Supporting Information for

**Could road constructions be more disastrous than an earthquake in terms of mass movement?**

**Hakan Tanyaş1, Tolga Görüm4, Dalia Kirschbaum2, Luigi Lombardo1**

1University of Twente, Faculty of Geo-Information Science and Earth Observation (ITC), Enschede, Netherlands

2NASA Goddard Space Flight Center, Hydrological Sciences Laboratory, Greenbelt, MD, USA

3USRA, Universities Space Research Association, Columbia, MD, USA

4Istanbul Technical University, Eurasia Institute of Earth Sciences, Istanbul, Turkey

Corresponding author: Hakan Tanyaş (h.tanyas@utwente.nl)



**Fig. S1** Google Earth scenes showing the pre- and post- road expansion conditions at a selected site (41º 16ʹ 24ʺ N and 41º 17ʹ 51ʺ E) representing the mass movements categorized as *Others*. The examined the segment of the road constructed between 10th September 2013 – 3rd September 2014. Landslides occurred between 18th November 2017 – 27th May 2018 and 20th March 2019 – 21st May 2019. The location of these mass movements is given at the lower right of the panel (a).



**Fig. S2** Google Earth scenes showing the pre- and post- landslide views at a selected site (41º 18ʹ 20ʺ N and 41º 20ʹ 14ʺ E), representing the mass movements that occurred along an existing road (i.e., *Pre-2010*). Mass movements occurred between 3rd November 2016 – 16th April 2017. The location of these mass movements is given in the lower right of the panel (a).



**Fig. S3** Google Earth scenes showing the pre- and post- landslide landscape at a selected site (41º 18ʹ 20ʺ N and 41º 17ʹ 58ʺ E) representing the mass movements triggered by natural agents (i.e., *No Road*). The landslide occurred between 17th July 2016 – 9th September 2016. The location of the landslide is given in the lower left of the panel (a).

**Table S1.** The satellite scenes used to create multi-temporal road and landslide inventories.

|  |  |  |
| --- | --- | --- |
| Source | Acquisition date | ID |
| RapidEye-5 | 09.25.2009 | 3758023\_2009-09-25\_RE5\_3A |
| 3758223\_2009-09-25\_RE5\_3A |
| 3758123\_2009-09-25\_RE5\_3A |
| 3758122\_2009-09-25\_RE5\_3A |
| RapidEye-5 | 11.09.2010 | 3758122\_2010-11-09\_RE5\_3A |
| 3758122\_2010-11-09\_RE5\_3A |
| 3758223\_2010-11-09\_RE5\_3A |
| 3758123\_2010-11-09\_RE5\_3A |
| RapidEye-3 | 10.21.2011 | 3758023\_2011-10-21\_RE3\_3A |
| 3758122\_2011-10-21\_RE3\_3A |
| 3758123\_2011-10-21\_RE3\_3A |
| 3758223\_2011-10-21\_RE3\_3A |
| RapidEye-5 | 05.29.2012 | 3758023\_2012-05-29\_RE5\_3A |
| 3758122\_2012-05-29\_RE5\_3A |
| 3758123\_2012-05-29\_RE5\_3A |
| 3758223\_2012-05-29\_RE5\_3A |
| RapidEye-2 | 06.26.2013 | 3758223\_2013-06-26\_RE2\_3A |
| 3758122\_2013-06-26\_RE2\_3A |
| 3758123\_2013-06-26\_RE2\_3A |
| RapidEye-2 | 09.10.2013 | 3758223\_2013-09-10\_RE2\_3A |
| 3758023\_2013-09-10\_RE2\_3A |
| 3758122\_2013-09-10\_RE2\_3A |
| 3758123\_2013-09-10\_RE2\_3A |
| RapidEye-4 | 09.12.2013 | 3758223\_2013-09-12\_RE4\_3A |
| 3758023\_2013-09-12\_RE4\_3A |
| 3758123\_2013-09-12\_RE4\_3A |
| RapidEye-1 | 07.11.2014 | 3758023\_2014-07-11\_RE1\_3A |
| 3758123\_2014-07-11\_RE1\_3A |
| 3758122\_2014-07-11\_RE1\_3A |
| RapidEye-3 | 09.03.2014 | 3758023\_2014-09-03\_RE3\_3A |
| 3758123\_2014-09-03\_RE3\_3A |
| 3758122\_2014-09-03\_RE3\_3A |
| 3758223\_2014-09-03\_RE3\_3A |
| RapidEye-3 | 05.20.2015 | 3758023\_2015-05-20\_RE5\_3A |
| 3758122\_2015-05-20\_RE5\_3A |
| 3758123\_2015-05-20\_RE5\_3A |
| 3758223\_2015-05-20\_RE5\_3A |
| RapidEye-3 | 09.03.2015 | 3758023\_2015-09-03\_RE1\_3A |
| 3758122\_2015-09-03\_RE1\_3A |
| 3758123\_2015-09-03\_RE1\_3A |
| 3758223\_2015-09-03\_RE1\_3A |

**Table S1.** (Continued)

|  |  |  |
| --- | --- | --- |
| Source | Acquisition date | ID |
| PlanetScope | 07.17.2016 | 20160717\_042959\_0d05\_3B |
| 20160717\_042759\_0c41\_3B |
| 20160717\_042800\_0c41\_3B |
| 20160717\_042801\_0c41\_3B |
| 20160717\_042955\_0d05\_3B |
| 20160717\_042956\_0d05\_3B |
| 20160717\_042957\_0d05\_3B |
| 20160717\_042958\_0d05\_3B |
| RapidEye-3 | 07.17.2016 | 3758023\_2016-07-17\_RE1\_3A |
| 3758123\_2016-07-17\_RE1\_3A |
| 3758122\_2016-07-17\_RE1\_3A |
| 3758223\_2016-07-17\_RE1\_3A |
| PlanetScope | 09.06.2016 | 20160906\_080327\_1\_0c65\_3B |
| 20160906\_080324\_0c65\_3B |
| 20160906\_080325\_0c65\_3B |
| 20160906\_080326\_0c65\_3B |
| 20160906\_080327\_0c65\_3B |
| PlanetScope | 09.08.2016 | 20160908\_071431\_0d06\_3B |
| 20160908\_071430\_1\_0d06\_3B |
| 20160908\_071430\_0d06\_3B |
| PlanetScope | 09.09.2016 | 20160909\_071400\_0e20\_3B |
| 20160909\_071358\_0e20\_3B |
| 20160909\_071359\_0e20\_3B |
| PlanetScope | 10.11.2016 | 20161011\_114552\_0d06\_3B |
| 20161011\_114552\_1\_0d06\_3B |
| 20161011\_114553\_0d06\_3B |
| PlanetScope | 10.22.2016 | 20161022\_072604\_0c19\_3B |
| 20161022\_072605\_0c19\_3B |
| 20161022\_072606\_0c19\_3B |
| PlanetScope | 11.03.2016 | 20161103\_090136\_0c0b\_3B |
| 20161103\_090135\_0c0b\_3B |
| 20161103\_090134\_1\_0c0b\_3B |
| 20161103\_090134\_0c0b\_3B |
| PlanetScope | 04.16.2017 | 20170416\_083914\_0c46\_3B |
| 20170416\_083914\_1\_0c46\_3B |
| 20170416\_083915\_0c46\_3B |
| PlanetScope | 06.09.2017 | 20170609\_072127\_0e30\_3B |
| 20170609\_072128\_0e30\_3B |
| 20170609\_072129\_0e30\_3B |
| PlanetScope | 07.26.2017 | 20170726\_072148\_0e30\_3B |
| 20170726\_072146\_0e30\_3B |
| 20170726\_072147\_0e30\_3B |
| PlanetScope | 09.04.2017 | 20170904\_072029\_103d\_3B |
| 20170904\_072030\_103d\_3B |
| 20170904\_072031\_103d\_3B |

**Table S1.** (Continued)

|  |  |  |
| --- | --- | --- |
| Source | Acquisition date | ID |
| PlanetScope | 09.18.2017 | 20170918\_071932\_0f42\_3B |
| 20170918\_071933\_0f42\_3B |
| 20170918\_071934\_0f42\_3B |
| PlanetScope | 10.19.2017 | 20171019\_072318\_0e26\_3B |
| 20171019\_072319\_0e26\_3B |
| 20171019\_072320\_0e26\_3B |
| PlanetScope | 11.18.2017 | 20171118\_072437\_0f4e\_3B |
| 20171118\_072438\_0f4e\_3B |
| 20171118\_072439\_0f4e\_3B |
| PlanetScope | 05.27.2018 | 20180527\_073042\_1025\_3B |
| 20180527\_073041\_1025\_3B |
| 20180527\_073040\_1025\_3B |
| PlanetScope | 06.28.2018 | 20180628\_073245\_0f17\_3B |
| 20180628\_073244\_0f17\_3B |
| 20180628\_073243\_0f17\_3B |
| RapidEye-3 | 07.24.2018 | 3758122\_2018-07-24\_RE2\_3A |
| 3758123\_2018-07-24\_RE2\_3A |
| PlanetScope | 08.27.2018 | 20180827\_073416\_0f15\_3B |
| 20180827\_073415\_0f15\_3B |
| 20180827\_073414\_0f15\_3B |
| PlanetScope | 09.25.2018 | 20180925\_071315\_103f\_3B |
| 20180925\_071314\_103f\_3B |
| 20180925\_071313\_103f\_3B |
| PlanetScope | 10.07.2018 | 20181007\_071157\_0f33\_3B |
| 20181007\_071156\_1\_0f33\_3B |
| 20181007\_071156\_0f33\_3B |
| 20181007\_071155\_0f33\_3B |
| PlanetScope | 11.09.2018 | 20181109\_073629\_1038\_3B |
| 20181109\_073628\_1038\_3B |
| 20181109\_073627\_1038\_3B |
| PlanetScope | 03.20.2019 | 20190320\_073854\_1035\_3B |
| 20190320\_073853\_1035\_3B |
| 20190320\_073852\_1035\_3B |
| PlanetScope | 05.21.2019 | 20190521\_063655\_100d\_3B |
| 20190521\_074307\_0f3f\_3B |
| 20190521\_074306\_0f3f\_3B |
| 20190521\_074305\_0f3f\_3B |
| 20190521\_063656\_100d\_3B |
| PlanetScope | 06.11.2019 | 20190611\_074120\_0f35\_3B |
| 20190611\_074119\_0f35\_3B |
| 20190611\_074118\_0f35\_3B |
| 20190611\_073955\_1021\_3B |
| 20190611\_073954\_1021\_3B |
| 20190611\_073953\_1021\_3B |

**Table S1.** (Continued)

|  |  |  |
| --- | --- | --- |
| Source | Acquisition date | ID |
| PlanetScope | 07.02.2019 | 20190702\_074207\_1024\_3B |
| 20190702\_074206\_1024\_3B |
| 20190702\_073441\_0e20\_3B |
| PlanetScope | 08.04.2019 | 20190804\_103007\_0f02\_3B |
| 20190804\_103006\_0f02\_3B |
| 20190804\_074420\_0f4e\_3B |
| PlanetScope | 09.25.2019 | 20190925\_075817\_42\_106e\_3B |
| 20190925\_074355\_0f35\_3B |
| 20190925\_074354\_0f35\_3B |
| PlanetScope | 10.02.2019 | 20191002\_061504\_100d\_3B |
| 20191002\_074426\_0f15\_3B |
| 20191002\_074425\_0f15\_3B |
| 20191002\_061505\_100d\_3B |
| PlanetScope | 11.09.2019 | 20191109\_074234\_1025\_3B |
| 20191109\_074233\_1025\_3B |
| 20191109\_074232\_1025\_3B |
| PlanetScope | 11.14.2019 | 20191109\_074234\_1025\_3B |
| 20191109\_074233\_1025\_3B |
| 20191109\_074232\_1025\_3B |
| PlanetScope | 04.13.2020 | 20200413\_074533\_1001\_3B |
| 20200413\_074532\_1001\_3B |
| 20200413\_074531\_1001\_3B |
| 20200413\_074530\_1001\_3B |
| PlanetScope | 04.17.2020 | 20200417\_054549\_0f4d\_3B |
| 20200417\_054548\_0f4d\_3B |
| 20200417\_054547\_0f4d\_3B |
| PlanetScope | 05.12.2020 | 20200512\_074305\_64\_106b\_3B |
| 20200512\_075632\_32\_105c\_3B |
| PlanetScope | 06.06.2020 | 20200606\_075039\_1026\_3B |
| 20200606\_075038\_1026\_3B |
| 20200606\_075037\_1026\_3B |
| PlanetScope | 07.07.2020 | 20200607\_074232\_100c\_3B |
| 20200607\_074230\_100c\_3B |