3. Results

3.1 Slope evolution from time lapse imagery

By using the images acquired every 10 minutes during ca. 2 years (~100,000 total pics), we have generated representative daily images by stacking good pics and excluding images with bad visibility. The images have been combined to produce a time lapse that is useful to follow the evolution of the rock mass during different temporal windows, and to identify and characterize different spatial domains (scan the QR code on the right and watch the time lapse in you tube!). In addition, we have also started to process the imagery using Digital Image Correlation (Manconi et al., 2018b; Bickel et al., 2018) to quantitavely measure surface displacement affecting the rock mass during several stages.

3.2 Rockfall catalogue

We have generated a preliminary rock fall catalogue by classifying events detected at the station R5-2 (see position in Fig 1). The automatic detection of events was performed using a standard STA/LTA approach and the classification performed with visual interpretation of both waveforms and spectrums to distinguish between mid, local and regional earthquakes, teleseisms, and unknown events. This initial catalogue is composed of ~3,500 events for the period 01-Jul-2017 and 15-Mar-2019.

3.3 Analysis of Seismic Energy Release (SER) vs. Surface Displacements

Fig. 4: (Left) The analysis of the catalogue shows that the distribution of the seismic energy release changes depending on the calendar season. Here we consider for each event the integral of the squared velocity, which is proportional to the seismic energy release, e.g. Hibert et al., 2017 for reference). The number and distribution of the events recorded during two winter periods are very similar. In addition, despite the number of events increases during spring 2018 due to the reaction to snowmelt, the number of seismic events decreases significantly. Some increase on seismic activity is also observed during rainfall events.

4. Outlook

We presented here the initial results of the analysis of a large dataset recorded during ~2 years on the Moosfluh slope instability. Despite preliminary, the information obtained combining data recorded by multitemporal terrestrial imagery and local seismic stations already provides interesting insights on the evolution of the rock mass in the period 2017-2019. Further work is aimed at a progressive validation and integration of the two datasets in order to consolidate our understanding on progressive spatial and temporal evolution of the rock mass disintegration over several stages.

References

Babich et al., 2016: Rendiconti della Societa Geologica Italiana 85, 328-330; Manconi et al., 2018a: Remote Sens., 10, 672; Strozzi et al., 2010: J. Geophys. Res. 2010, 115...