COMMENT TO THE AUTHOR C3284 - 2015

General comments:

1 - "I think the introduction could benefit from a little bit of extra information on the landslides - are they seasonal?"

The landslide motion is complex and associates a seasonal kinematic regime (subsidence of a few centimeters per year in springtime and autumn), an event-type kinematic regime with high acceleration of displacements (e.g. January 1982, 1988, 1995, 2001: several decimeters of subsidence per event), and deceleration periods.

2 - "The article mentions periods of accelerated retrogression, is it tied to increased precipitation or any other factors?"

Investigations at the Cirque des Graves landslide have demonstrated the control of rainfall inputs and groundwater fluctuations the observed amplitudes of displacement. The recent observations confirm that the seasonal kinematics with low amplitude of displacements is associated to low intensity rainfall periods and to a limited groundwater rise (+1m). While major acceleration events (return period of over 6/7 years) are associated to long-lasting rainfall periods (several month with particularly abundant winter rainfall amount) with high groundwater water level (+2m above the annual mean level defined for the period 1976-2013).

3 - "Lastly, one of the figure captions mentions information gathered from a witness - maybe this information could be in the introduction too."

"Since January 1982, the movements caused many damages and repairs of the road crossing the landslides"... Along the road RD 513 many fissures and cracks appear every year since 1982 because of the seasonal activity of the landslide. These fissures are regularly filled and no monitoring network have been implanted, since 1995, to measure the subsidence. Indeed, measurement of the road subsidence were possible between 1984 and 1995 with the use of a monitoring network implanted near the road. The device was destroyed in 1998, and then only punctual measurements, pictures and witnesses provide values of the road subsidence.

4 - "In addition, my understanding is that the primary measurements of movement in the landslide zone were of subsidence - i.e. vertical changes. Are there any horizontal changes?"

A first geodetic network, consisting in 87 topographic benchmarks, was initiated in December 1984 (Maquaire, 1990) and has been used between 1985 and 1988. Some of these benchmarks are still on-site and ensure the long-term continuity of observations. The acquisition of kinematics data over 84 benchmarks provided evidence of spatial differences in the kinematic pattern of sub-units within the landslides. The main direction of the landslide was perpendicular to the coast through the North. But a vertical component was also measured at the toe of the landslide and near the main scarp in upstream. We focus our paper on this vertical component only.

5 - " Fissures in the road surface are mentioned are there any measurements of widening?"

The cracks and fissures visible along the road are regularly filled by authorities. None permanent device, such as extensometer is possible, but the widening is punctually measured in winter season, between the appearance and filling cracks.
[page 7492] After the large failure event of January 1982 at the "Cirque des Graves" landslide, the authorities in charge of the road traffic installed a monitoring network on both sides of the road RD513. The monitoring network consisted of four fixed observation points (PT 1-1' at both sides of the cross-section S1; PT 2-2' at both sides of the cross-section S2; Fig. 2a). This monitoring network has been exploited to measure the road subsidence until 1995 when it was destroyed.

6 - "At the beginning of section 2.1 there's mention of low elevation - are there any slope measurements to add?"

At the toe of the upstream plateau, the slope range is 15 to 20%.

7 - "Regarding the GPR - time-depth conversion was mentioned, but not the dielectric constant. I think that would be helpful to add."

The definition of the velocity is based on the diffraction hyperbola analysis. The constant is consequently estimated between 4 and 5.

Comments in the manuscript:

Page 7490 line 15 - induced many damages is awkward sounding. --> *caused many damages*
Page 7494 line 10 reflectors till depth - until? confusing because till is a geological unit. --> *until*
Page 7494 line 15 - landslides needs to be landslides' I believe. --> *landslide's boundaries / landslides' boundaries*
Page 7496 line 7 failure - needs to be a plural --> *failures*
Page 7496 line 16 - complimented is a better word? --> *?? I don't understand*
Page 7496 line 22 - vertical or horizontal displacement? also decimeters? --> A*t the landslide head, major acceleration are characterized by several decimeters of vertical displacements*
Page 7496 lines 26-27 awkward sentence --> " Consequently, not so many slopes were investigated with this technique" --> Consequently, using GPR techniques remains difficult in this environmental conditions and few studies in complex hydro-geological context have been successful.

Figure 1 - rotational is misspelled --> rotational