# Risk management of the gravity driven processes in the Romanche valley

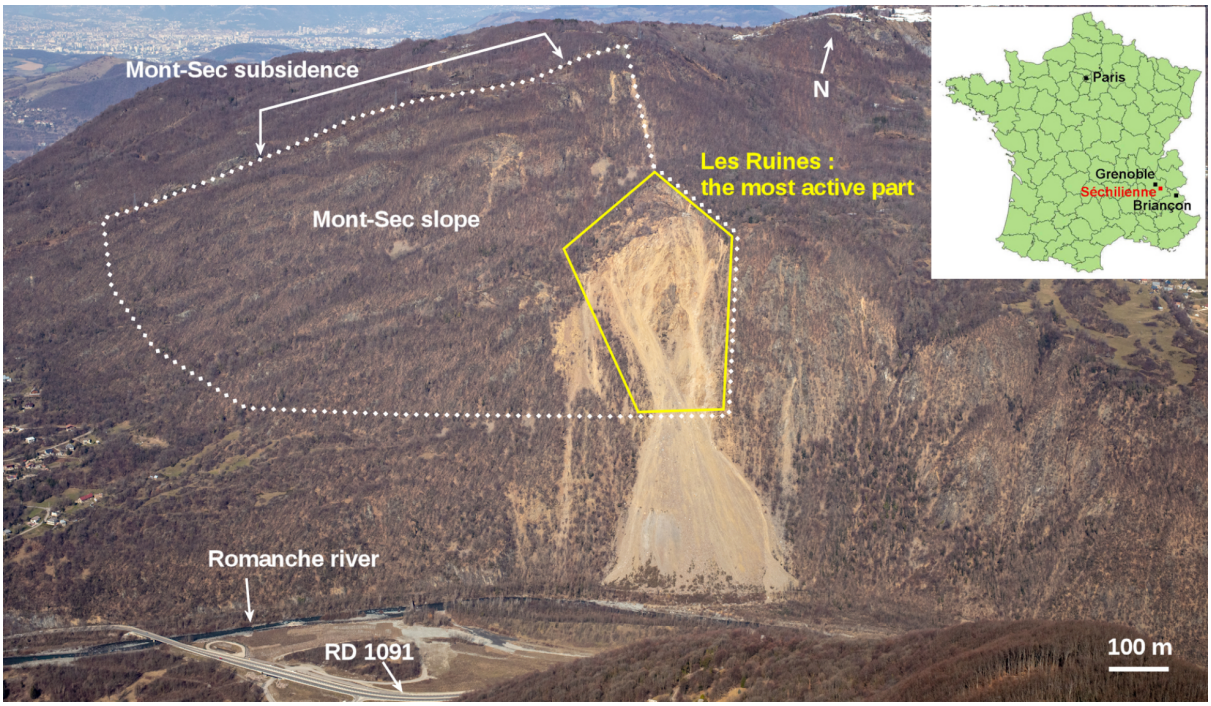
*Topic*: Protection of the stakes of the Romanche Valley (houses, roads, hydroelectric development, industries) against multiple hazards (slope movement, landslides,rockfalls, avalanches, ...)

*Stakes:* Ensure the safety and maintain the activity of the Romanche Valley

*Key words:* geology, slope movement, monitoring, rockfalls, protection works, multi-hazards, multi-stakes

**Stop 1 : Séchilienne landslide**

This mountainous slope of the Belledonne massif in Isère displays a large-scale instability that tended to increase in the early 1980s. Public safety authorities have been monitoring the site since 1985 to anticipate a potential catastrophic failure of all or part of the slope movement that could reach the stakes at the bottom of the valley (RN91, Romanche, homes in the hamlet of Ile-Falcon). Within the slope movement, there is a zone with higher surface displacement velocities (up to 4.5 m/year in 2013). This zone concerns a volume of more than 3 million m³ of highly fractured micaschists. Although the surface displacement rates have slowed down significantly since the end of 2013, the likely evolution scenario still envisages the rupture of the frontal zone in several phases within a timeframe that cannot be precisely estimated today.




Séchilienne landslide

**Stop 2 : EDF Romanche hydropower plant**


Protection works on the cliff above Romanche hydropower plant

EDF Romanche project is the largest hydropower plant in France since 2011. 6 old stations (60 years) are renewed on 13 km of river upstream from Grenoble. With €250 million and 92 MW power, it consists of a gallery under the Belledonne mountain range, and a restitution plant below a subvertical cliff. Preliminary works was necessary above the 3 zones in order to protect the sites and ultimately the operating traffic (requiring scaling, anchoring, deflector nets, rockfall barriers, embankments…). The particularity of these countermeasures lies essentially in the size of the surfaces treated (25,000 sqm2 of nets, 4,000 m of anchors, 10,000 m of barriers, 200 m of embankments) with singular exposure and accessibility onto the site.