SEISMOLOGY@SCHOOL
COURSE PROGRAM

Hes-so Valais-Wallis
Aula François- Xavier Bagnoud
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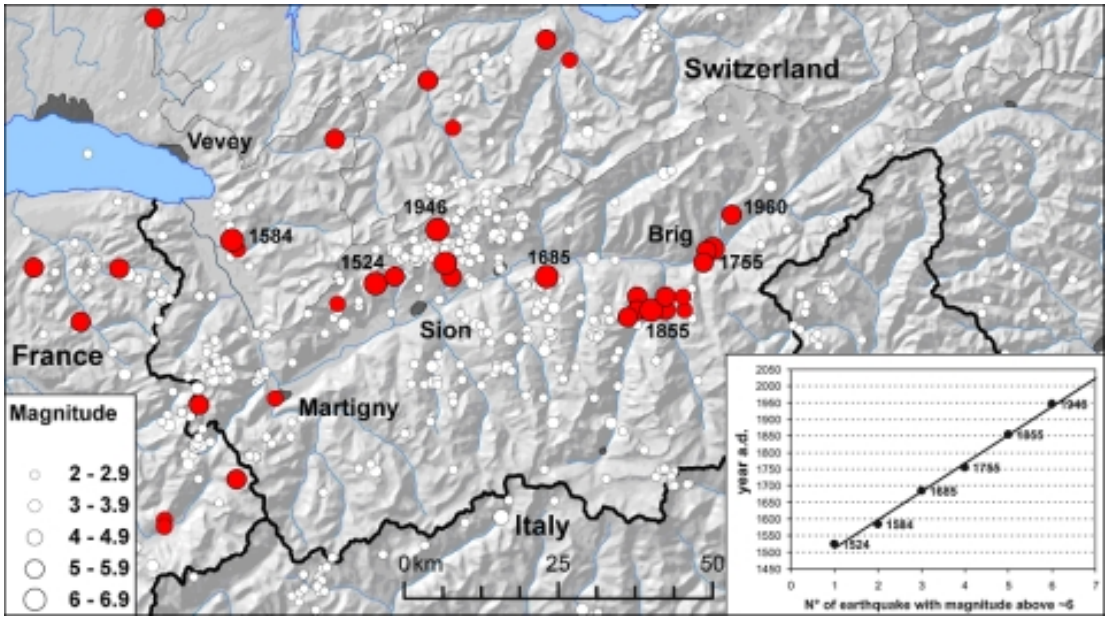
Earthquakes in Switzerland seriously threaten society and human beings. Although damaging earthquakes are rare when compared to more seismically active regions, such events have occurred and will continue to do so. Over the past 700 years, a total of 28 events of a moment magnitude Mw≥5.5 are known, twelve of which caused severe damage (Intensity of VIII or higher).

Moderate to high seismic risk in Switzerland results from high population density and high degrees of industrialization, as well as from low preparedness. Since earthquakes strike generally without warning and exhibit relatively long return periods of strong ground shaking, the best preparation modern society can achieve is to upgrade the building stock, infrastructure and critical facilities so that damage is minimized. The input for all measures of risk mitigation is assessment of the different hazards associated with earthquakes through advanced technology.

Large earthquakes in the Valais and the timing of magnitude 6 or larger historical events



The Valais is the area of greatest seismic hazard in Switzerland and has experienced a magnitude 6 or larger event every 100 years (1524, 1584, 1685, 1755, 1855, 1946), with the last magnitude 6.1 earthquakes in 1946 close to Sion and Sierre (Figure 1). This area and in particular the region of Visp hold special interest: on average the Visp region has been struck by damaging earthquakes every 40 years (Intensity VI-VIII), with the last in 1960 reaching a macroseismic intensity of VIII. The Visp event of 1855 was the largest in Switzerland for the last 300 years. Besides its seismic activity, the test area in the Valais is characterized by several factors adding to the total hazard level: rough topography, unstable and steep slopes, deep sediment-filled valleys, and wide glacier- and snow-covered areas. On the one hand, during the Brig event (Mw=6.1) in 1755, the Visp event in 1855 (Mw=6.4) and the Sion/Sierre event in 1946 (Mw=6.1) the area experienced great damage from earthquake ground motion and different secondary phenomena such as liquefaction in the Rhone plain, landslide reactivation and extended rock fall. On the other hand, we expect that smaller and more frequent earthquakes induce large ground motions locally, as well as small-scale movements and failures on critically stressed slopes. Earthquakes also degrade rock

mass strength and thus add to landslide preparation.

Due to river regulations and engineering progress in the last two centuries, seismically unfavorable sites have become attractive for expanded settlement and industries. During the last century, many villages grew into the Rhone plain and expanded near hazardous slopes in the valleys. They are still growing. Future earthquakes will therefore cause more damage than was observed in the past. For this reason we must recognize and map potential areas, estimate ground motion and non-linear behavior for engineers and planners, and provide adequate estimates for the building code.