Nat. Hazards Earth Syst. Sci. Discuss., 2, C3491–C3498, 2015
www.nat-hazards-earth-syst-sci-discuss.net/2/C3491/2015/

Natural Hazards and Earth System Sciences
Open Access
Discussions

Interactive comment on "Ground-penetrating radar observations for estimating the vertical displacement of rotational landslides" *by* C. Lissak et al.

C. Lissak et al.

candidelissak@yahoo.fr

Received and published: 24 February 2015

COMMENT TO THE AUTHOR

General comments:

1 - "E.g. no drillings have been presented. Furthermore no data about road reconstruction are presented. There is just an assumption that after the acceleration events there must have been a major road reconstruction..."

Answer of the author: No drilling was possible on the road but we have much information on intervention (frequency, way of reconstruction, road geometry). Between

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

two major crises, the subsidence of the road (not horizontal component of the displacement) is visible. For the road safety and the traffic, the road section collapsing is regularly leveled and smoothed to its initial level. The history of the reconstruction corresponds to the major acceleration of the landslide. To keep the road safe and to keep the road traffic, after all acceleration events (1982 to 2001), the road was blocked off for few days for reconstruction. Interviews with territorial agents responsible for the road network management confirmed us assumption and provided us data on the road pavement (geometry, construction material...).

2 - "All profiles presented are oblique to the main displacement direction. This might be an advantage but can be also a disadvantage especially in case of inclined strata and relevant vertical displacement. Even so the authors describe the position of the profiles close to the head scarp, over 30 years there might be also relevant lateral displacement."

Answer of the author: All profiles are perpendicular of the main displacement direction. A first geodetic network was implanted in December 1984. It was composed of 87 topographic benchmarks. The benchmark position was measured between 1985 and 1988 and most of were then destroyed. In 1995 and 2008 several new benchmarks were implanted to ensure the long-term continuity of observations. All measurements provide evidence of spatial heterogeneities in the landslide kinematic pattern. The main direction of the landslide is perpendicular to the coastline, through the North except near the main scarp where displacements are predominantly vertical. Ancient topographic maps and surveys are also available (before the first major acceleration in 1982). These documents highlight a regressive evolution of the landslide: a retrogression of the main scarp without enlargement of the of the landslide boundaries.

3 - "The Chant des Oiseaux Landslide is not very well connected to the story of the manuscript. Only data are presented without detailed discussion either regarding the subsidence history (of which you know little) or in comparison to the data from the Cirque des Graves landslide. Therefore, I suggest either omitting it from the manuscript

or discussing it more in detail with respect to the topic of the manuscript.”

Answer of the author: Indeed we have few quantitative data for the Chant des Oiseaux landslide. We focus our research on the Cirque des Graves landslide, but the kinematics of the both landslides are similar : (1) a seasonal dynamics in spring and in autumn (several centimeters of displacement per year), (2) alternating periods of acceleration crises (several decimeters or meters of displacement per year) and (3) deceleration periods. At the Chant des Oiseaux landslide, we don’t have monitored the displacements, and main information on the landslide dynamics and the road subsidence come from geotechnical reports, photos and witnesses. Consequently, geophysical data provide an estimation of the road subsidence for the last 30 years. These values coincide with the values estimated at the Cirque des Graves landslide with almost 2m of collapse since 1982’s acceleration. It demonstrates that the method can be used for less monitored areas.

ïĄĺïĄĺïĄĺïĂăïĂăïĄğïĄğïĄğ

Comments on the manuscript:

See the pdf file.

Comments on the figures:

Please also note the supplement to this comment:
http://www.nat-hazards-earth-syst-sci-discuss.net/2/C3491/2015/nhessd-2-C3491-2015-supplement.pdf

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 2, 7487, 2014.

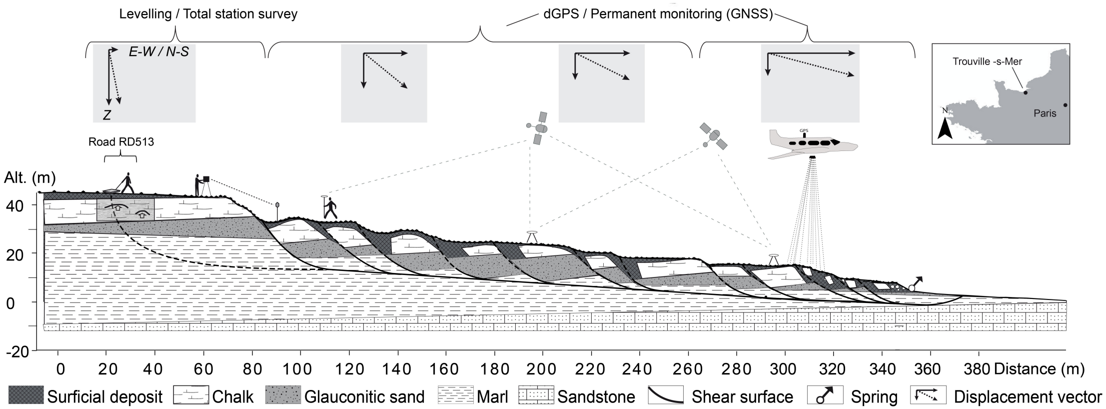

Fig. 1.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

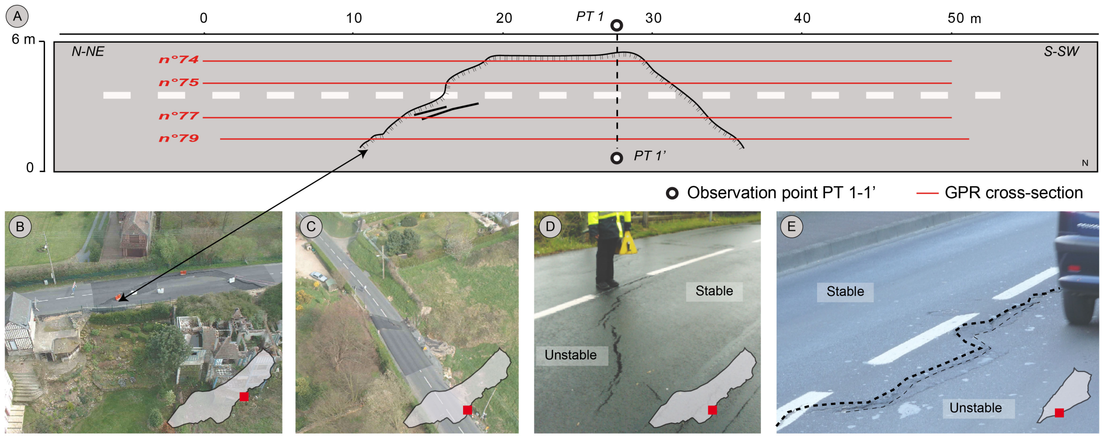

Fig. 2.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

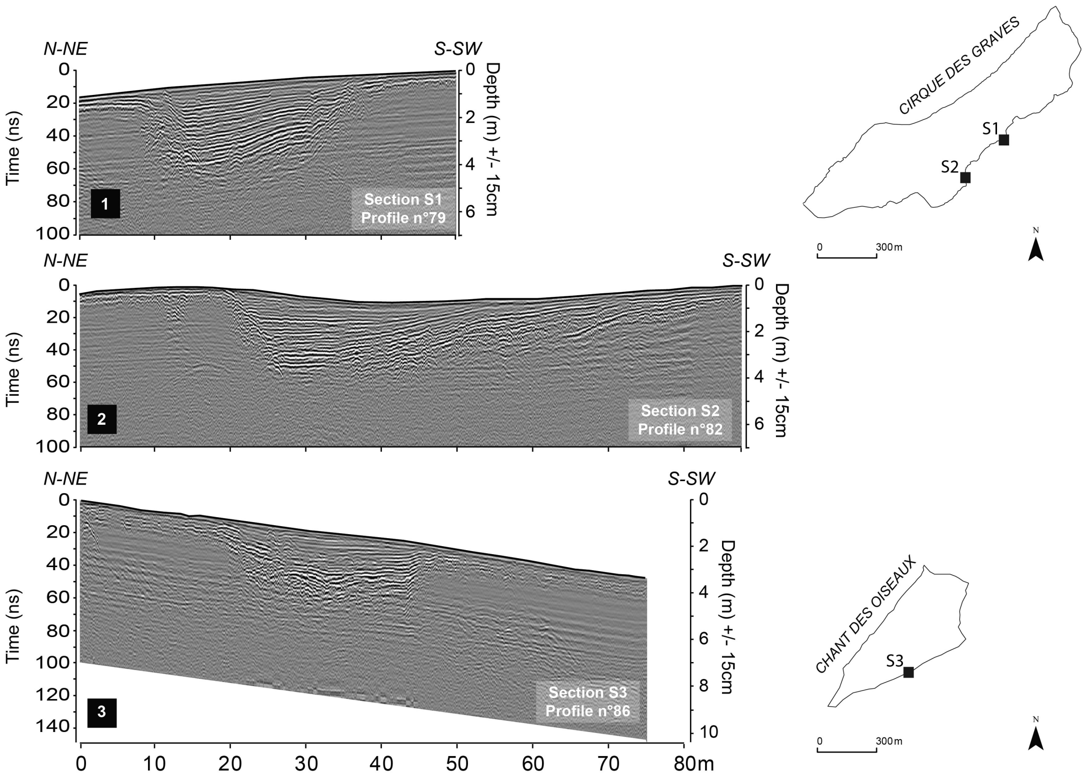

Fig. 3.

NHESSD

2, C3491–C3498, 2015

Interactive Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

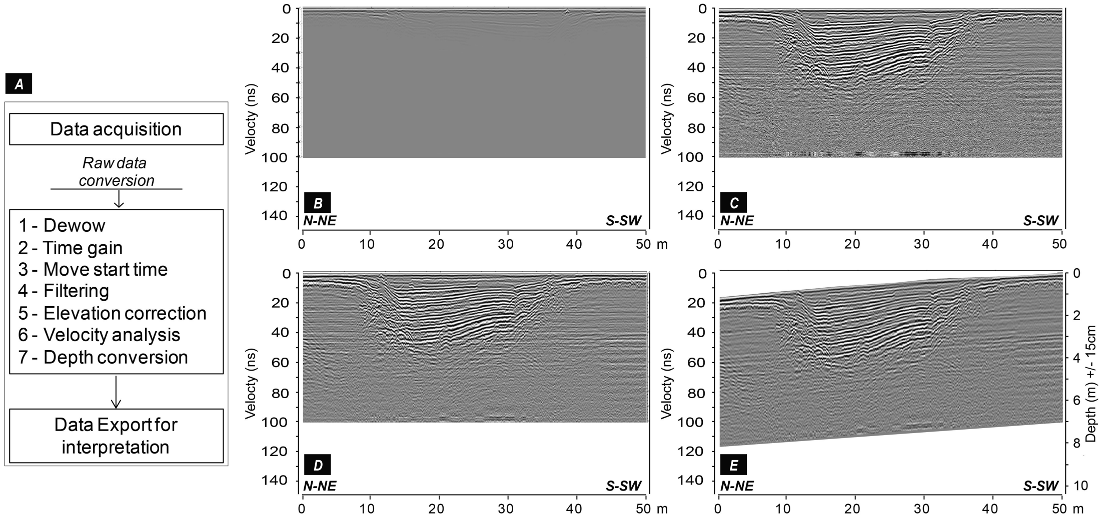

Fig. 4.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

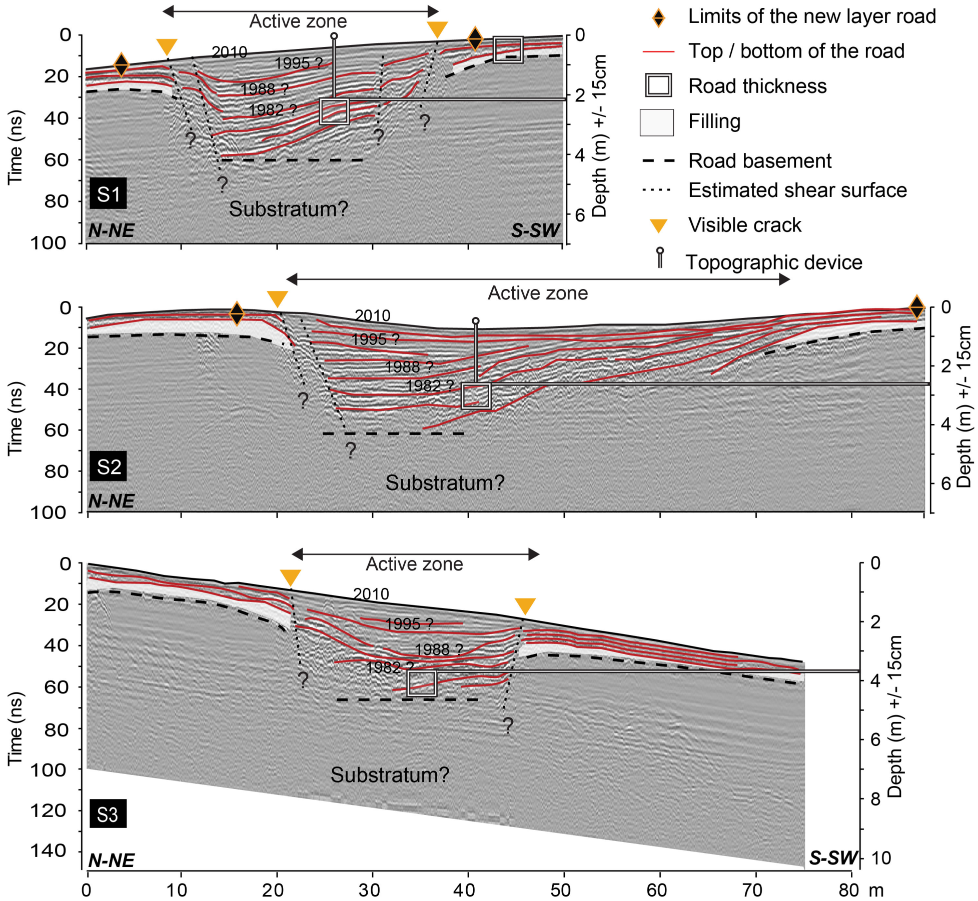
Active zone
Limits of the new layer road
Top / bottom of the road
Road thickness
Filling
Road basement
Estimated shear surface
Visible crack
Topographic device
2010
1995 ?
1988 ?
1982 ?
Substratum?
S1
S2
S3
N-NE
S-SW
Time (ns)
Depth (m) +/- 15cm
m

Fig. 5.