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Methodologies for the characterisation of spatially distributed hydrological events: the Italian case study

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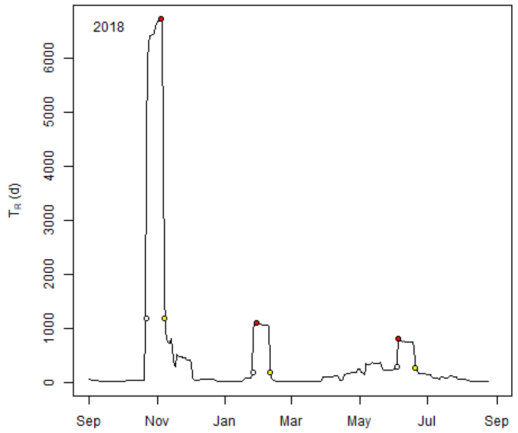
Data and Methods

REGIONAL RP METHOD

Q -> Exceeding Empirical Frequencies ->RP



Empirical Regional Return Period

$$T_r(i,j) = \frac{1}{n}\sum_{j=1}^{n} g(j) * winodw(t_r(i,j), w)$$

Low pass filter

Classification Parameter: Regional Return Period

CIMA

MIT (Minimum Inter-event Time)

Annual maxima best fit

Daily return period for each station & Gaussian filter

Classification Parameter: Sum of each local return period

Data and Methods

Event	Regions	Date	Source	Damage
Soverato 2000	Calabria	10/09/00	polaris	13 casualities. Triggering of various landslides.
Vibo Valentia 2006	Calabria	03/07/06	polaris	3 casualities. Presence of many debris.
Debris flow Villar Pellice	Piemonte	28/05/08	polaris	Debris flow that has swept the villages and the roads.
Flood Event Italia 2008	Sardegna, Piemonte, Campania, Calabria, Veneto, Sicilia	10/10/08	reports	Flooding all over Italy, landslides and closed roads.
General bad weather in the Nord-Est and Center of Italy	Toscana,Friuli, Veneto	07/07/09	polaris + reports	Flooding of streams and canals, resulting in closures of several roads.

HISTORIC FLOOD DATABASE

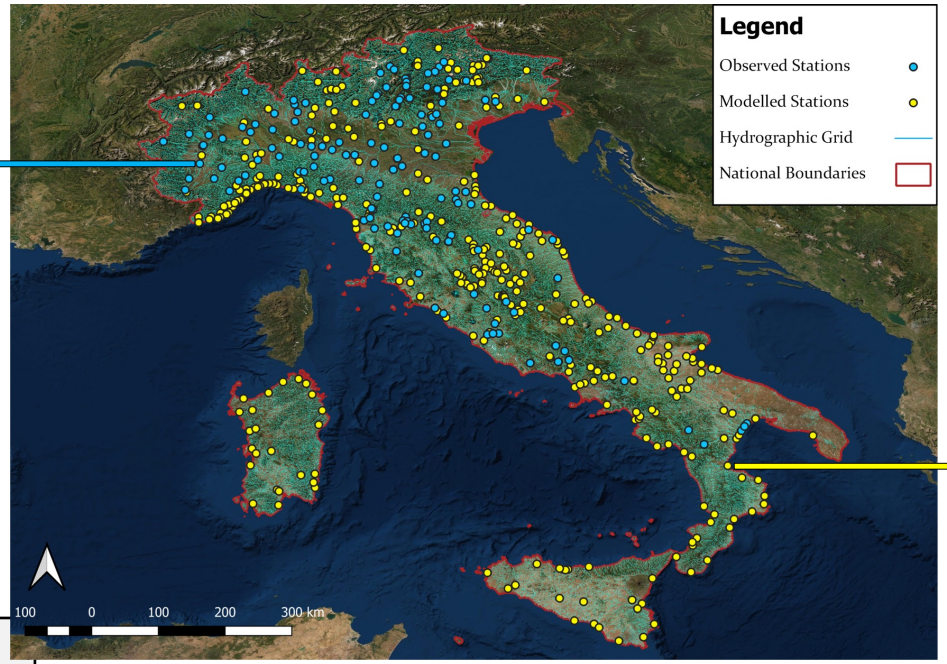
Reports from Italian Civil Protection Department

+

CNR & IRPI Databases

Observed Data

- 145 hydrometeorological active sections
- Unevenly spatial distribution



2005-2019

Modelled Data

- 457 sections generated by hydrological model (CONTINUUM)
- Homogeneous spatial distribution

Results

Date	Regional RP Method	CIMA	Historic	TOT (1-3)
07/11/12	1	1	1	3
21/01/13	1	1	0	2
17/05/13	1	1	1	3
16/11/13	1	1	1	3
01/12/13	1	1	1	3
05/01/14	0	1	1	2
03/05/14	1	1	1	3
12/11/14	1	1	1	3
30/01/15	1	1	0	2

LOGIC TABLE

Logic table of macro-events selected from methods

Method consistency

Method consistency

% of all events	Observed	Modelled
3	45	42.5
3 No CIMA	2.5	0
3 No Regional RP Method	0	0
no data	10	10
/	42.5	47.5

% of first 22 events	Observed	Modelled
3	68.2	63.6
3 No CIMA	4.5	0.0
3 No Regional RP Method	0.0	0.0
no data	4.5	4.5
/	22.7	31.8

Both methods show **similar results**

Critical and large events are **selected**

Discussion and Conclusions

1

More than 60% consistency between historical data and model outputs

2

Uneven distribution of events in Italy

3

Mobile space window with integration of radar and satellite data

4

Climate change and future trends

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THANK YOU

This presentation participates in OSPP

Outstanding Student & PhD candidate Presentation contest

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