Press release, 26 January 2021

Earthquakes in Switzerland in 2021

Last year, the Swiss Seismological Service (SED) at ETH Zurich recorded just over 1,100 earthquakes in Switzerland and surrounding areas. This figure is slightly down on previous years, due in part to the fact that no major earthquake swarms occurred in 2021. At the same time, the number of quakes having a magnitude of 2.5 to 4.1 was above the long-term average.

Since 1975, an average of around one earthquake with a magnitude of 4.0 and above has occurred each year; 2021 saw a higher than average number of such quakes, with three striking in that year alone. The first quake at this magnitude shook the area around the Furka Pass on 1 July last year. Its impact was mainly felt to the north as far as Zurich and Schaffhausen, as evidenced by the more than 900 felt reports received. By contrast, the magnitude 4.1 earthquake that occurred on 5 October near Arolla (Valais) was reported by only a few people, almost exclusively within the canton itself. This quake was part of an earthquake sequence that became active again in September 2020. The same area had already experienced a similarly strong quake in 1996. In Valais, the earthquake swarms near Saint Léonard and the Sanetsch Pass continued to be active and also resulted in some noticeable quakes so did the one in canton of Vaud near Les Diablerets.

The third quake having a magnitude greater than 4.0 occurred on 25 December in the Ajoie region (Jura). It was primarily felt in the Jura, though there were some reports from the western Swiss Plateau as far as Lausanne, Bern, Lucerne and Zurich. The main quake with a magnitude of 4.1 was followed by two equally noticeable aftershocks having magnitudes of 3.5 and 3.2. While Valais is well known as an earthquake region, the Jura quakes make it clear that all of Switzerland is earthquake country. Although the last quake of this magnitude in the Ajoie region occurred more than a century ago, making them rather rare, they are not unexpected.

As a long-term average, 24 quakes with a magnitude of 2.5 or more occur in and around Switzerland each year. In 2021, this number was slightly higher (32). Felt reports from members of the public were received for 52 of these quakes, with 10 each eliciting observations from over 100 people. The SED received the most reports from the public (approx. 1,100) for the magnitude 2.8 and 3.2 earthquakes occurring near Bern on 3 February and 15 March, mainly owing to the high population density in the vicinity of the hypocentre. Quakes in adjoining parts of neighbouring countries are also significant for determining Switzerland's seismic hazard. An earthquake with a magnitude of 4.4 that hit Bergamo (Italy) on 18 December was felt mainly in Ticino and some parts of Valais, Grisons and Central Switzerland. The SED received around 1,000 reports about this quake.

In addition to natural earthquake activity, the SED's seismic network also records tremors triggered by humans. Though most of these are explosions, some are man-made earthquakes. Physically speaking, the latter are no different from natural quakes but there are reliable indicators as to whether a quake is man-made (e.g. its exact place of origin in the subsurface, the temporal and spatial correlation with the stress changes sparked by humans). As such, it is vital that these interventions be monitored through a dense network of seismic stations.

To this end, the SED has expanded its network at various sites in Switzerland. The SED currently supports the seismic monitoring of five deep geothermal projects in Switzerland as well as ETH Zurich's BedrettoLab. The SED also runs a condensed seismic network in northeastern Switzerland on behalf of Switzerland's National Cooperative for the Disposal of Radioactive Waste

(Nagra) with a view to better understanding the subsurface and seismic activity at potential sites for final repositories of spent nuclear fuel. More than 200 stations throughout Switzerland continuously transmit their measurement data to the SED, making it possible to record all earthquakes having a magnitude of 1.5 and above – a value well below the perception threshold. In areas where it is particularly dense, the seismic network can record even smaller earthquakes.

For additional information

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The **Swiss Seismological Service (SED) at ETH Zurich** (SED) at ETH Zurich is the federal agency responsible for monitoring earthquakes in Switzerland and its neighbouring countries and for assessing Switzerland's seismic hazard. When an earthquake happens, the SED informs the public, authorities, and the media about the earthquake's location, magnitude, and possible consequences. You can find further information at:

www.seismo.ethz.ch