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The role of earthquake triggered and climatic driven landslides in sediment transport and dispersal in an active graben: The case study of 1913 Krathis River landslide event, N. Peloponnese, Greece

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Landslides can form hazardous natural dams either triggered by earthquakes or by climate – driven phenomena. Landslide damning of river courses has sensible effects on mountain valley morphology both upstream and downstream the dam site. In March 1913, an area of almost 1650 square kilometers from the foot wall of an active fault collapsed and formed a rapid rock slide debris along the trace of the fault scarp. The rock slide moved down-slope at a speed of about 60 km/h, burying one village, impounding two lakes and restraining the Krathis River flow. Newspapers of the period documented a massive flood almost 10 months after the landslide event caused by the filling and overtopping of the in-stream lake, resulted in the catastrophic fail of the dam. The catastrophic breaching caused a downstream flood that traveled over 15 km north, towards the Gulf of Corinth and estimated rise in river level of 1.5 m in the delta plain. The off-stream Tsivlos Lake is still preserved and reaches a maximum depth of 80 m. However, during the outburst flood event the in-stream lake preserved some of its water volume after 1914 flood and some remnants can still be noticed close to the Krathis active river bed until today. The origin of the massive landslide event is under further research. We suggest as a triggering factor of the landslide a combination of seismicity few days before the manifestation of the landslide and heavy rainfalls.
The example of 1913 landslide event shows that active tectonics influence the landslide travel path constraining the debris movement parallel to the active fault trend. The case of Krathis River impoundment is significant because it combines the creation of a natural dam lake and the catastrophically short term outburst of a lake. Other mountain valleys of N. Peloponnese are similarly characterized by strong seismicity due to a dense pattern of active normal faults that dominates the tectonic evolution of the area and thus, can be optimal sites for landsliding, especially earthquake induced, resulting in landslide damning. Therefore, this case study consists an excellent opportunity for investigating the way that landsliding affects sedimentation rates through river dispersal in an area of high seismicity and mountainous topography.