Geophysical Research Abstracts, Vol. 9, 03642, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-03642

Characterization and age dating of coastal cliff collapse in southeast France

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The aim of this study is to understand retreat processes of coastal cliffs and evaluate their tsunamogenic potential. The Cap Canaille cliff, located about 25km south of Marseille is considered as the highest coastal cliff in Europe, with 394 m of limestone and sandstone facing the Mediterranean Sea. Several morphological evidences such as decametric blocks at the base of the cliff suggest that a major collapse might have happened in the past. Detailed analysis of aerial pictures, bathymetry and digital elevation model (DEM) show the lateral extent of collapsed areas, and allow us to estimate that the last largest collapse affected about 5 millions m3. Since most of this volume dropped into the sea, it is likely that it created a local tsunami when it occurred. Modelling of the coastal run-up that could be expected, based on the local bathymetry, is in progress. In an attempt to determine the age of the last cliff collapse, Cosmic Ray Exposure (CRE) dating of the present cliff and of surfaces of collapsed blocks were performed, 36Cl being used for calcareous lithologies, whereas 10Be is used for silicated lithologies. First CRE ages obtained on the studied collapsed blocks range from 2 000 to 3 000 years B.P. Furthermore, 14C dating of coals collected in the fine material of the debris slope deposit are in progress. The CRE dated collapsed blocks are in addition used to develop and calibrate a new paleomagnetic dating method based on a secondary magnetization: the viscous remanent magnetization (VRM) which allows constraining the rotation history of the studied samples.