



## **Protection of a French highway against rockfalls in volcanic and tropical conditions**

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The Reunion island is a French volcanic island situated in the Indian Ocean. This island with landscapes of paradise is very attractive, consequently with very high population density due to permanent inhabitants and tourism. In the same time, a complex volcanic geology limits available areas for settlements and transport infrastructures. One direct consequence of this situation is the construction of the main highway of the island in the 70s directly close to the ocean and below several-hundred meters unstable cliffs. This "Route du Littoral" (littoral road) with its four lanes is also directly subjected to rock-falls for more than ten kilometres and regularly, accidents are to be deplored. To limit risk, some special procedures are applied to the traffic, closing some lanes depending on the rain accumulation level that has a direct influence on the cliffs activity. But, this can not be satisfactory especially for a road supporting more than forty thousands cars a day. After previous protection works in the 90s, a new geological analysis based on rock-falls statistics, defines zones to be treated in priority. Two main protection techniques are foreseen: The first one consists in applying nets directly to stabilise particular cliffs parts to prevent rock drops (active protection). The second one is based on the installation of hanging nets to canalise falling rocks to the bottom of the cliff and prevent them to gain speed and prejudicial rebounds (passive protection). Finally, more than 400 000 square meters of metallic nets are to be installed against these volcanic cliffs. In parallel, technical specifications are developed, based on tension tests using a specific test machine to define nets mechanical characteristics and to choose the best products among fabricants proposals. The problem is to find the best compromise between the protection function of these nets and works and terrain constraints. This selection allows us to test a lots of nets types : this database is also available to better understand nets behaviours and resistance to improve the use

of metallic nets against rock-falls in the future.