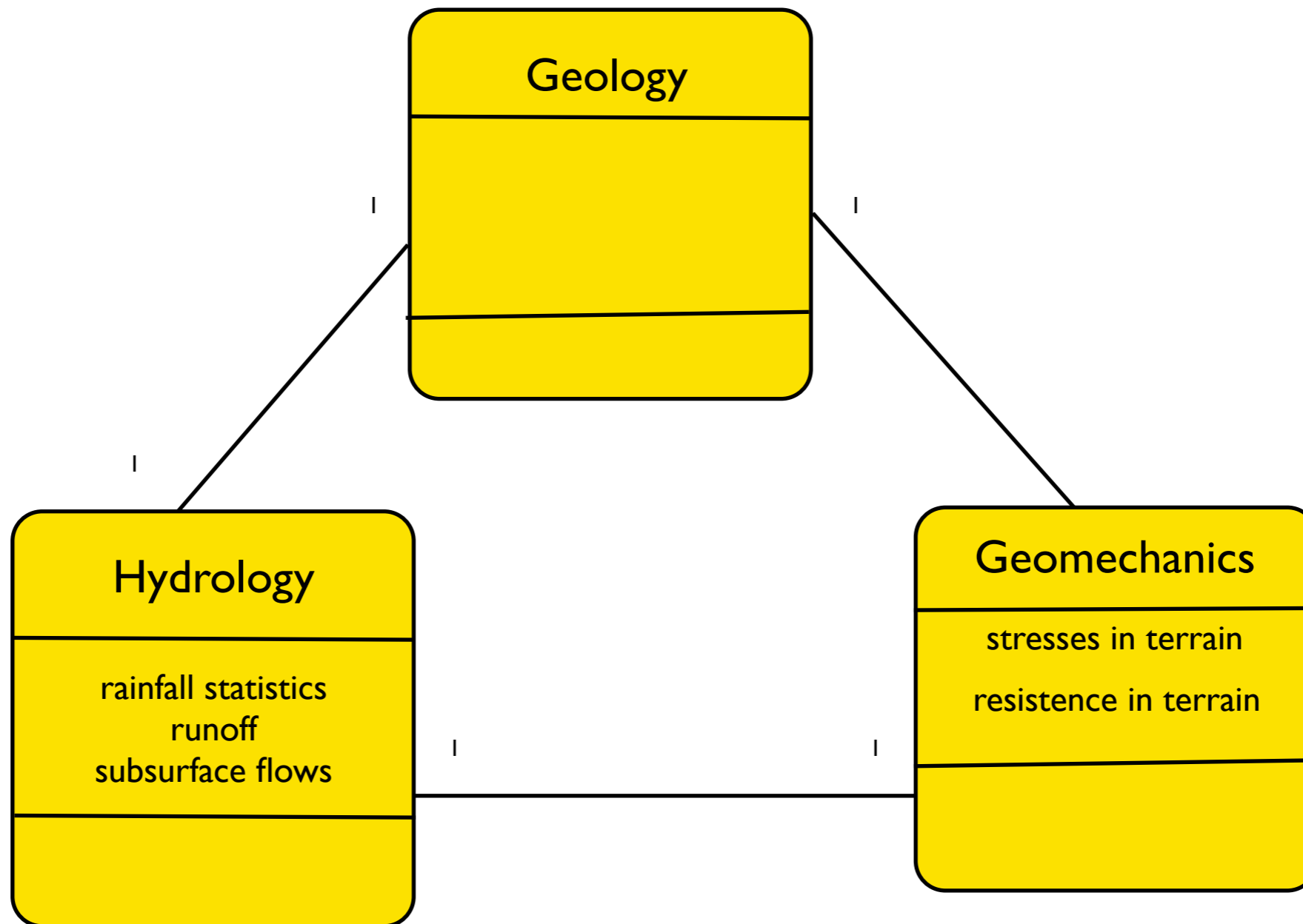


Water and (a lot of) mud

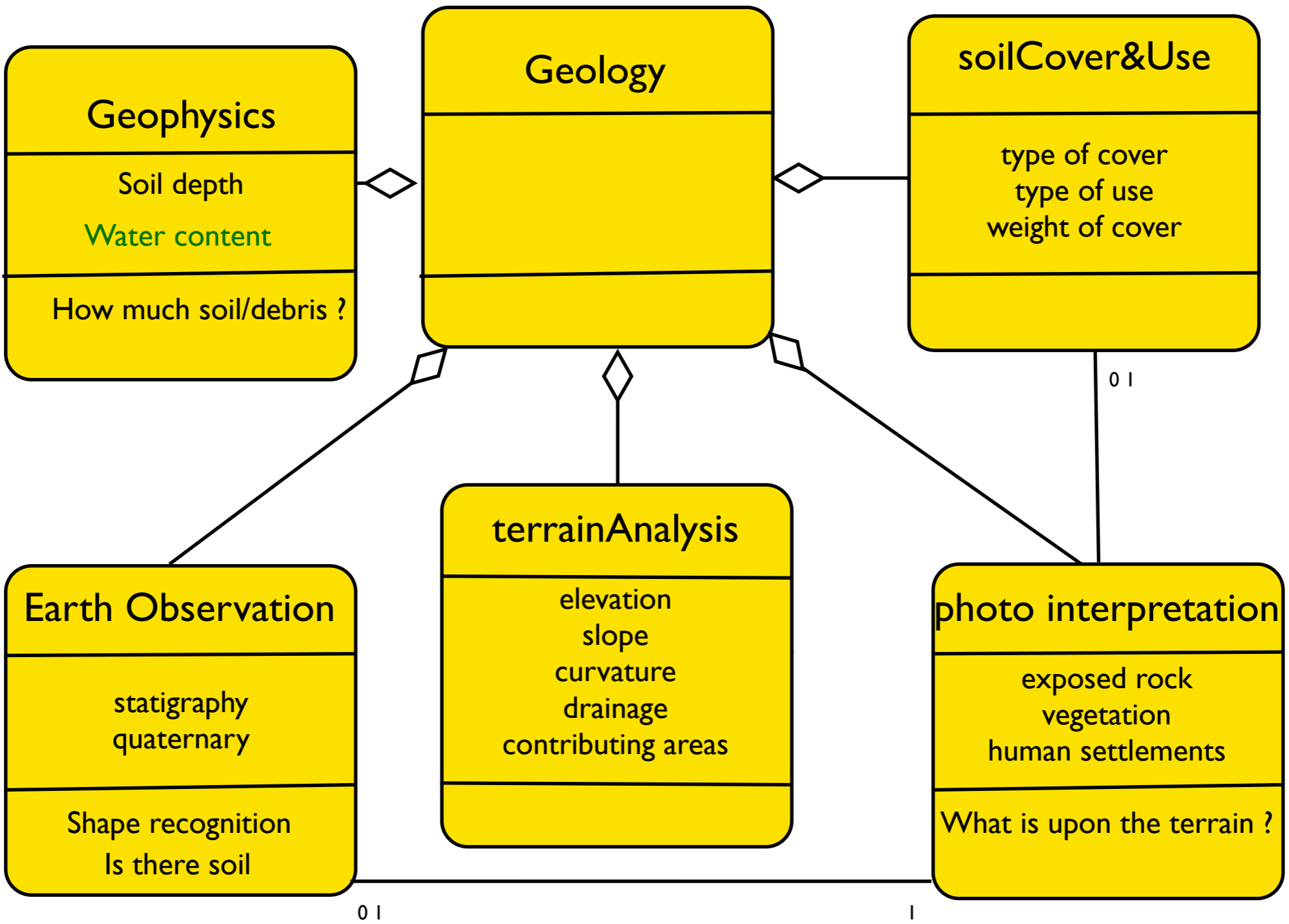
The physics



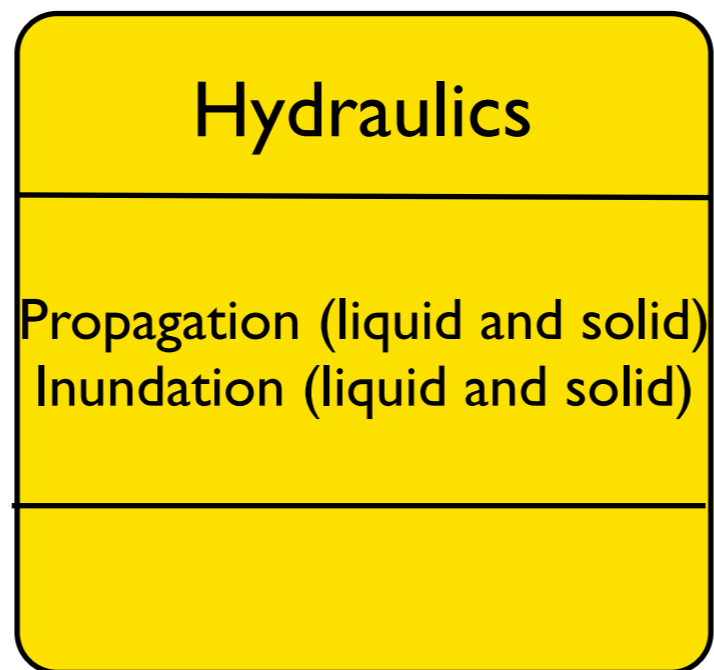
Triggering



The medium

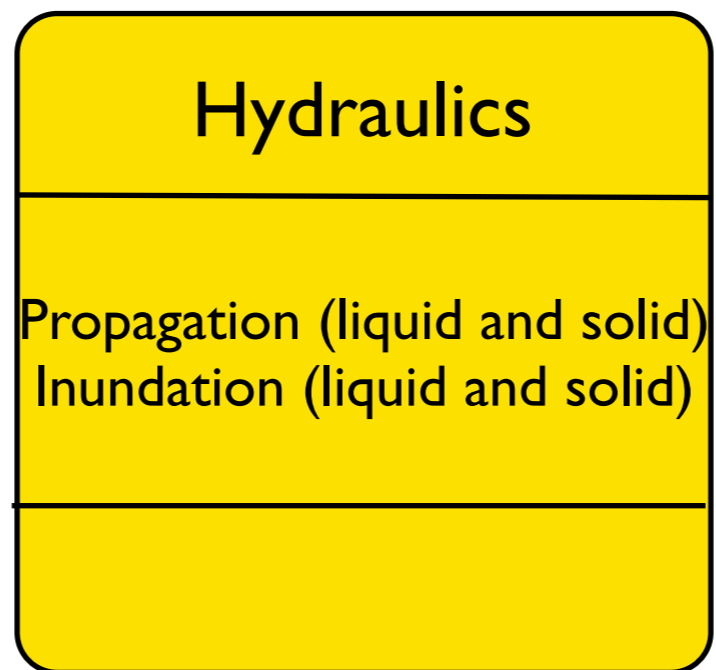


The outcome



How much - Where -with which velocity

The outcome



How much - Where -with which velocity

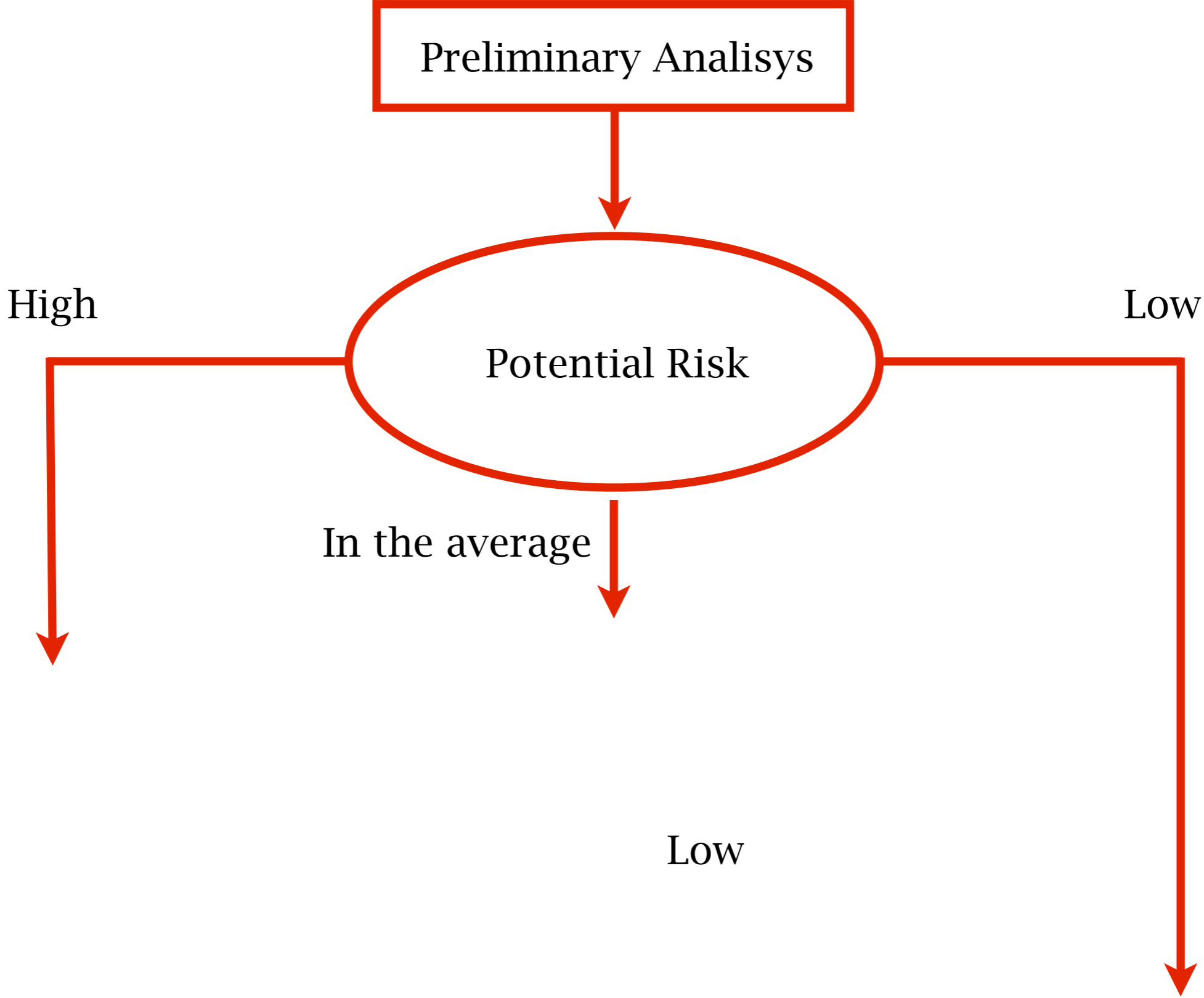
With which uncertainty

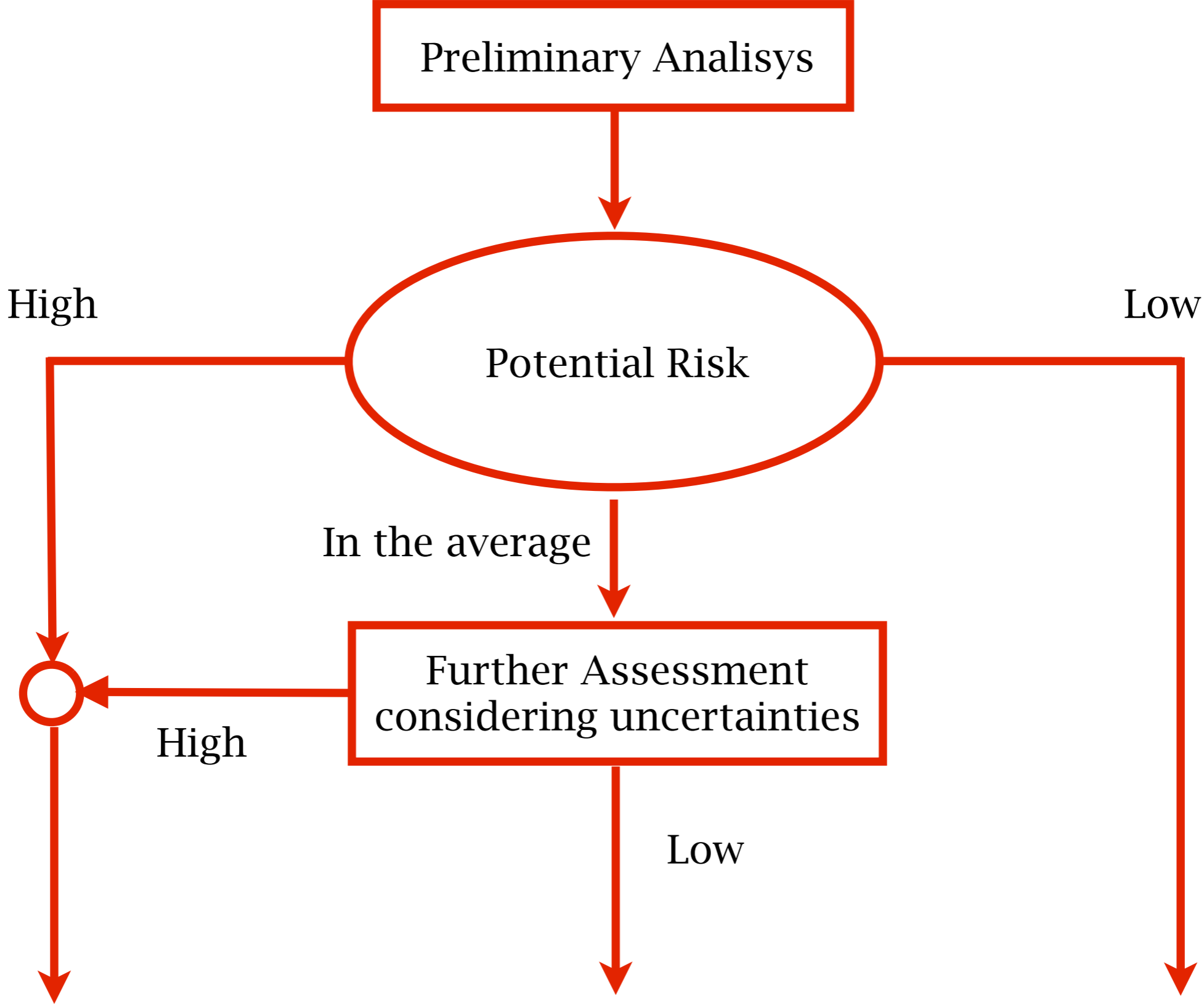
LOW

Preliminary Analysis



Low

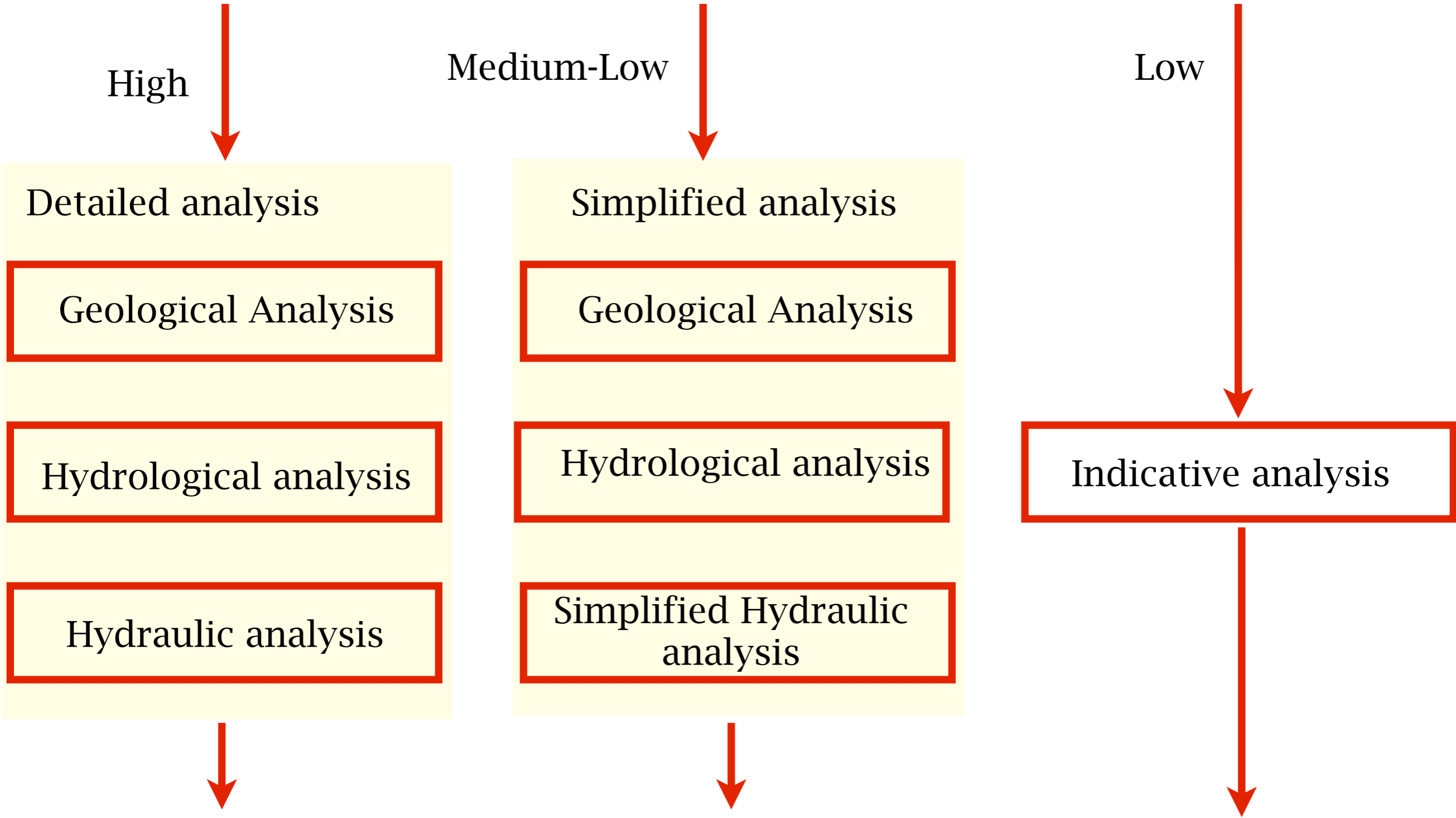


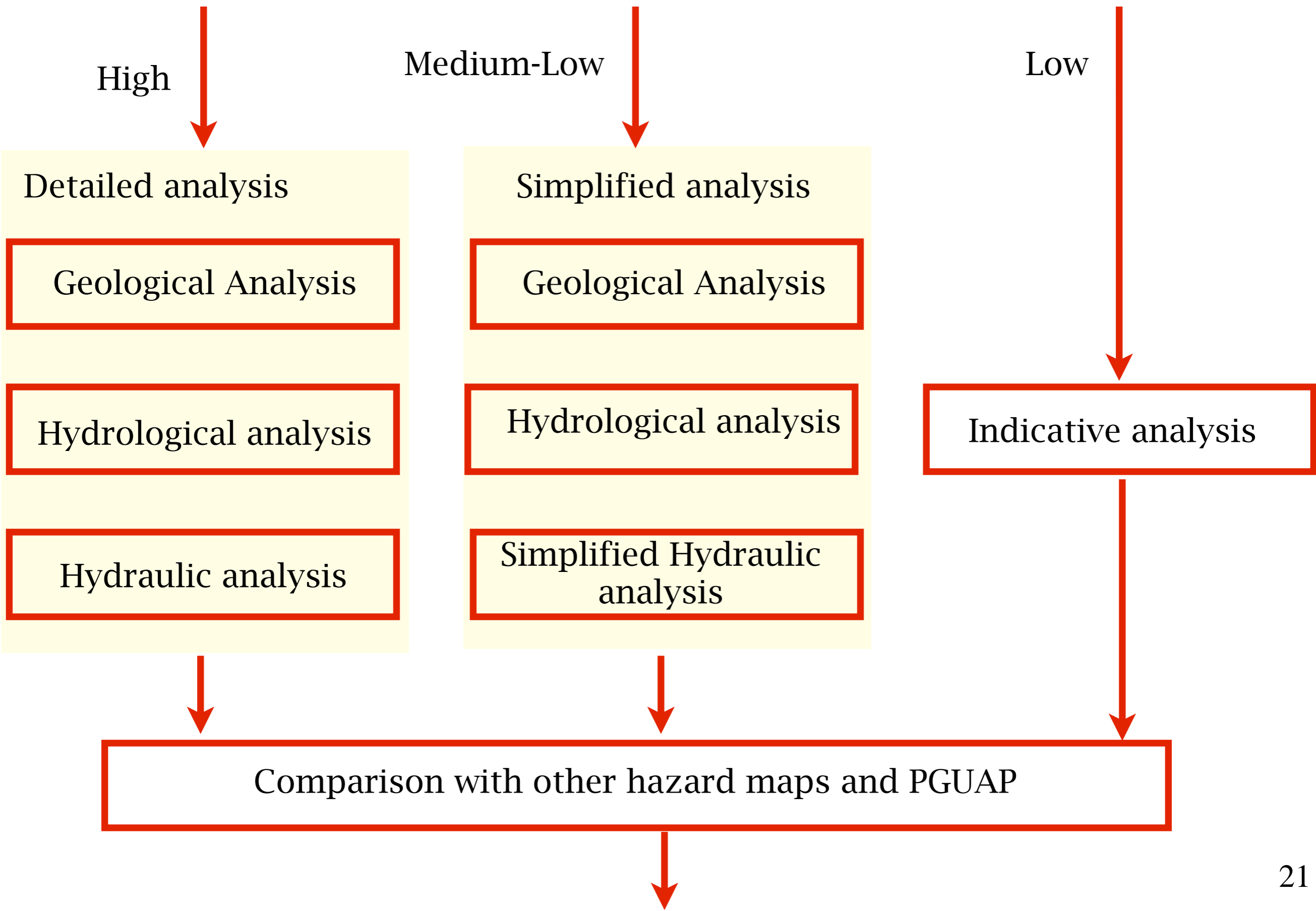


Low

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graph TD; A[Low] --> B[Indicative analysis]; B --> C[ ];
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Indicative analysis

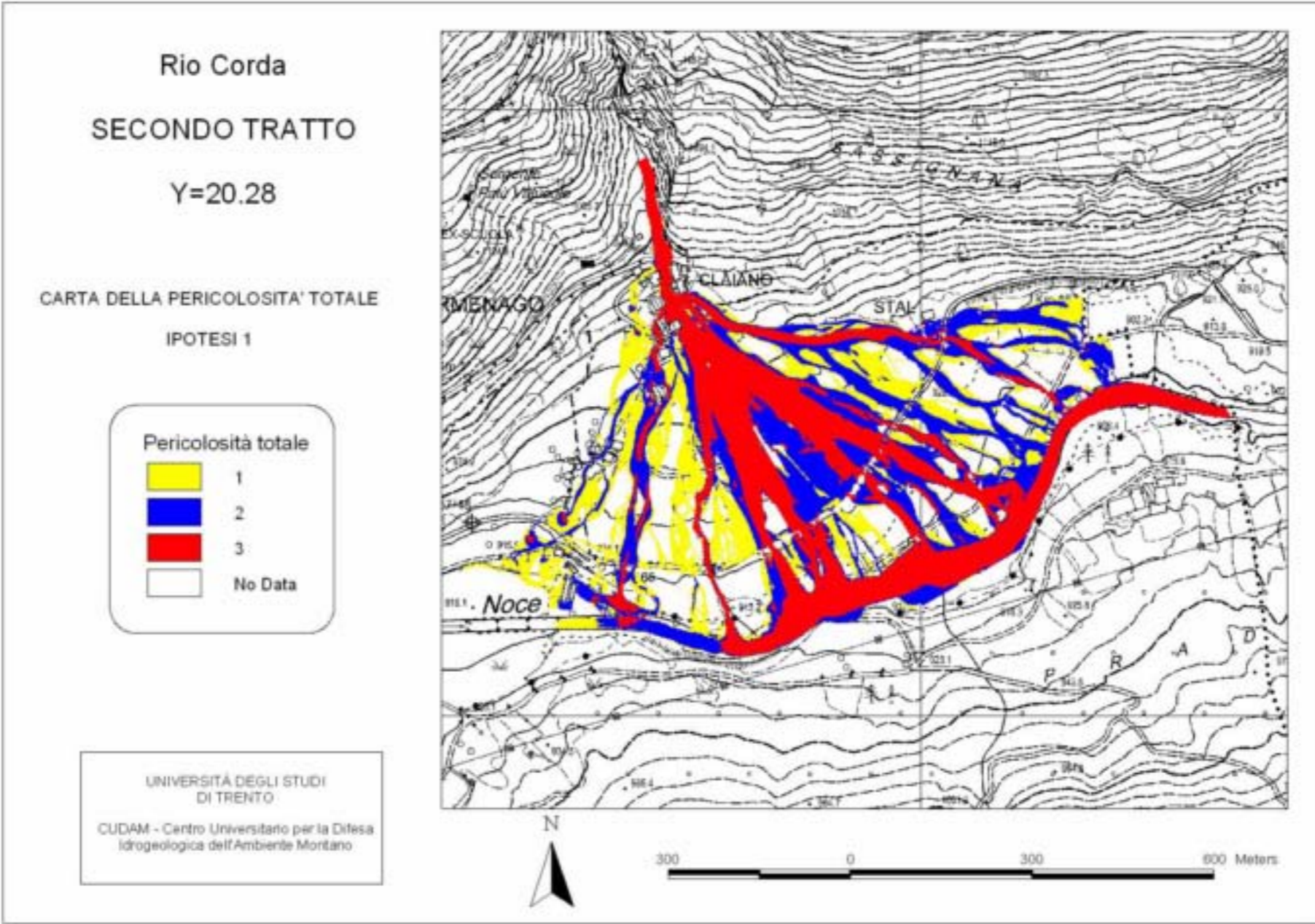




The lesson we learnt

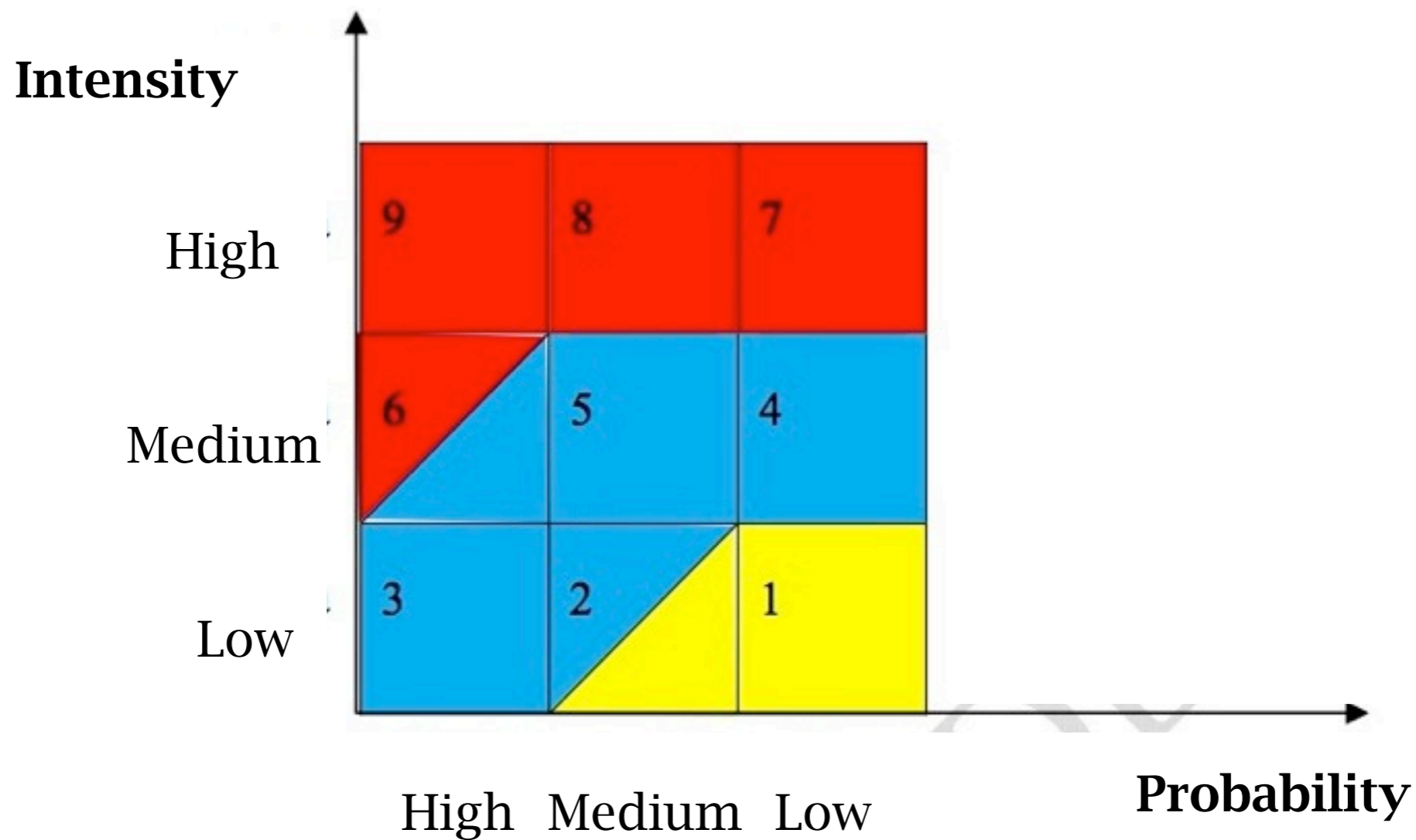
- **Even from the technical point of view there is the necessity of many interacting competences**
 - **Assumed that the choice of the right models has been done (which is not easy), there is a data requirement to be fulfilled, even for a minimal result**
 - **Data when NOT available need to be produced. Institutions need standards (to which you can give a price) procedures to get them**
 - **Data when available are usually in strange formats. Nobody knows what INSPIRE is.**

Drawing the map



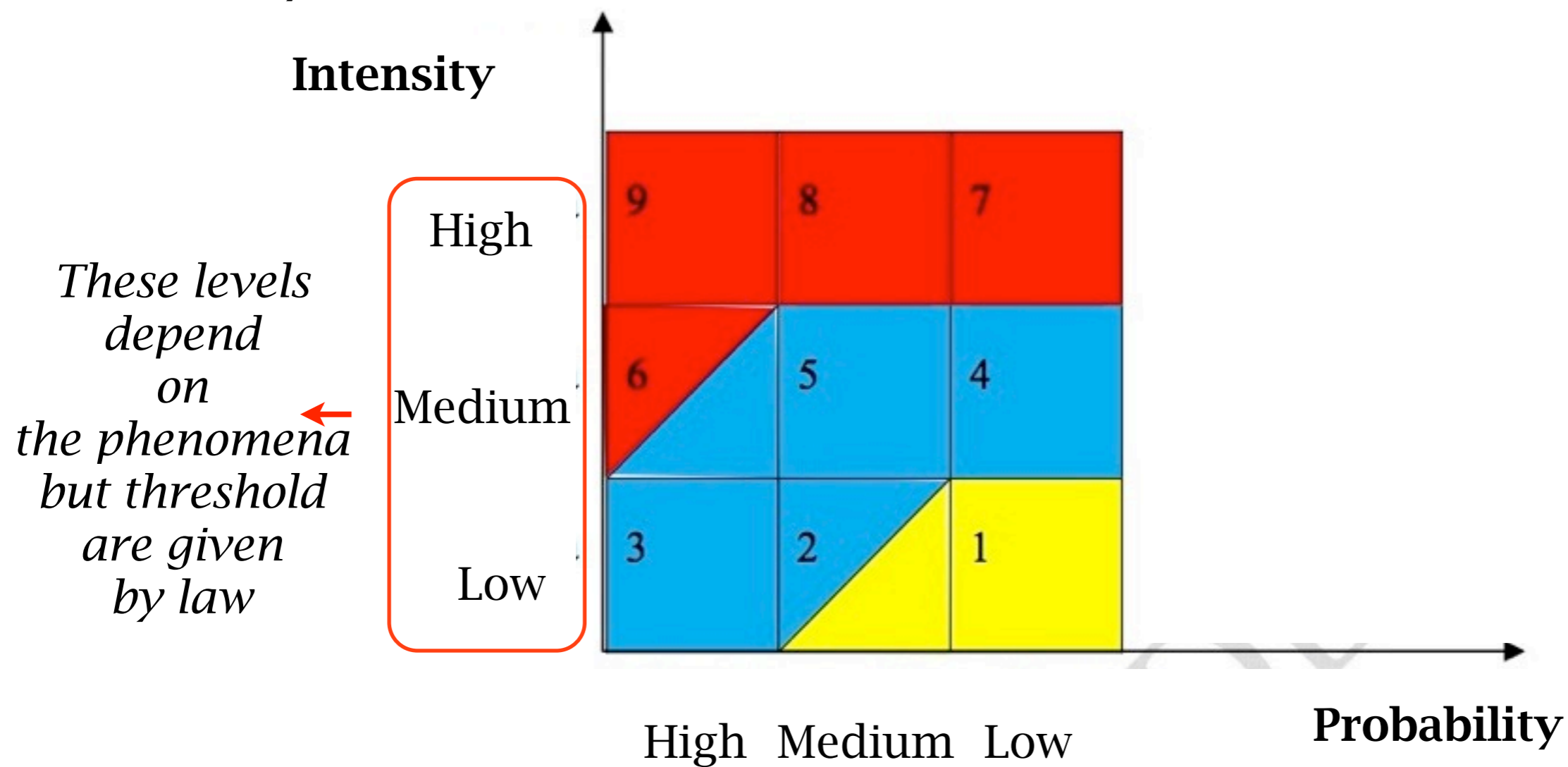
The risk map

- Required the definition of degree of hazard which is, somewhat arbitrary



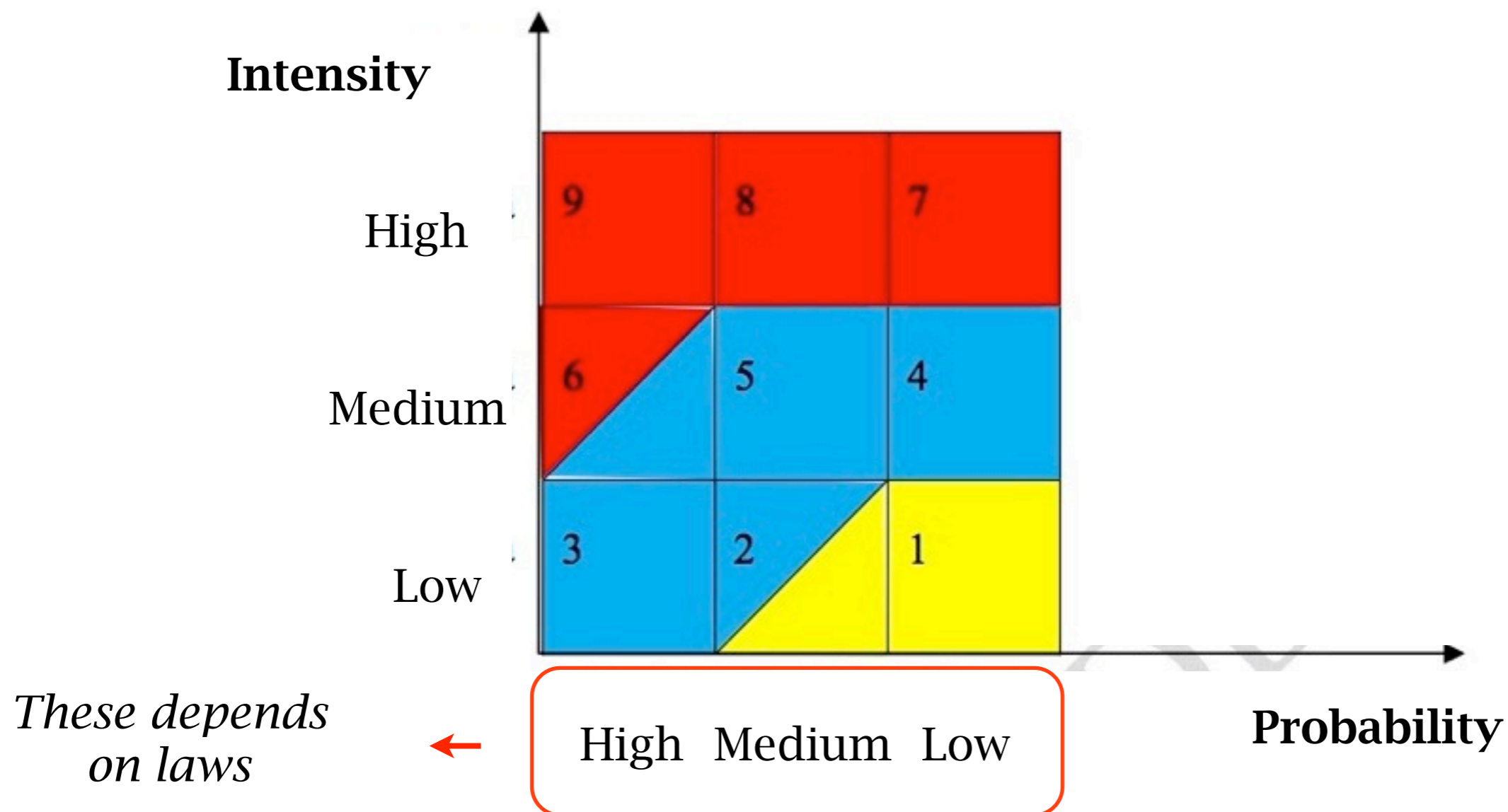
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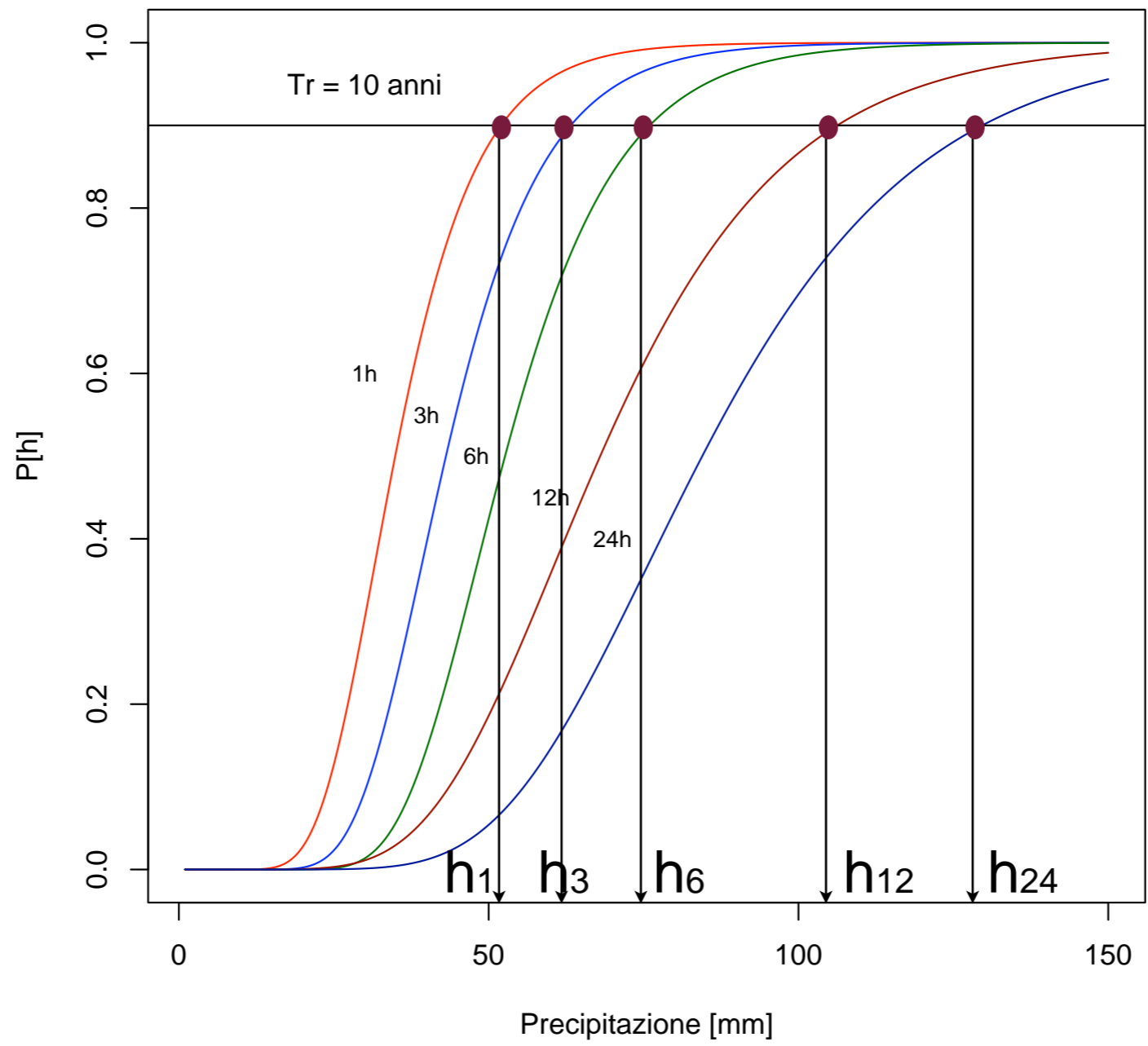


The risk map

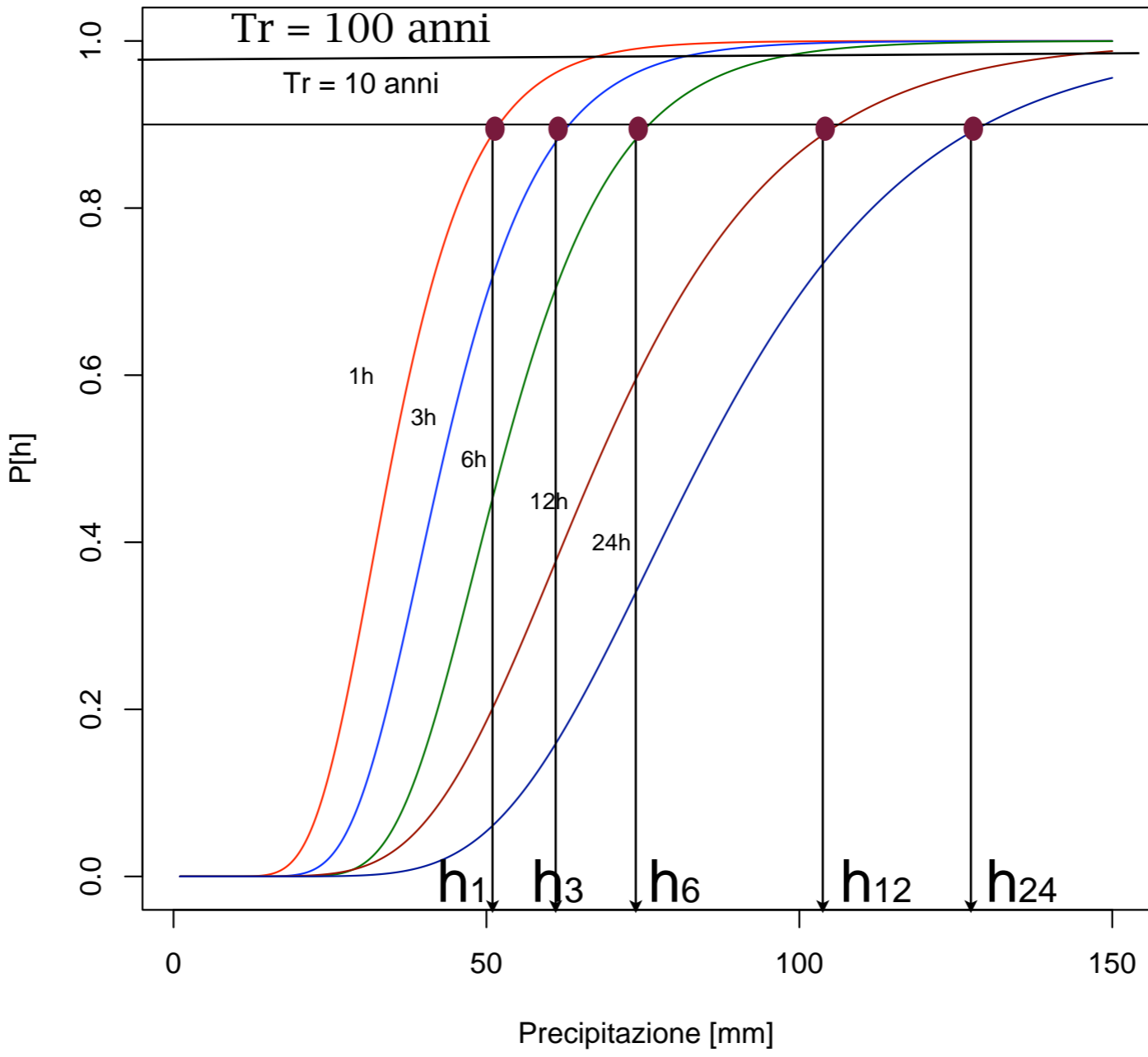
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For instance



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Where do 500 years of return period is ?

- How much reliable is it ?
- How much is the uncertainty produced in models ?

Where do 500 years of return period is ?

- **How much reliable is it ?**
- **How much is the uncertainty produced in models ?**

BTW

- **Usually people do not understand the concept of return period, which is interpreted literally, and not statistically, over a certain area of interest**
- **Some colleague declared that return period is dead**

Going back to models

- **There should be freedom to use the best models.**
- **But there is the need to have standards**
- **And beyond standards, the need to rely on some concept of responsibility for who makes the maps**

Going back to models

- **Standard model should be available for free, as a concept of democracy, and control. While usually many services rely on proprietary software, whose scientific basis cannot be verified by inspection of the code.**

Therefore

- We proposed, at least for the hydrological part of the guidelines, **free software** to support independent investigations of the problems.

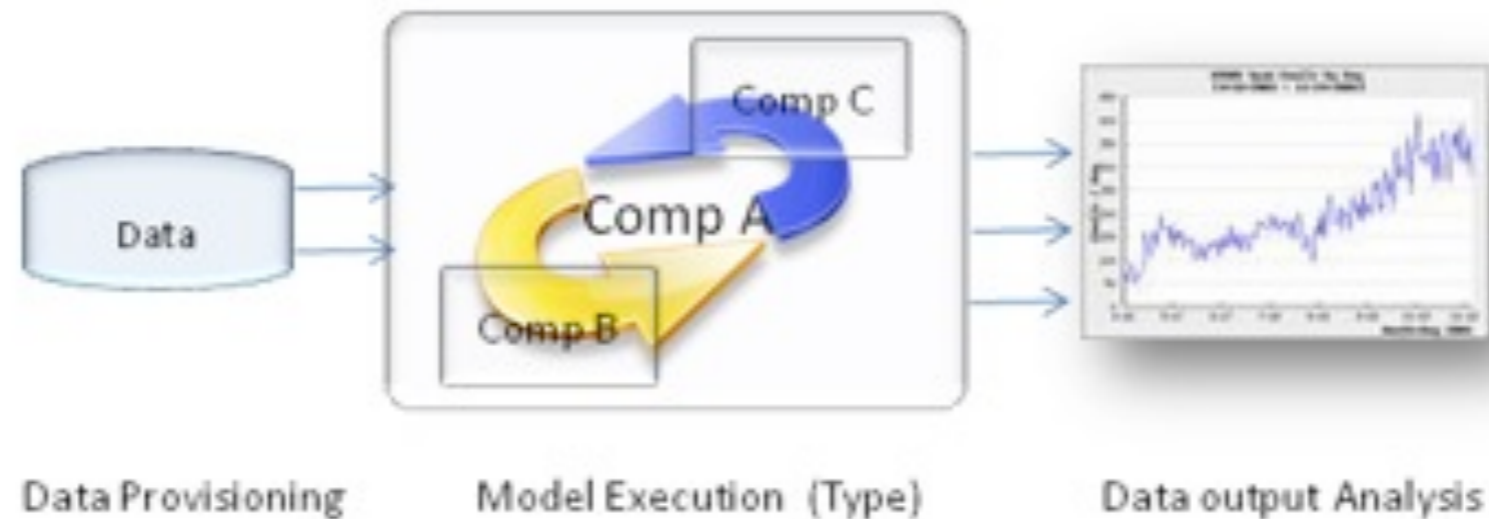
Knowing that

- Many technical issues are actually under scrutiny by the scientific community, and should not be given for granted.

There are many experiences

in this direction in the World. Possibly the most remarkable is the Object Modeling System v3 pursued by the US Department of Agriculture.

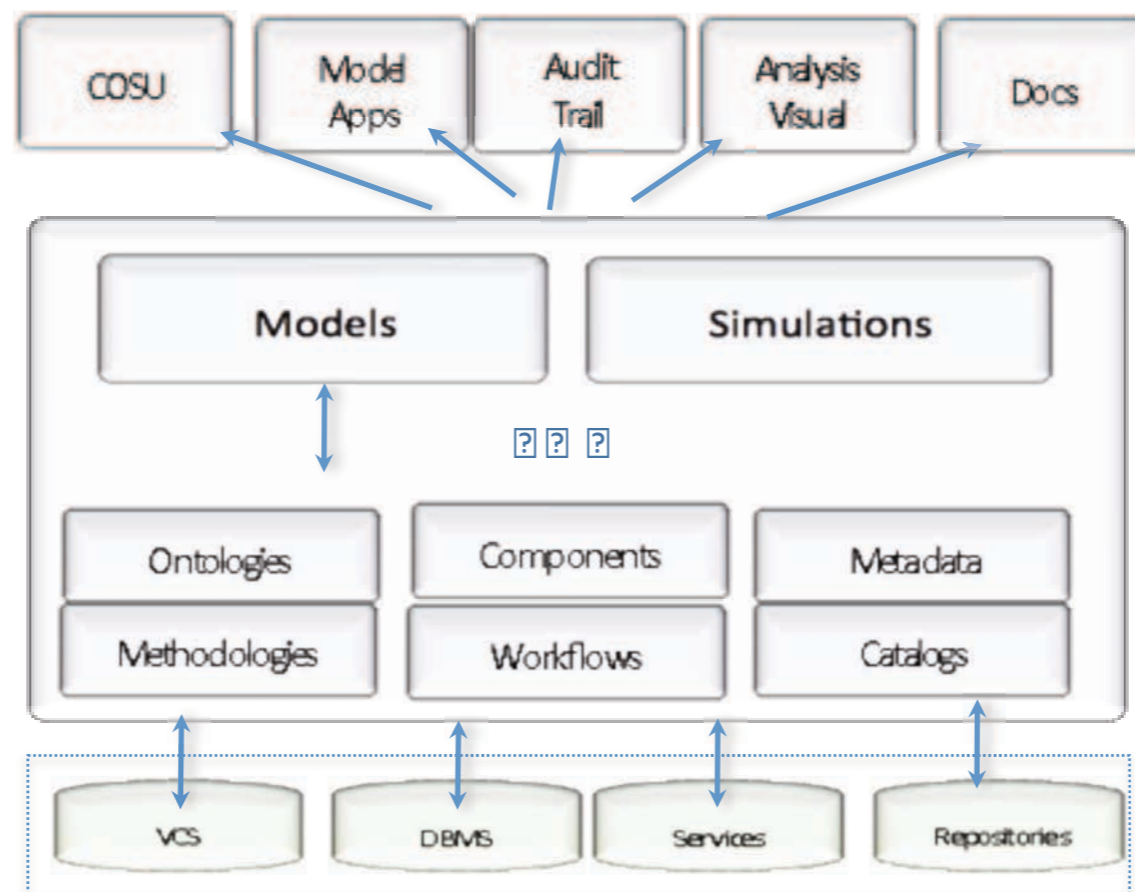
JGrass 3/ OMS 3



After David et al., 2009

OMS v3

The **Object Modeling System OMS** is a modular modeling framework that uses an open source software approach to enable all members of the scientific community to address collaboratively the many complex issues associated with the design, development, and application of distributed hydrological and environmental models.



OMS3 can be found at: <http://www.javaforge.com/project/omslib>

Conclusion

Even if the process of hazard mapping is very technical, its acceptance to the community must be the consequence of an **integrated process of discussion and acceptance**.

Otherwise, the technical results either are **not understood** (i.e. technologists must explain what they did e why), or simply considered in an alternative among others, and not applied.

In turn, the identification of an hazard, does not automatically individuate the solution but usually, a **set of solutions**, which, again require discussion and acceptance to be transformed in policies.

Not the **same solution** is valid everywhere.

Hazard information, Protection, Warning

Sense of danger: As Vladimiro Dorigo wrote, (*Una Laguna di chiacchere*, 1972), the idea of how Nature is strong must be recovered, and we need to be respectful of it.

Sense of change: climate is changing, and what is assessed for now could not be for the future.

Sense of vulnerability: what was acceptable times ago in term of risk is not anymore acceptable.

Grazie per l'attenzione !



**CORSO
MIGG**

Corsi di Modellazione
idrologica e geomorfologica
integrata nei GIS

25-28 Ottobre 2011
L'analisi idrologica per la
redazione di carte del pericolo
derivante dal franamento e
dalle piene con JGrass
(CUDAM e HYDROLOGIS)

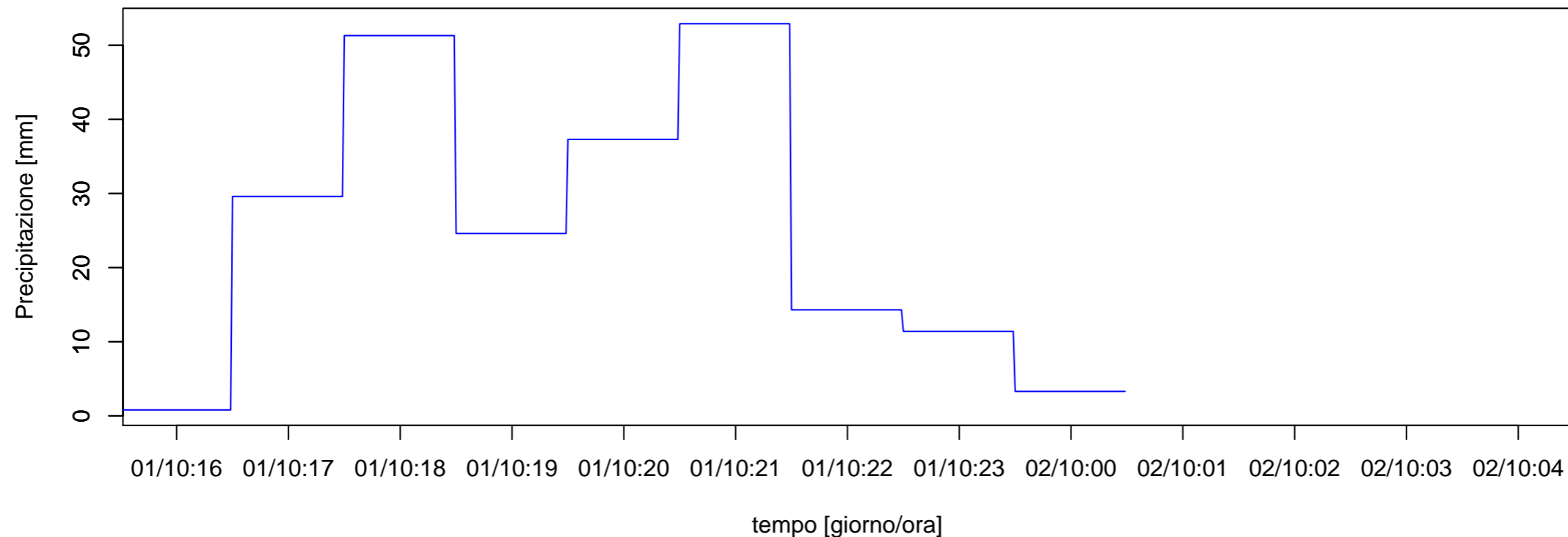
7-10 febbraio 2012
Progettazione e gestione delle
reti idrauliche
(CUDAM, HYDROLOGIS e
HYDROMATES)

<http://events.unitn.it/migg2011-2012>

The Vigata Case

It begins with a storm ...They were **rolls, waves** that finished in a puff: known noises, village things.

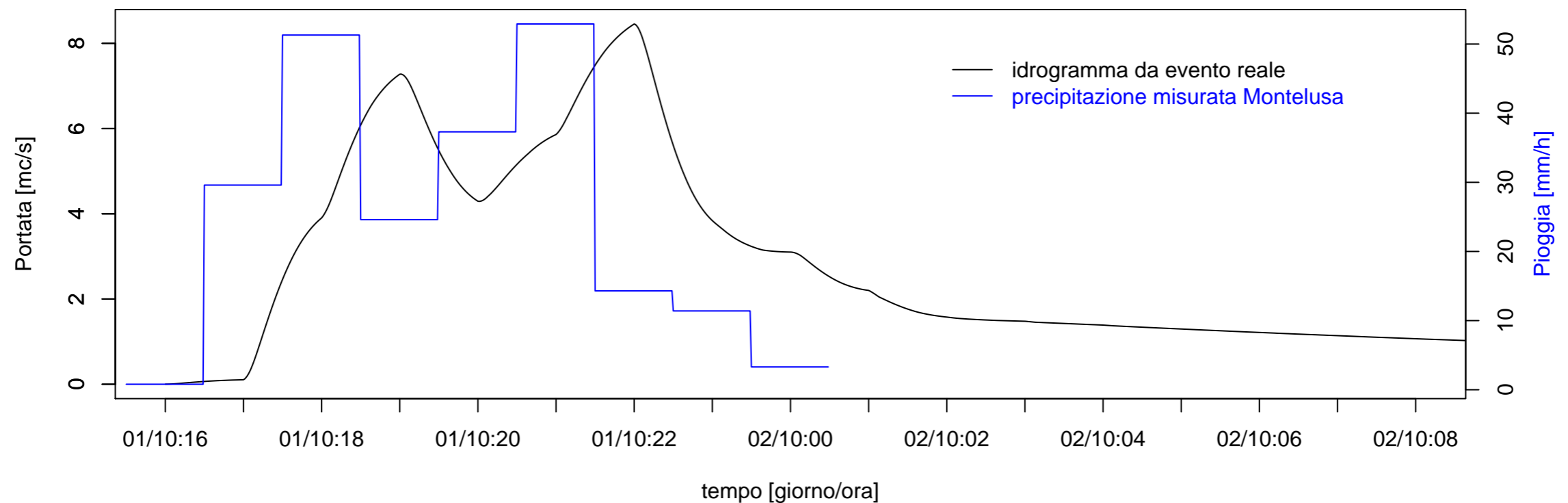
(L. Meneghello, Libera nos a Malo)



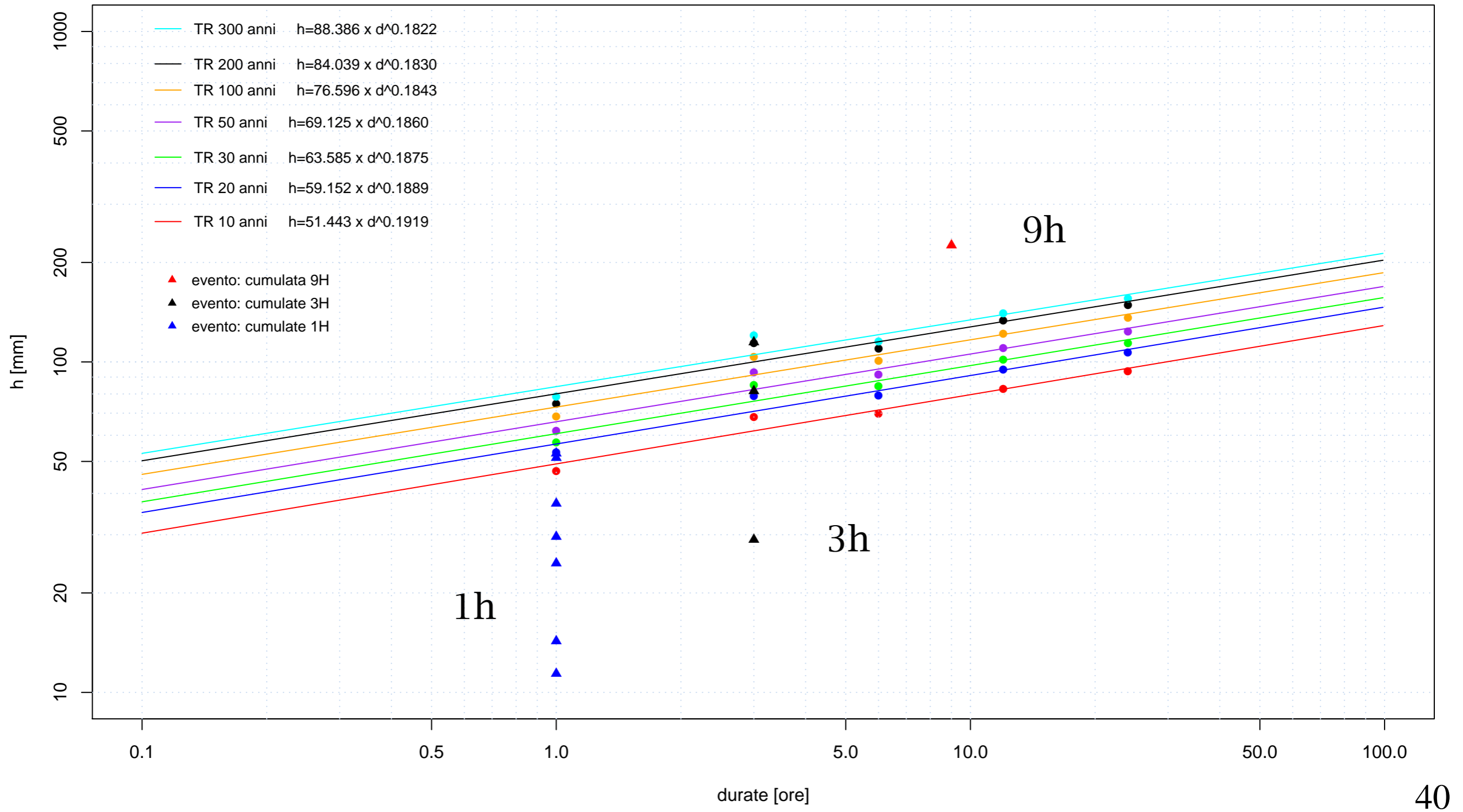
The Vigata Case

The downpours were onto the courtyards here around, the **thunder** up here above the roofs; I could recognize by ear, a little further up, the place of the usual God that made **storms** when we were children, He too a village character.

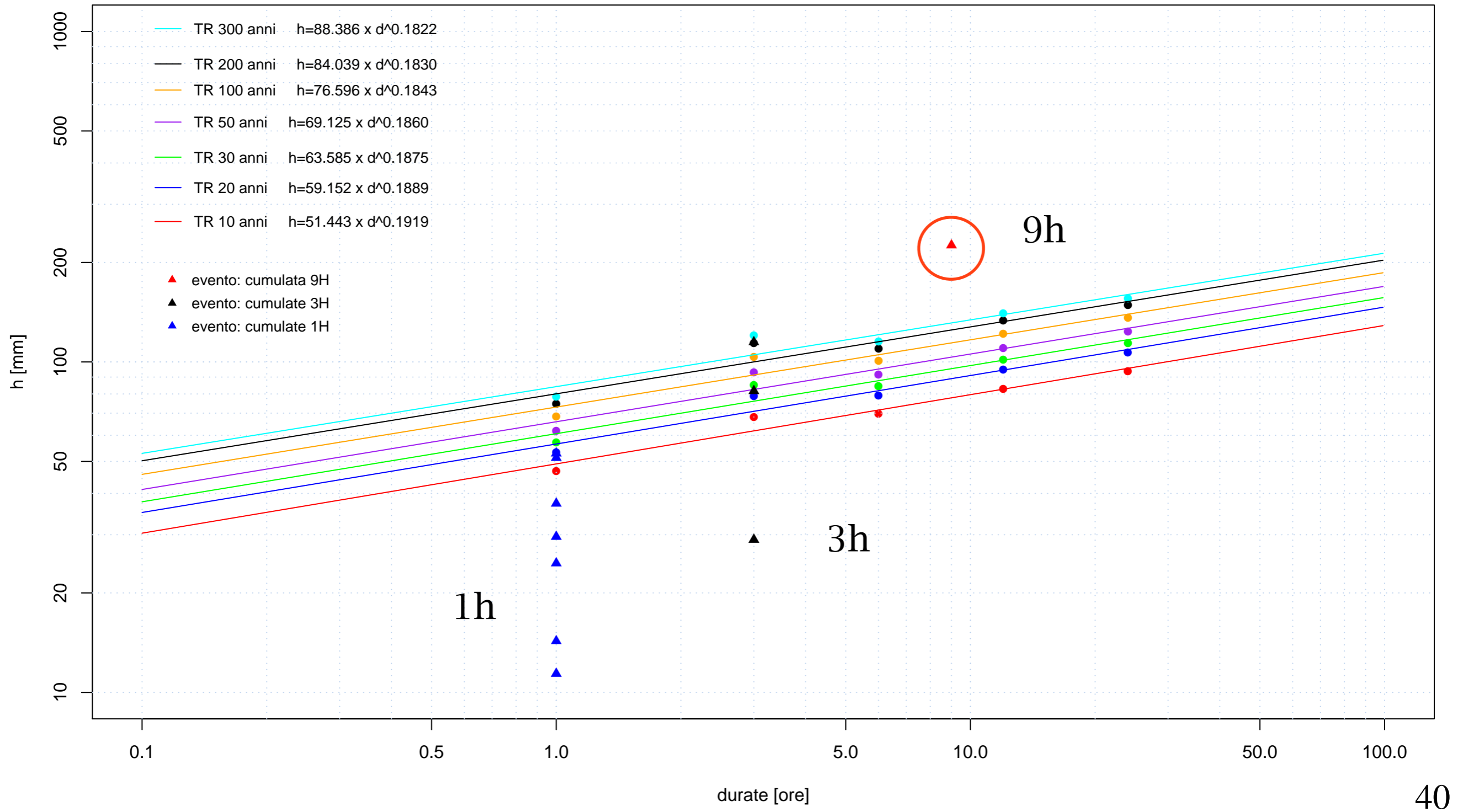
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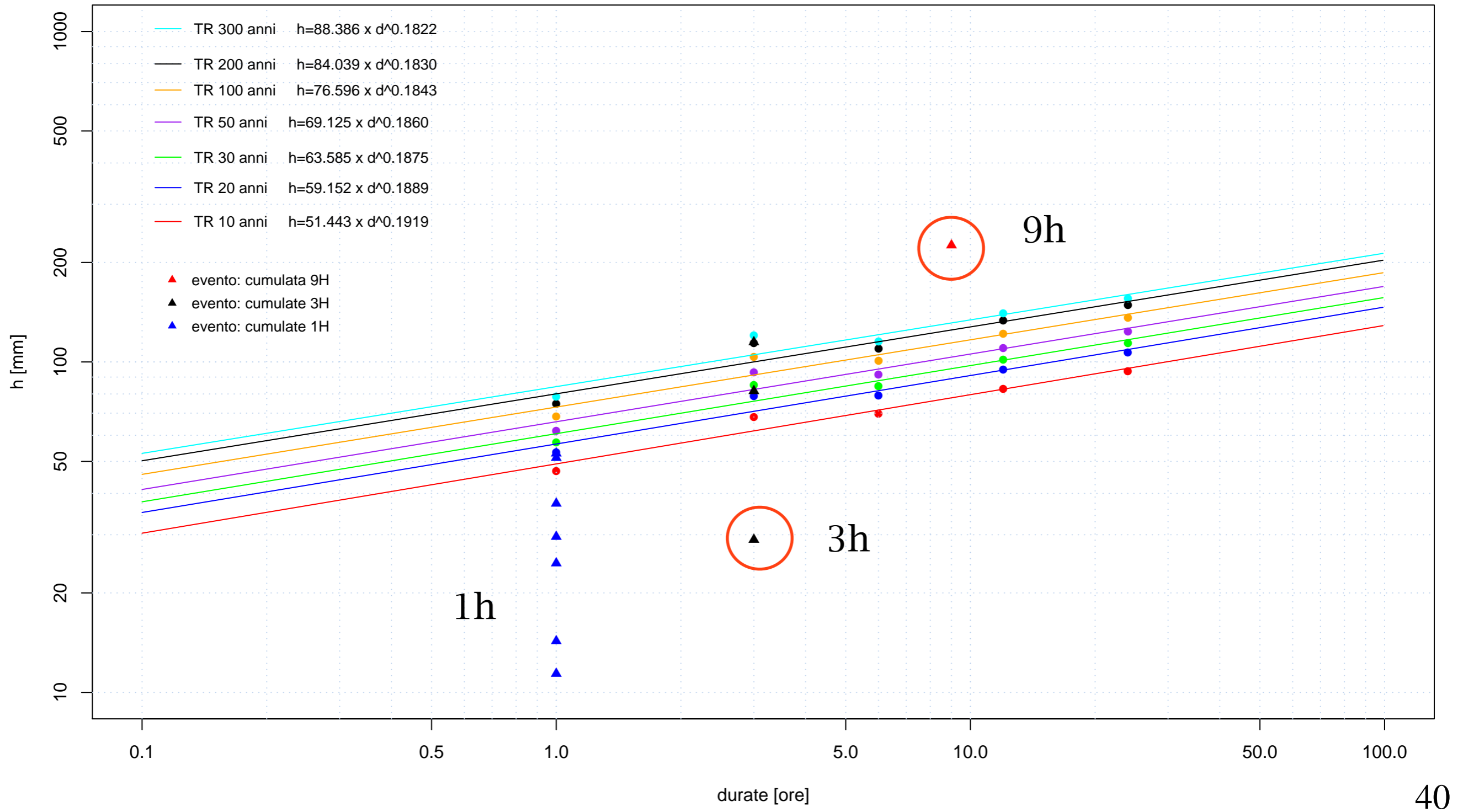
The Vigata Case



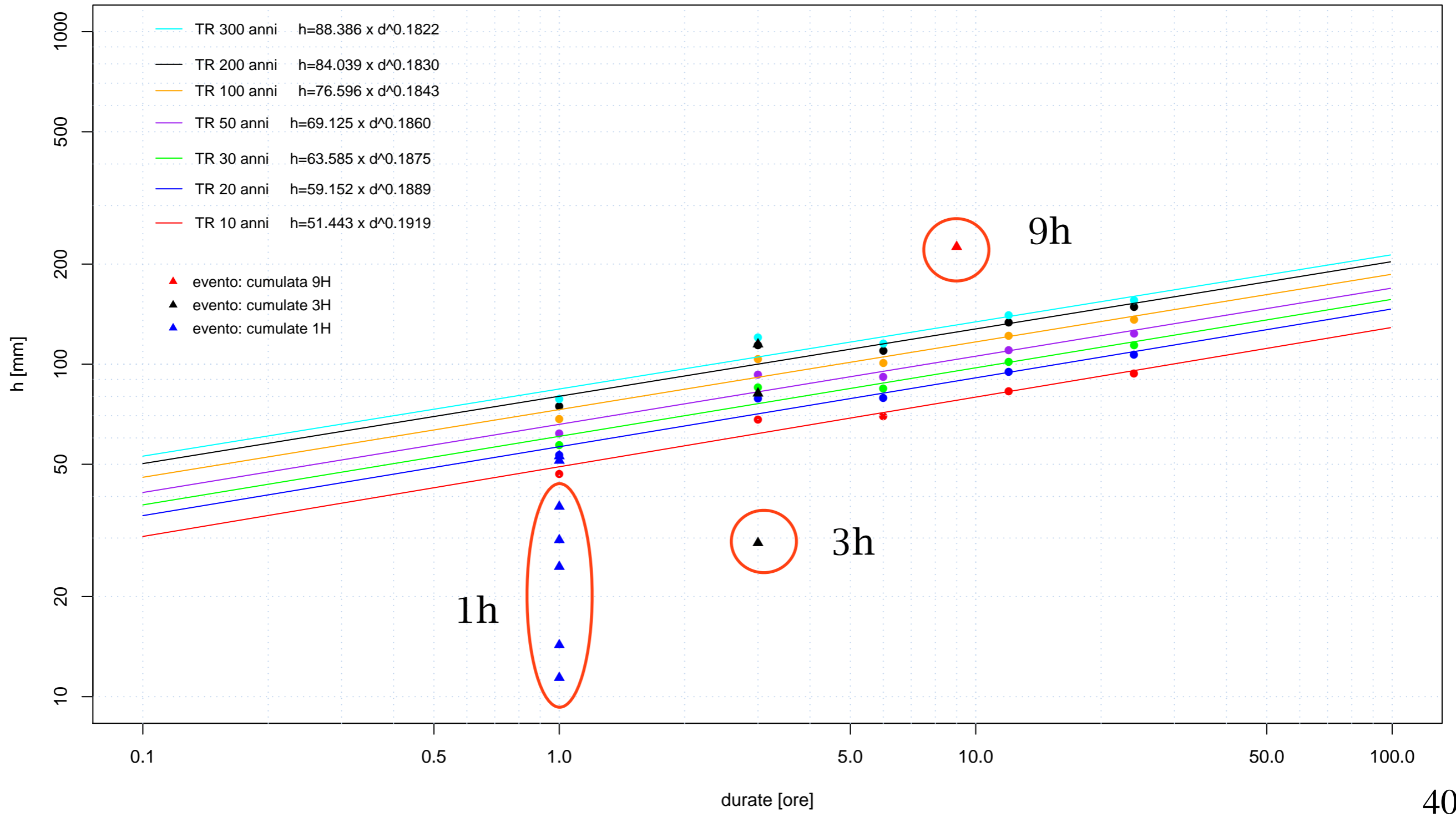
The Vigata Case



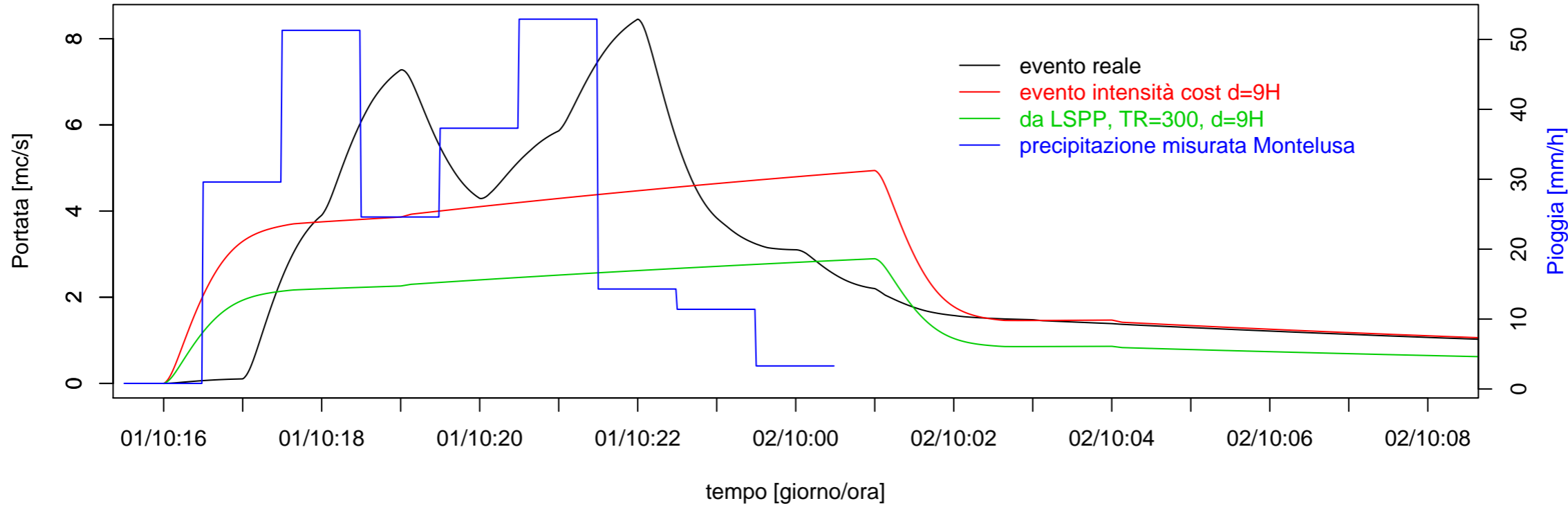
The Vigata Case



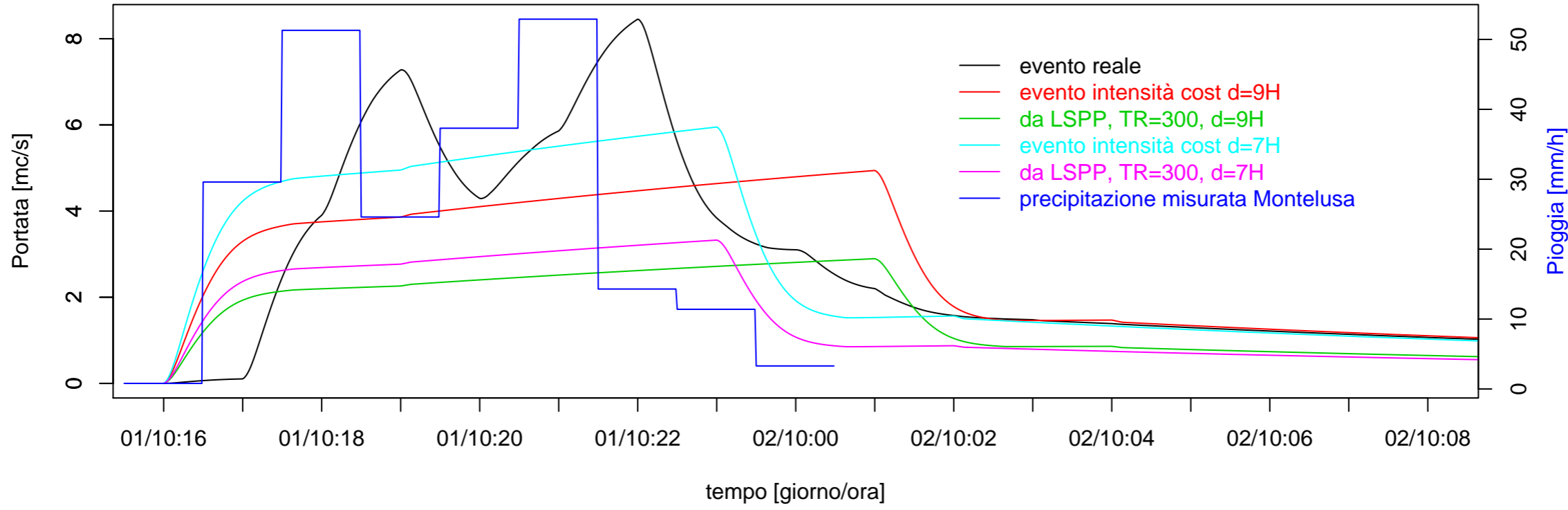
The Vigata Case



The Vigata Case

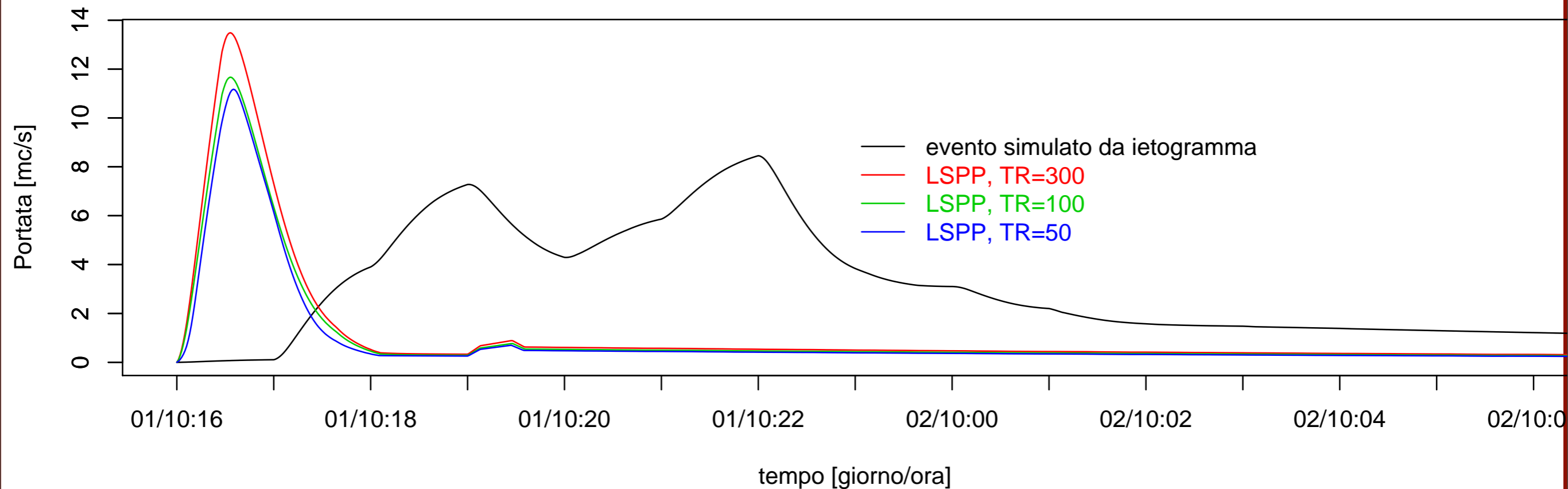


The Vigata Case



The Vigata Case

In this basin, the maxima discharge are those which have short duration.



Oihbo'

Rainfall data are at hourly time step. We need sub-hourly

Rainfall has actually been measure elsewhere, at Montelusa a few kilometers from Vigata.

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Moral

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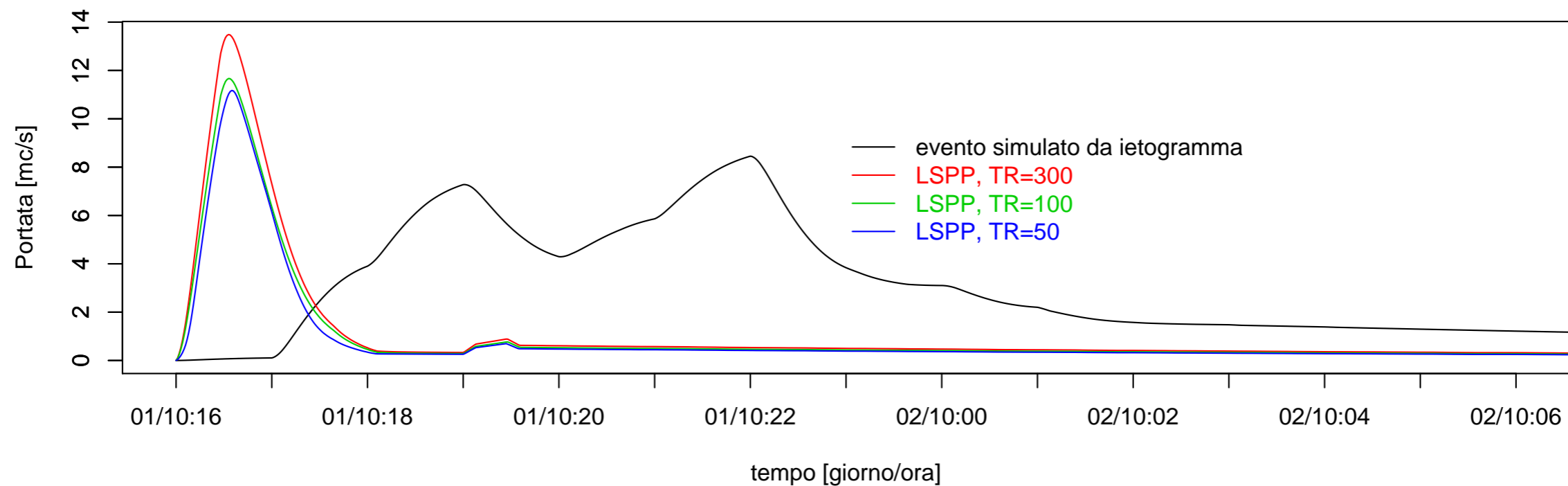
In future

Maybe having data from high resolution meteorological models -less that
1 km²

The Vigata Case

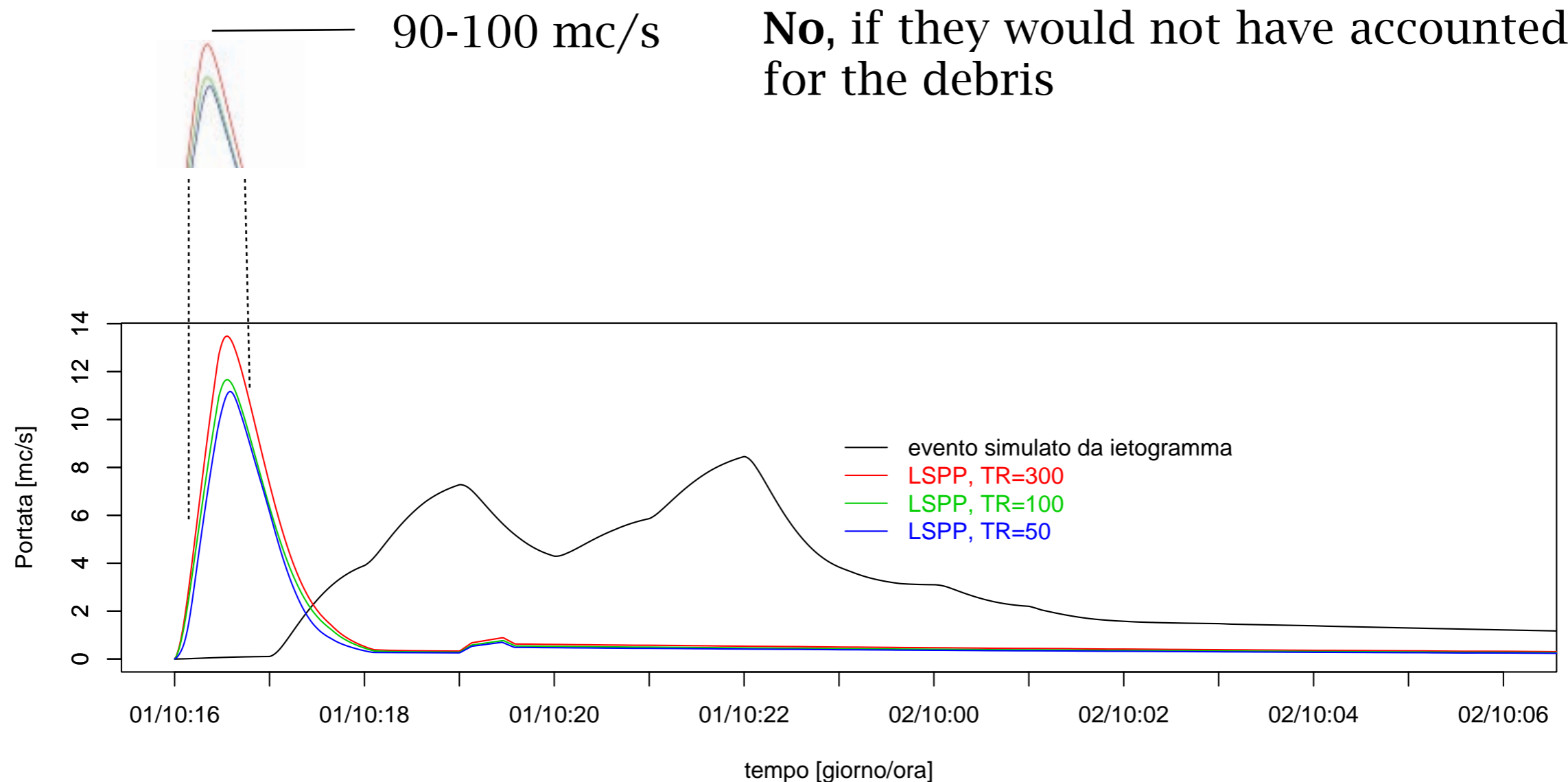
BTW if the hydrologists have used the usual practice. Would have they contained the flood ?

Yes, they would



Il caso di Vigata

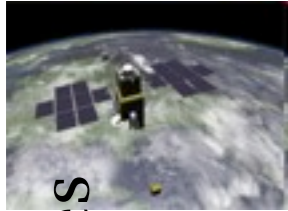
BTW if the hydraulic work have been made following the usual practice. Would have they contained the flood ?



*... you know what
I'm craving? A
little perspective.
That's it. ...
Anton Egò*

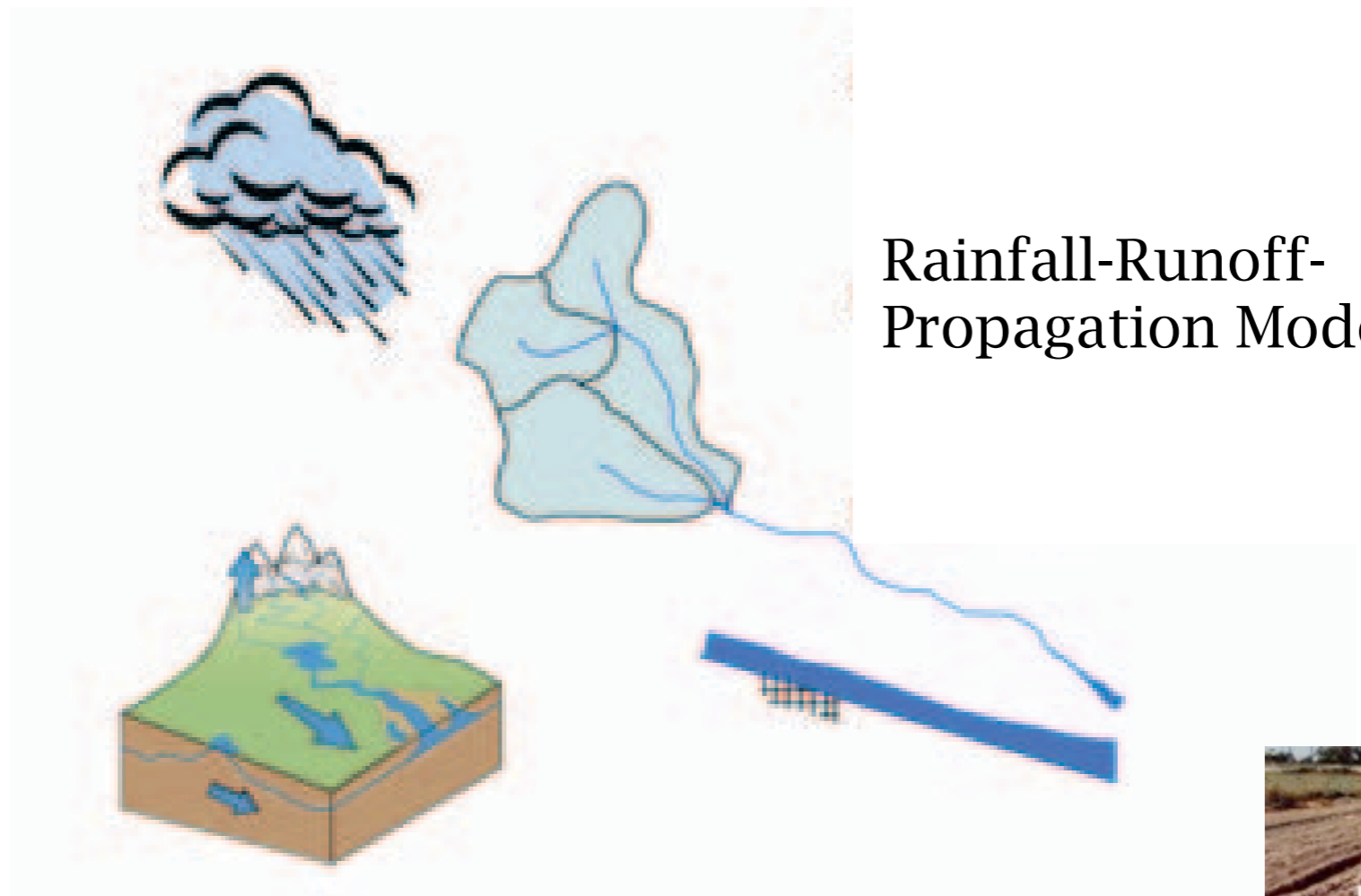
Investing resources
to save
resources

In this case



Control from satellites

Meteorological model at high resolution (radar, ground networks, satellites)



Rainfall-Runoff-Propagation Models

Fully distributed hydrological models



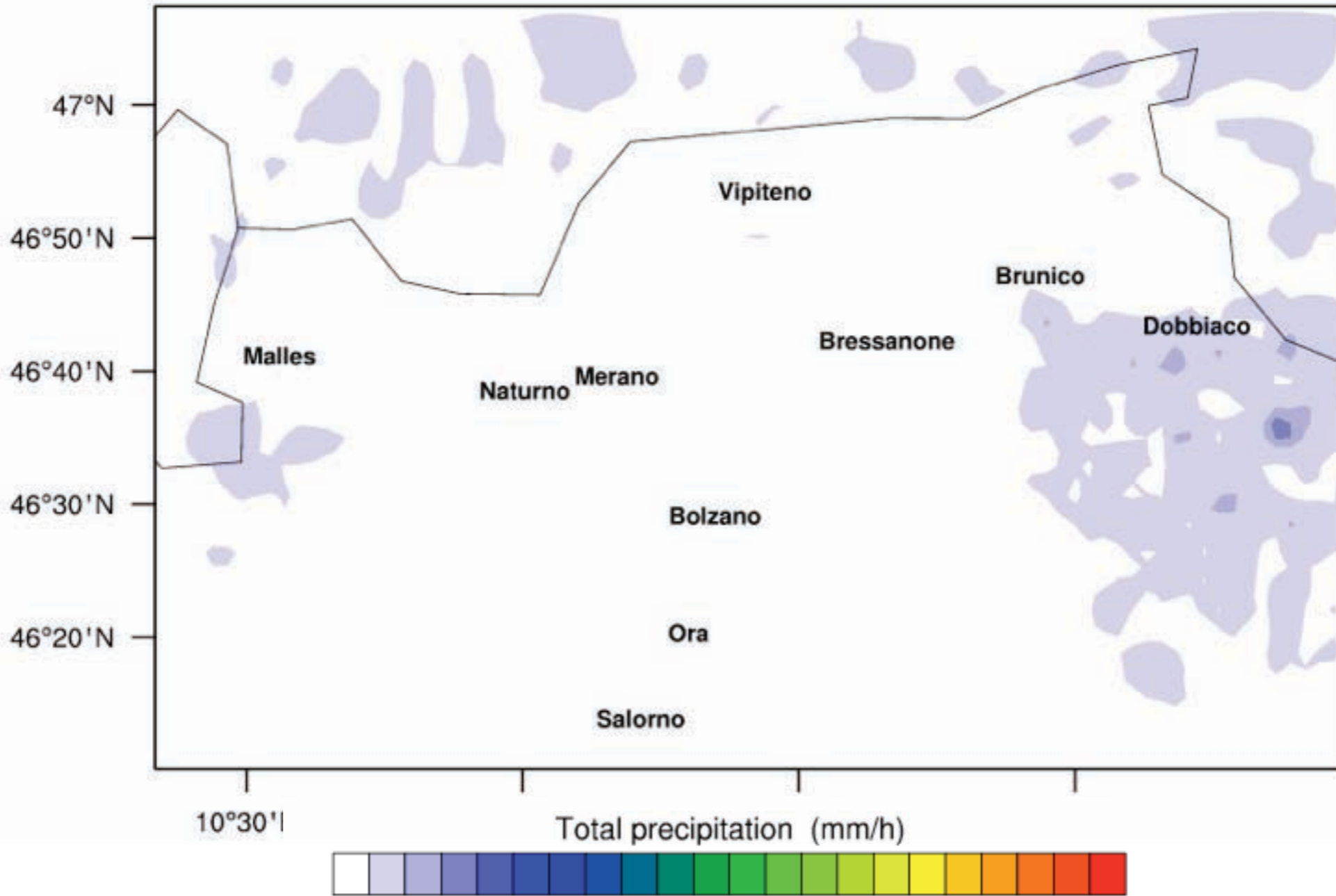
Ground measure and experiments

Forecasting

Real-time WRF - Domain 3

Init: 2010-09-28_00:00:00
Valid: 2010-09-28_01:00:00

Total precipitation (mm/h)



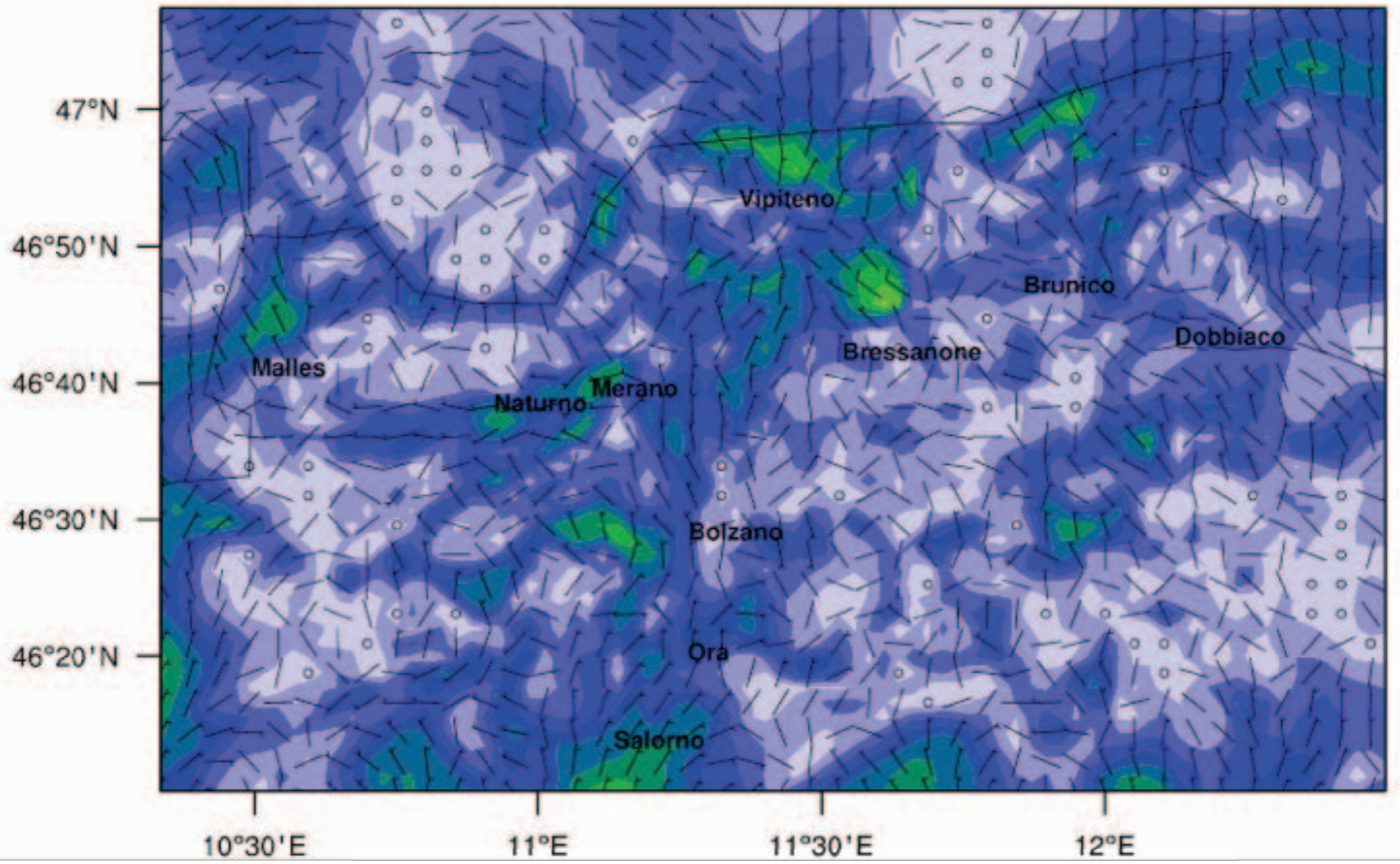
courtesy CISMA (www.cisma.bz.it)

Forecasting

Real-time WRF - Domain 3

Init: 2010-09-28_00:00:00
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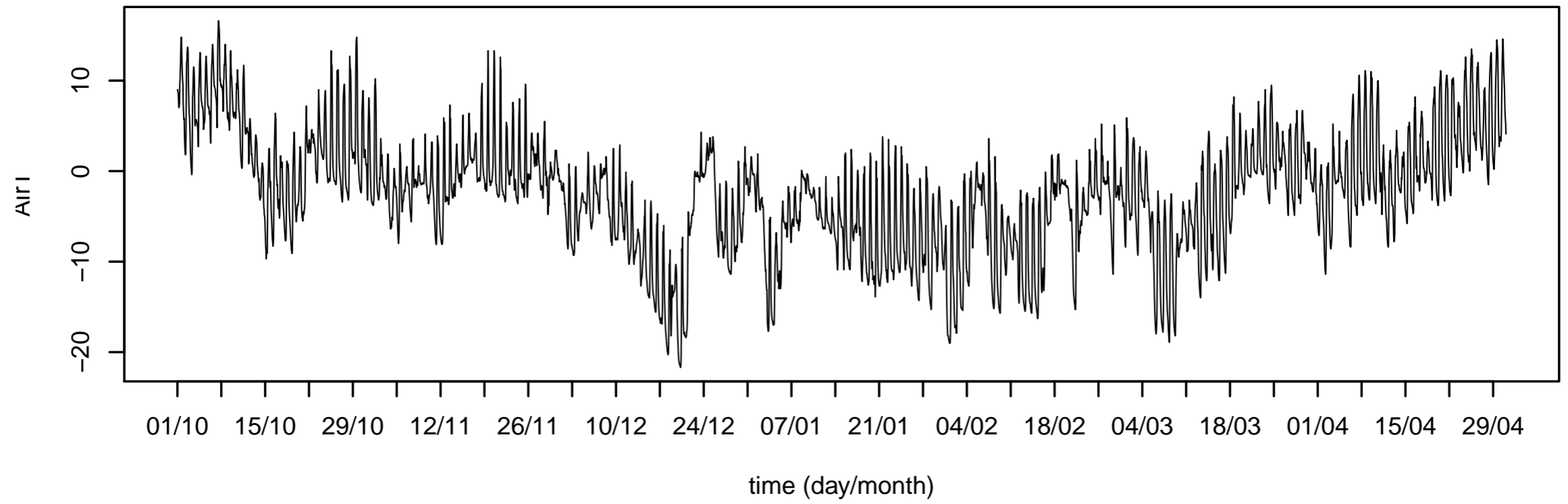
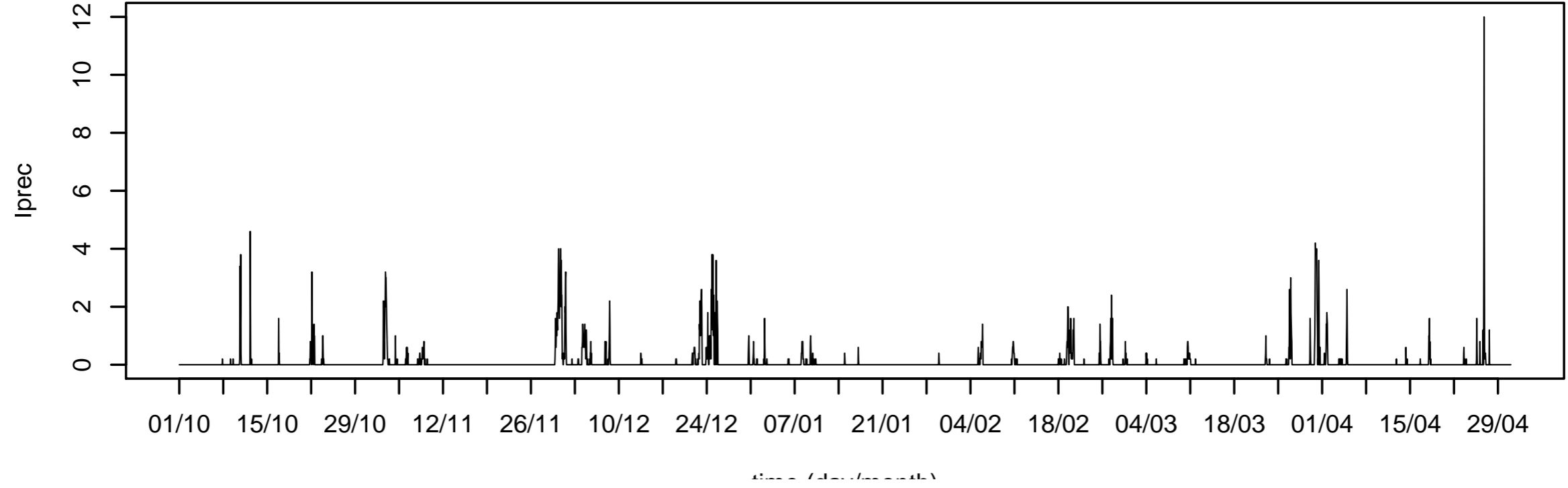
Wind intensity (m/s)
Wind vectors



courtesy CISMA (www.cisma.bz.it)

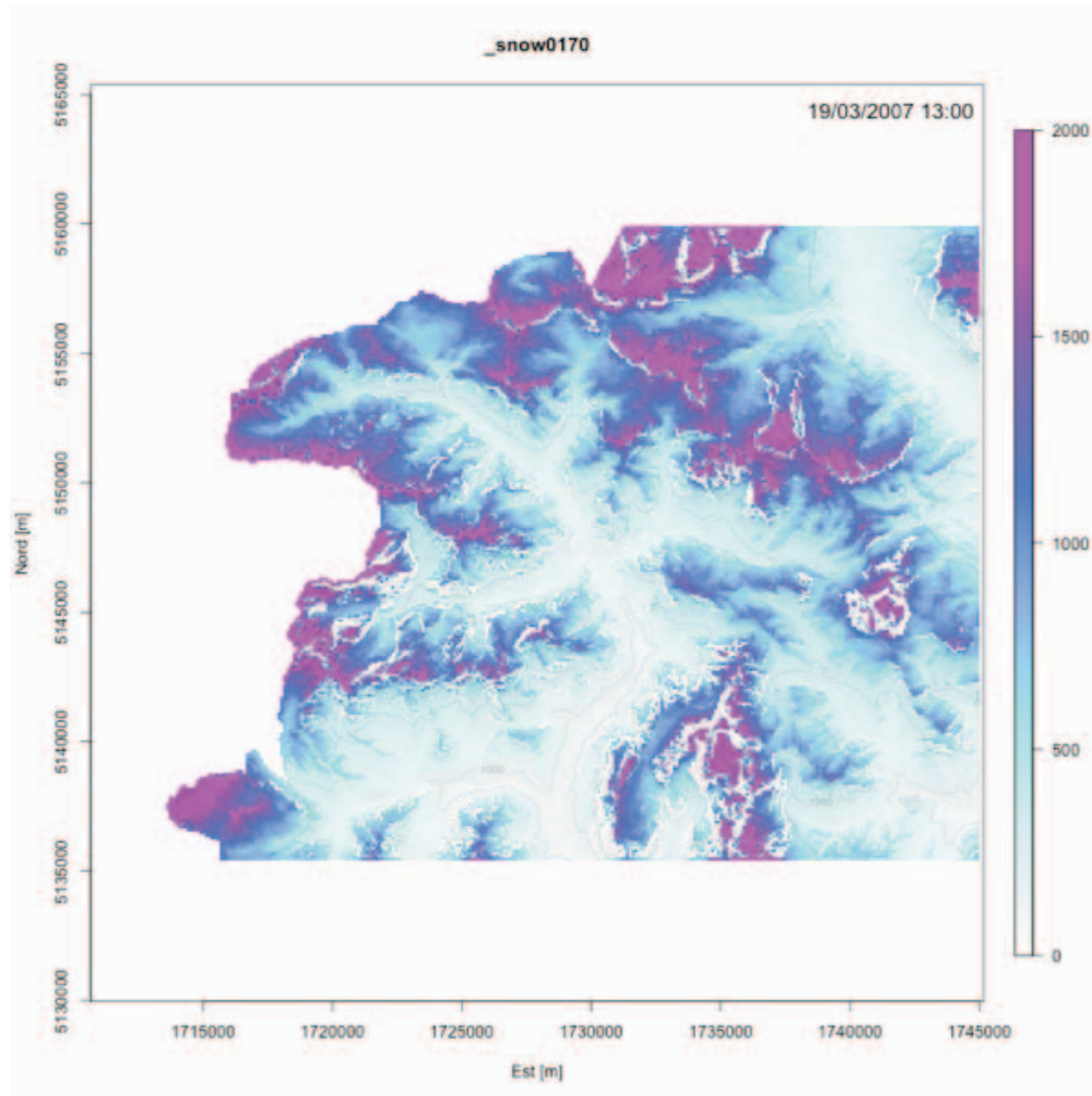
Forecasting

courtesy Mountain-ering (www.mountain-ering.com)



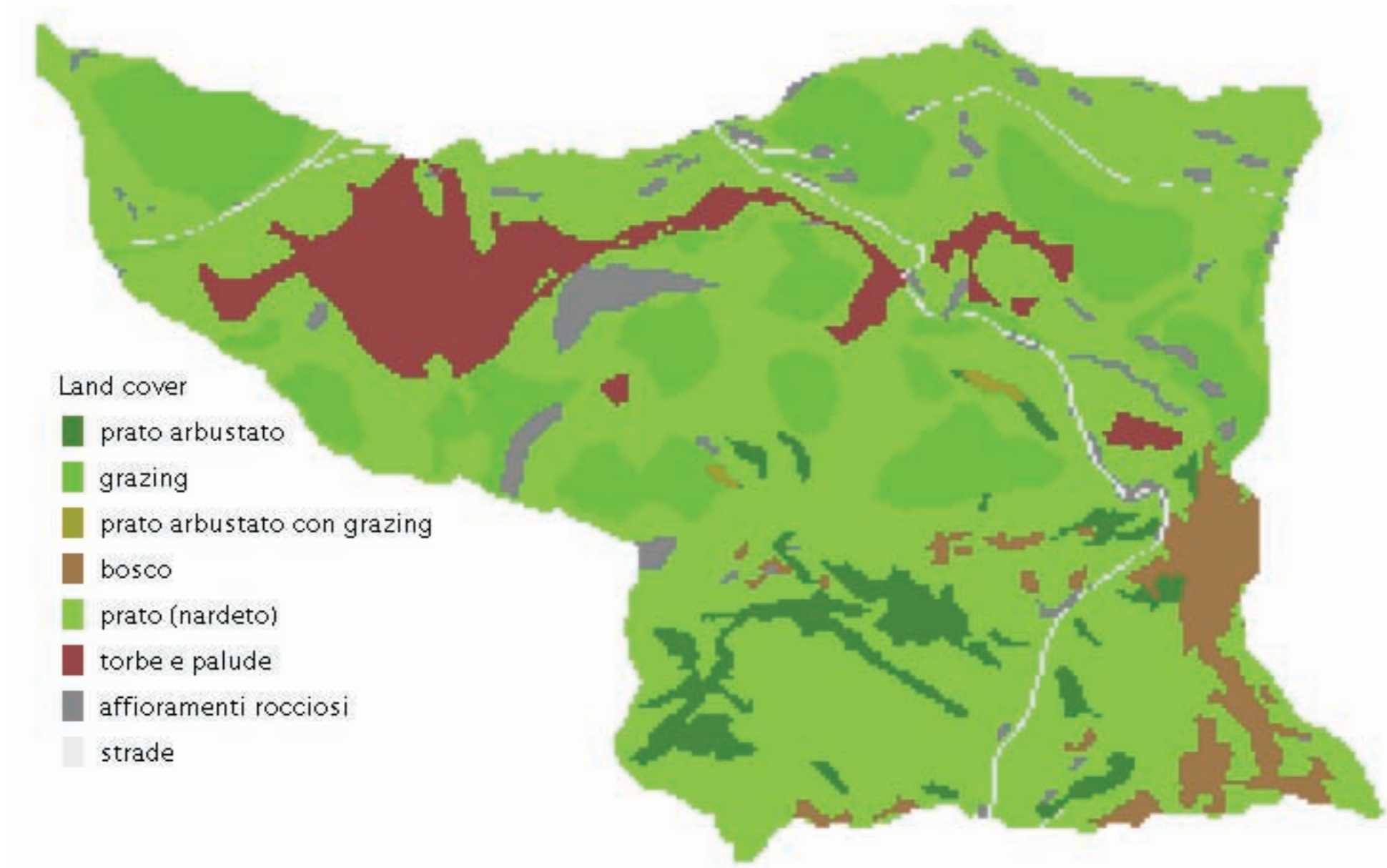
Forecasting

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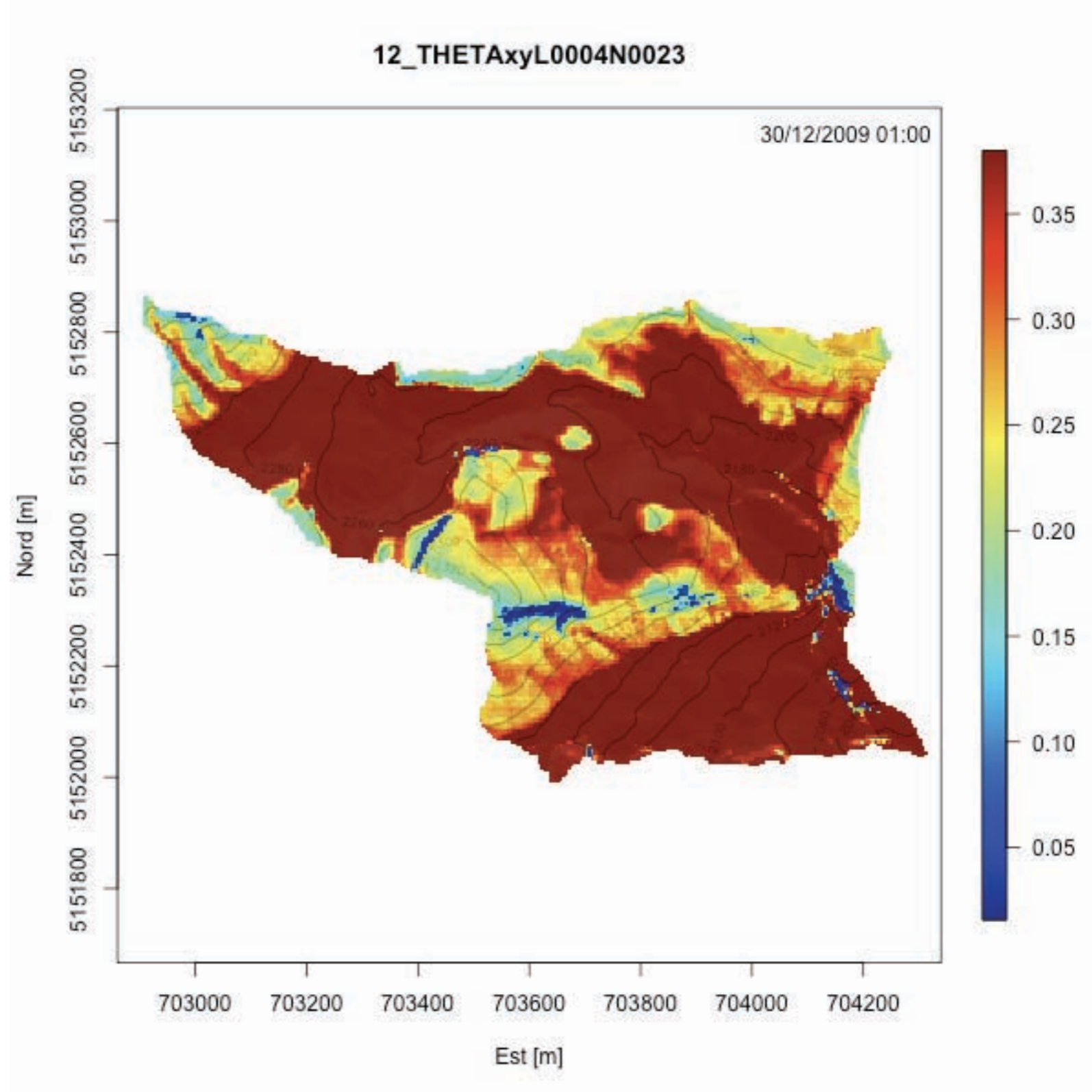
Forecasting

courtesy Prof. E. Farabegoli, Univ. Bologna



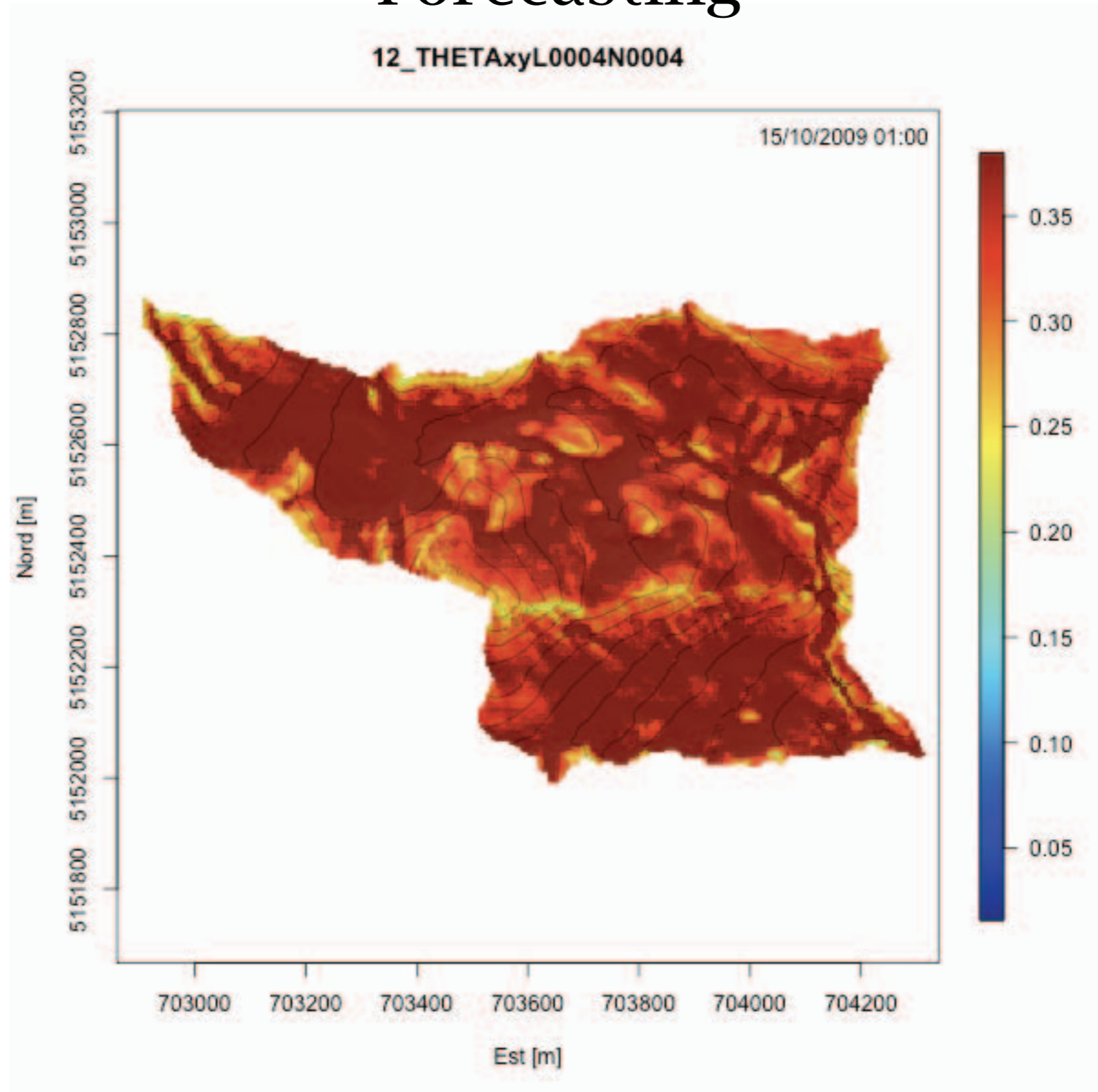
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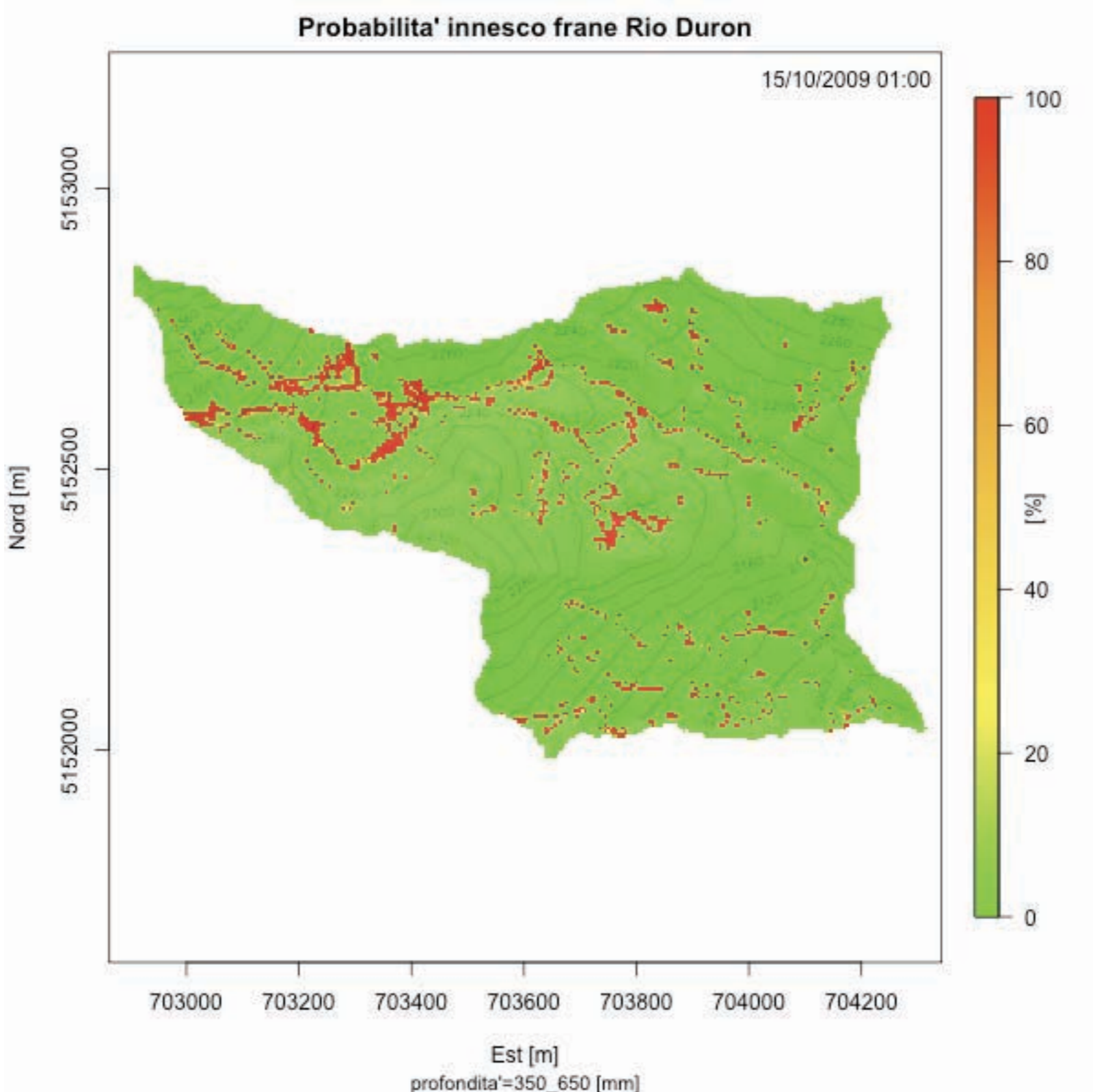
Forecasting

courtesy Mountain-ering (www.mountain-ering.com)



Forecasting

courtesy Mountain-ering (www.mountain-ering.com)



What you cannot forecast, you can prevent



Courtesy del Prof. Aronne Armanini- Check dam with Debris Flow Breaker

Thank you for your attention

G.Ulrici - 2000 ?

