Regione Emilia-Romagna

The "RONCOVETRO LANDSLIDE"

"LA LAVINA DI RONCOVETRO"

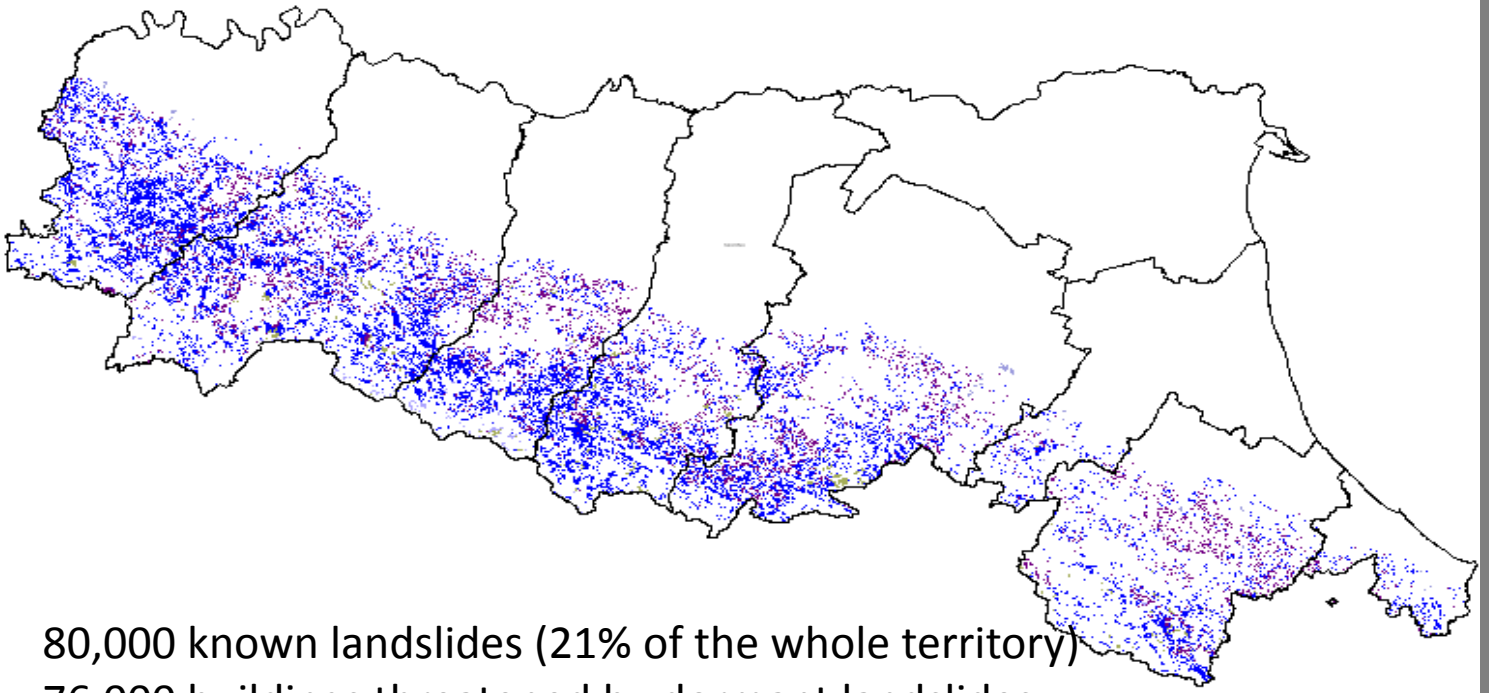
& Co.

Giovanni Bertolini & Marco Pizziolo

Wi-GIM www.life-wigim.eu Wireless sensor network for Ground Instability Monitoring

LIFE12/ENV/IT/001033
A project co-funded by the EU Life Program

Emilia-Romagna Region - Landslides Inventory



80,000 known landslides (21% of the whole territory)
76,000 buildings threatened by dormant landslides
7,000 buindings standing on active landslides

The Large Earth Flows

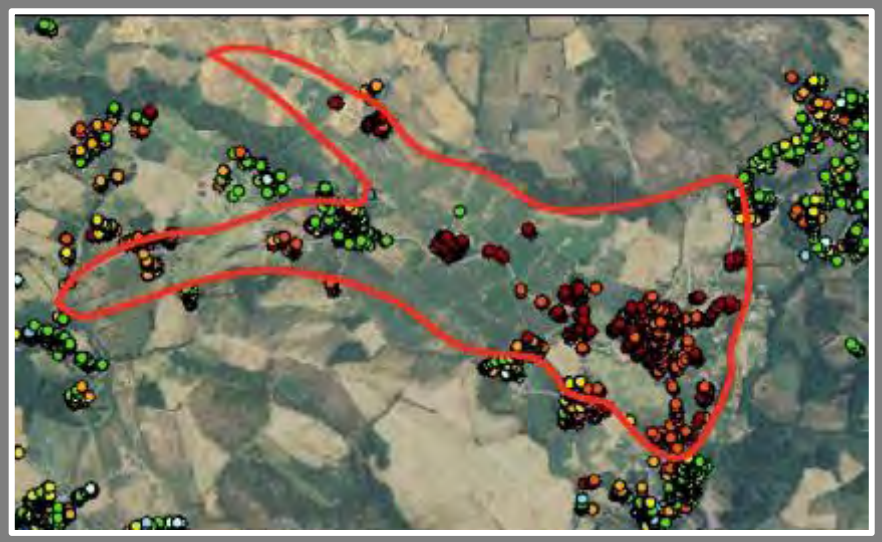
These are the typical features of our earth flows :

1. a thickness ranging from 10 to 50 m.
2. medium slope angle from 8° to 11°
3. they alternate long-lasting periods of dormancy (tens of years) with short reactivations (months)
4. ……and, as usual, they carry a village on their back

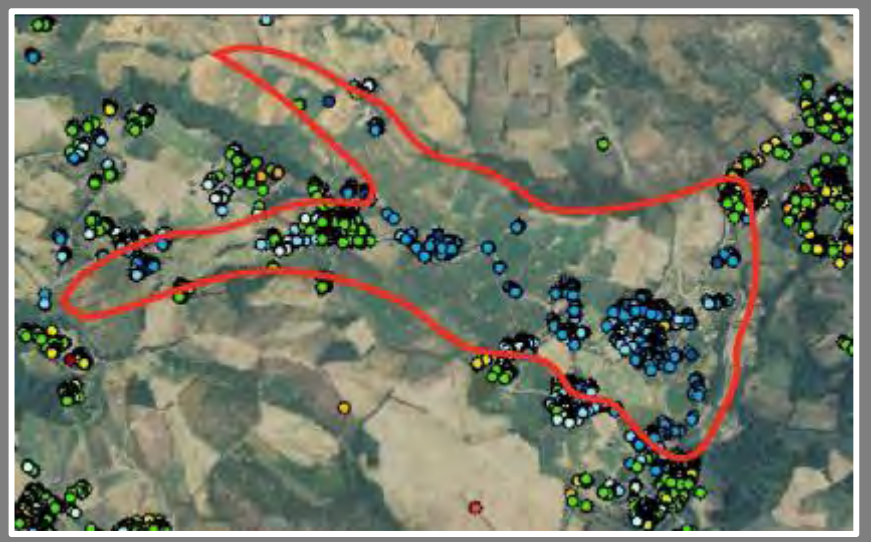

Provazzano landslide, Parma (Italy)
Photo: gbertolini@regione.emilia-romagna.it

Provazzano
landslide,
Parma (Italy)

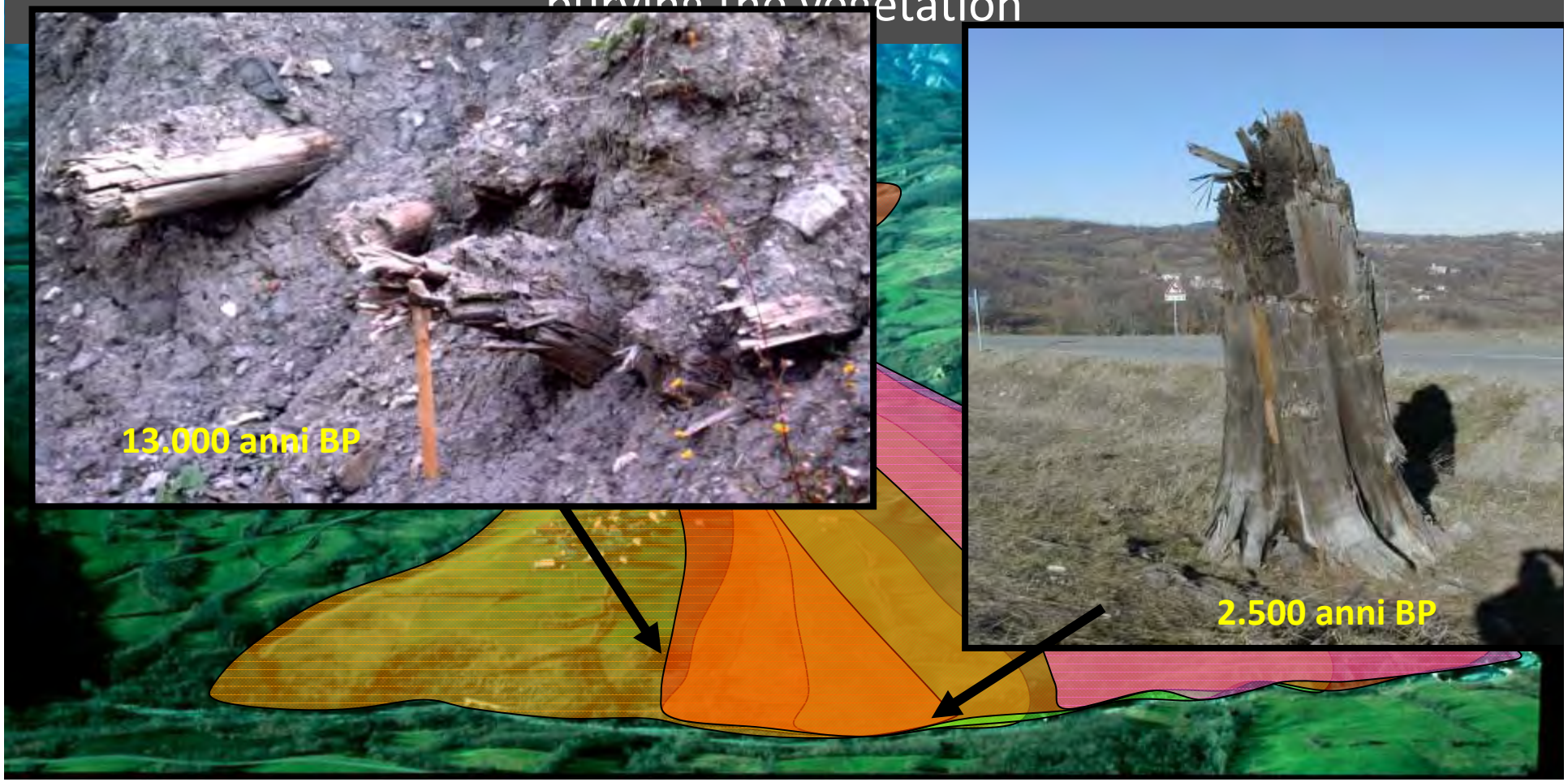
PS InSAR
Cosmo Sky Med
Ascending



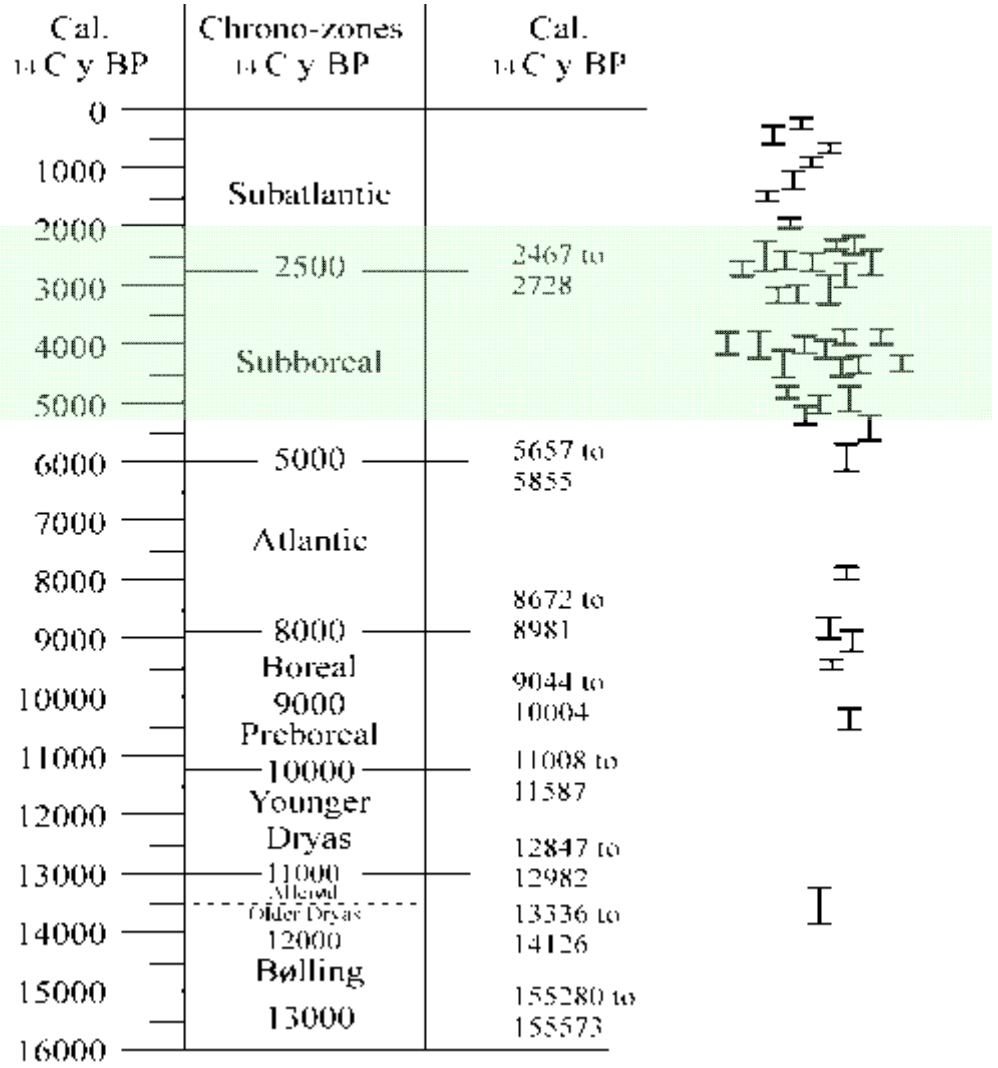
PS InSAR
Cosmo Sky Med
Descending



They originated and grew by superimposition of minor earth-flows, burying the vegetation



A careful observation of cores almost always can find organic remnants.



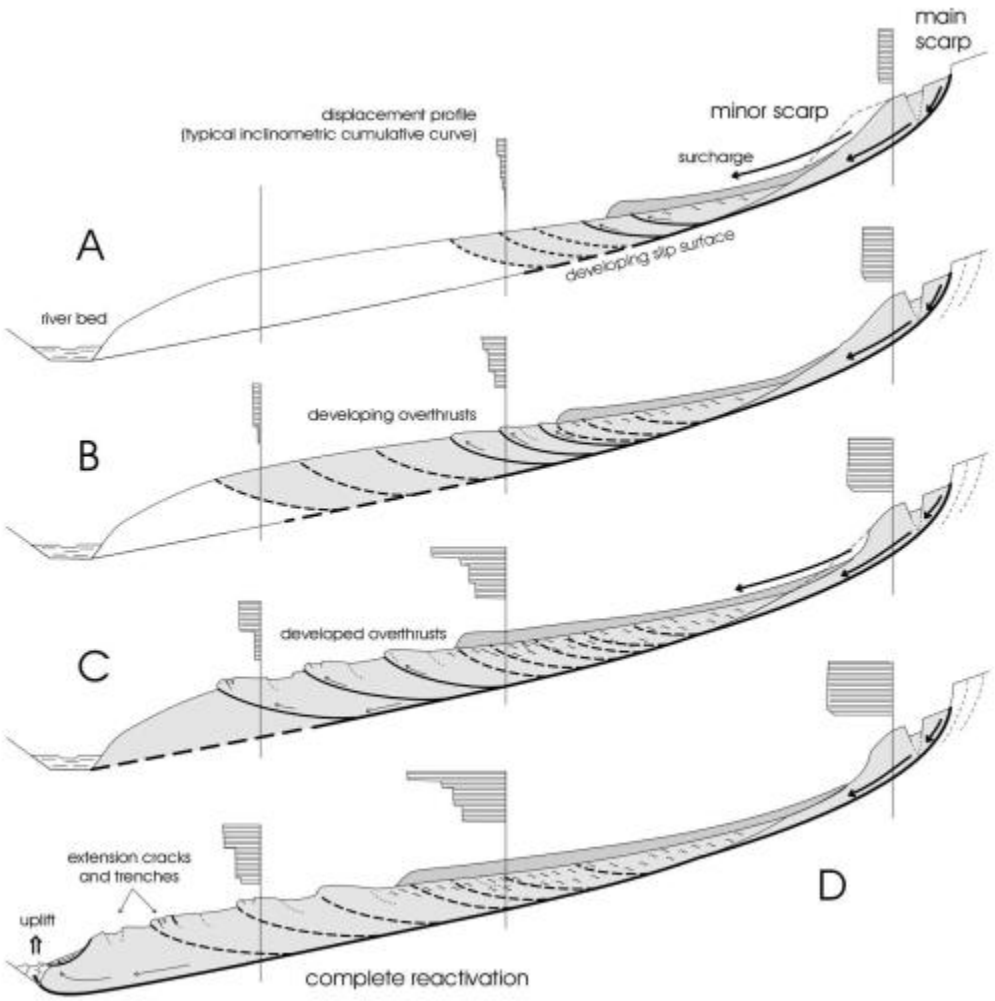
Growth in size and thickness

Origin

they still represent the main source of risk, because of their habit of reactivate every 1, 10, 100, 1000 (?) years.

The reactivation often occurs through a recurrent behaviour, from the main scarp (the most instable part of the slope), propagating toward the toe by progressive failure.

Please note: these "*earth flows*" mainly reactivate by "*sliding*", not by "*flowing*".



…on the other hand, they are not always dangerous, as demonstated by the ancient Roman Villa of VELLEIA, that stood 11 centuries “undisturbed” on this large earth flow (inhabited by Romans from I b.C. to IV A.D)

The Frana di Gazzolo

It s an example: after several months of studies and monitoring this “dormant” landslide was considered safe, allowing an industrial centre to be built on it.

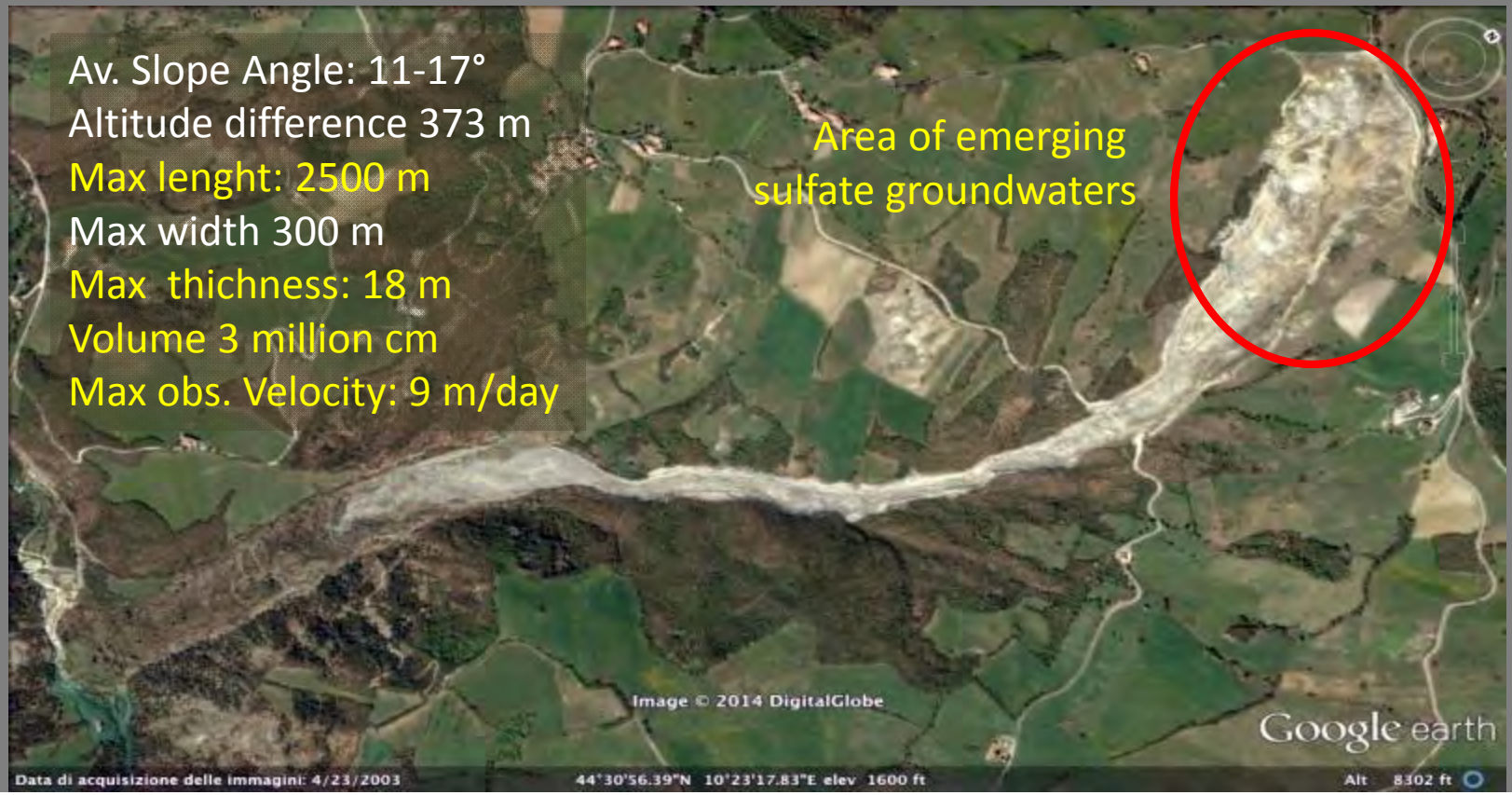
The role of monitoring

As a consequence of that, in the last 30 years the Emilia-Romagna region has developed a network made up by several hundreds of inclinometers and piezometers, aimed to

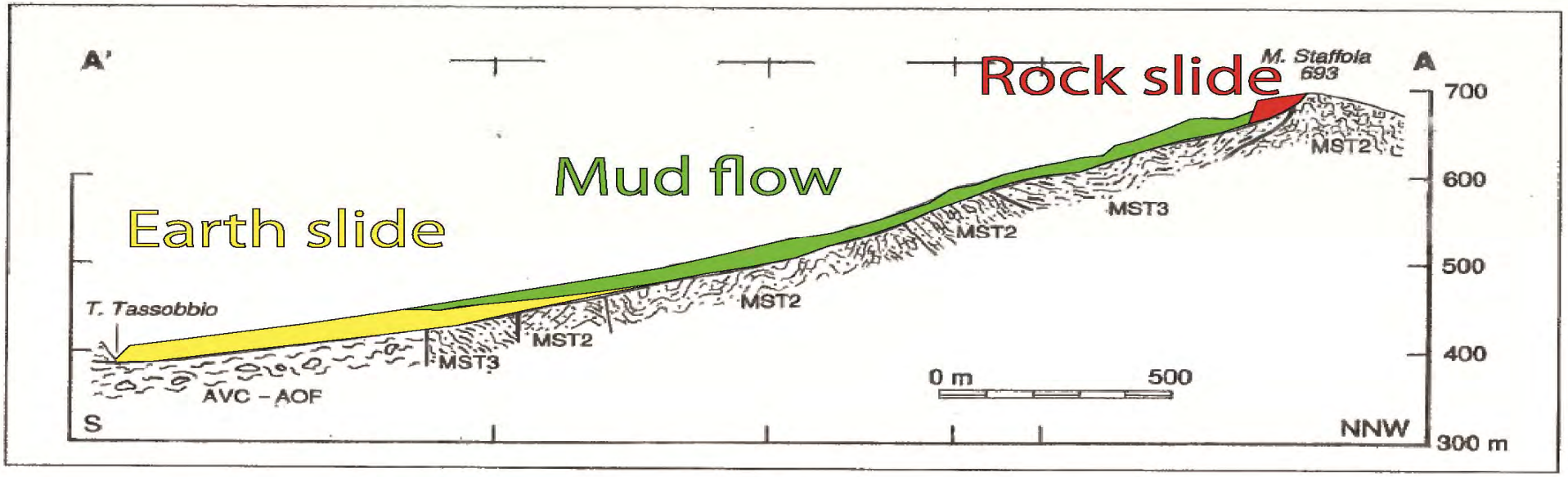
1) ….. assess the possibility of their reactivation;
2) …… obtain data for the implementation of active and passive actions (consolidation works, territorial planning)

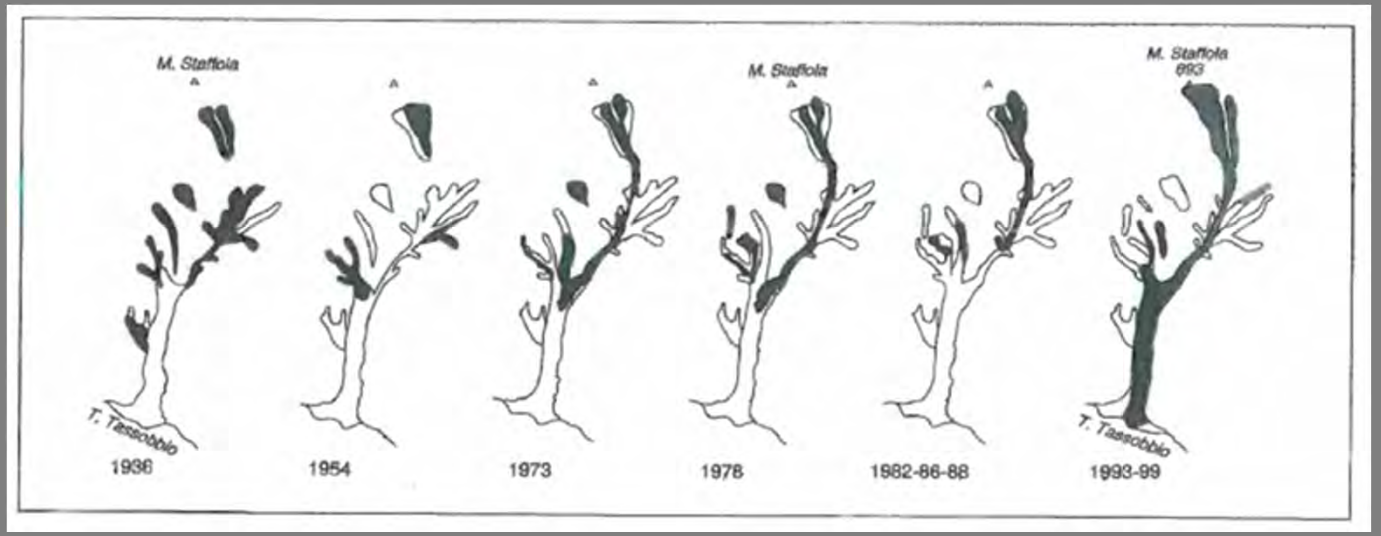
RER is always interested in every method and technology of monitoring, like the WiGim technology that has been tested on the “Lavina di Roncovetro” that was chosen for its very peculiar behaviour.

The main (and more interesting) feature of the “Lavina di Roncovetro”, that makes it different from others, is its perennial state of activity, due to the continuous rising of mineralized (sulfate) groundwaters from the subsoil




ROCK SLIDE
MUD FLOW
EARTH SLIDE
Image © 2014 DigitalGlobe
Google earth
Data di acquisizione delle immagini: 4/23/2003
44°30'56.39"N 10°23'17.83"E elev 1600 ft
Alt 8302 ft

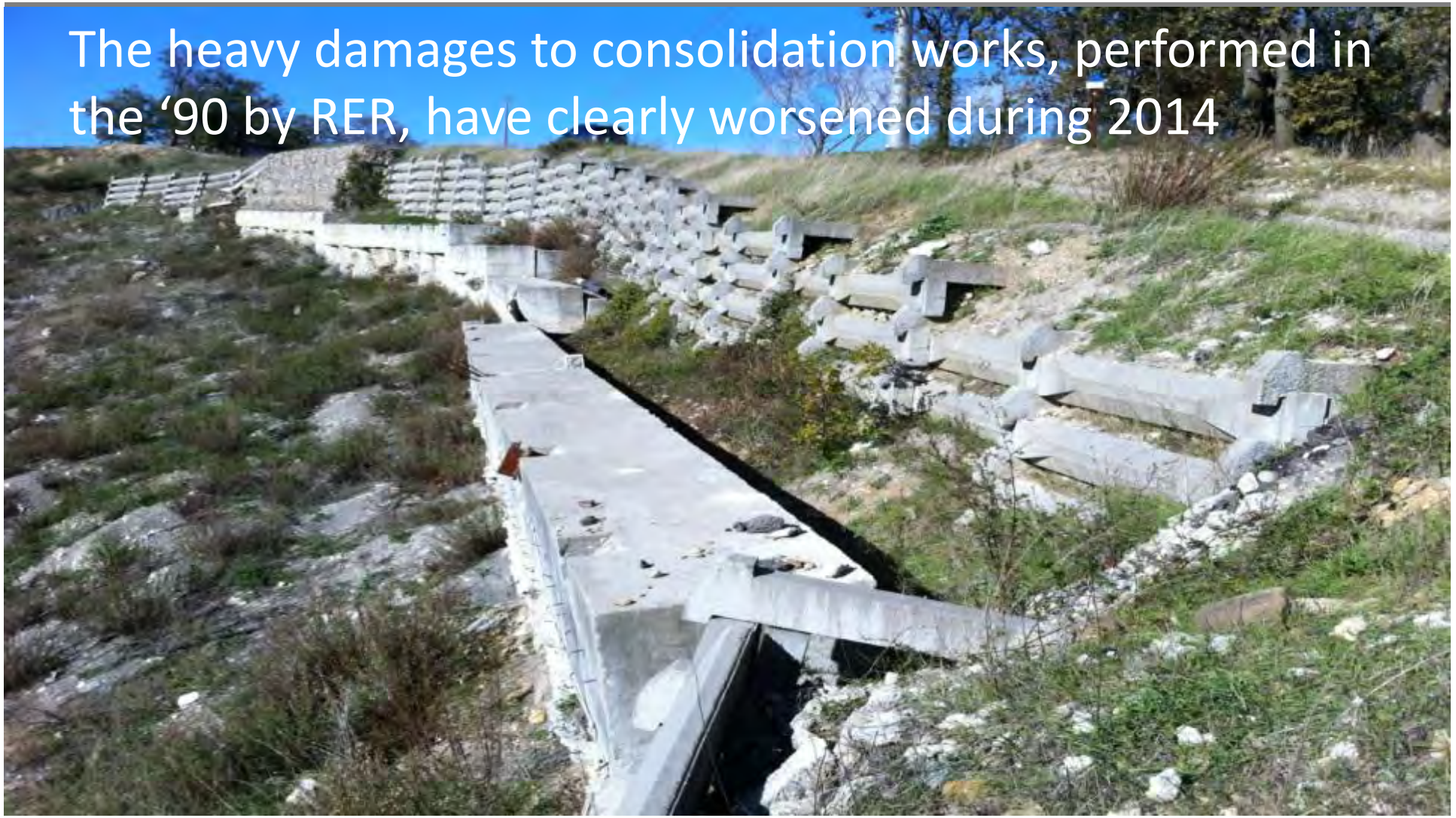

A'
Rock slide
M. Staffola
693
A
Mud flow
Earth slide
MST2
MST3
MST2
MST2
T. Tassobbio
MST2
MST3
AVC - AOF
0 m
500
S
NNW
700
600
500
400
300 m



The “Lavina” has doubled its amplitude in the last 80 years

217 metres in 20 years

682 metres in 20 years
(2,8 m/month – 9 cm/day)


The heavy damages to consolidation works, performed in the ‘90 by RER, have clearly worsened during 2014

To end my speech, in synthesis, bacause of its very peculiar behaviour, the Lavina di Roncovetro has shown the be a good test-site for WiGim monitoring.

Tank you for the attention