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Control of the inherited glacial morphology of the post-glacial slope destabilization. The western Romanche valley case study (French western Alps)

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In the main Alpine valleys, the chronological constraints about the onset of the slope movements following glacial retreat are scarse. The western part of the Romanche valley (French western Alps), carved in the micaschists of the Belledonne Massif, is affected by numerous slope destabilizations. A detailed geomorphological study using a high resolution LIDAR digital model elevation coupled with cosmogenic 10Be dating provide a regional view of the dynamics of slope destabilization in this area. Our data show the presence of two contiguous gravitational movements with two distinct kinematics. The Faulaurent landslide, located to the east of the valley, corresponds to a massive slope collapse (volume > 400 hm3) following the total downwastage of the Romanche glacier near 16 ka. In contrast, the Séchilienne landslide (60 hm3), located to the west, shows a progressive and continuous slope destabilization activity since 8 ka. Our dataset coupled with recent sub-surface geophysical investigations allow to propose a new scenario of the post-glacial slope destabilization of valley involving a major control of the inherited glacial morphology.