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Geological and structural interpretation of Åknes Landslide

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Åknes is an active complex large rockslide of about 30-40 million m3 located within Proterozoic gneisses of Western Norway. This rockslide is on of the most intensively monitored site in the world since 2004. The mechanism understanding is crucial to implement a suitable monitoring system. The new data allows refining the conceptual model of this landslide. The observed surface displacement indicate that this rockslide is divided in several blocks moving in different directions at different velocities ranging from 3-10 cm/year. Detailed inspection by field surveys and LiDAR digital elevation model analysis indicate that the movements and the block geometry are controlled by structural features such as main schistosity (S1), folds, joints and faults. Most of the sliding surface reactivates S1. The variation in orientation of S1, by folds and undulation creates change in sliding direction. The main folds are crossing obliquely the landslide body, making S1 vertical near the hinge zone. Vertical S1 creates favourably orientated planes to be opened that lead to the creation of extension failures acting as back cracks. In the top of the landslides the opening of such a fracture creates a trench approximately 30 m wide. The blocks are laterally delimited by sub-vertical faults acting as transfer surfaces. The sliding surface is not continuous, it is stepped by a sub vertical joints perpendicular to the main direction of sliding, that have been clearly identified on topography in the vicinity of Åknes landslide. The landslide is limited by two kilometric faults. This interpretation gives a coherent framework of the movements obtained by various methods. In addition, this model leads to a reinterpretation

of the morphology, indicating that in the past several rockslides occurred. They can be related to scars exactly located at sub-vertical S1 in the folds hinges. The question is now to define where the next blocks will accelerate.