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Earthquakes in Switzerland in 2020

2020 was a busy and yet also a quiet year for Switzerland's seismic network. Last year, the Swiss Seismological Service at ETH Zurich recorded 1,400 earthquakes in Switzerland and its neighbouring countries. This is slightly more than would have been expected based on the long-term average. 'Felt reports' (i.e. reports of having felt an earthquake) from members of the public were received for 106 of these quakes, with over 100 people submitting their observations about seven of them. At the same time, though, the levels of background noise logged by the seismic network were exceptionally low in 2020. The recorded data show that these fell sharply in many locations, especially during lockdown.

The largest earthquake and most of the felt quakes formed part of an earthquake sequence near Elm (in the canton of Glarus), which was particularly active in both spring and autumn. An initial relatively strong earthquake, with a magnitude of 3.1, shook Glarus on 26 May 2020, and was followed by dozens of smaller aftershocks. On 25 October, the same fault system saw Switzerland's largest earthquake of the year with a magnitude of 4.3, which was felt as far away as Ticino and Lake Constance. No significant damage was recorded. Again, this was followed by more than 250 aftershocks, some of which could also be felt over a wide area, with magnitudes of up to 3.9. In total, there were over 350 earthquakes in this sequence. Largely because of these events, 2020 was an above-average year in terms of the number of quakes.

While the Elm sequence mainly affected German-speaking Switzerland, on 23 June an earthquake with a magnitude of 3.8 near Vallorcine in France prompted a lot of felt reports from French-speaking western Switzerland. Meanwhile, residents of Italian-speaking Ticino experienced a quake with a magnitude of 3.9 that had its epicentre near Milan in Italy, and another of 2.9, close to Bellinzona (in the canton of Ticino itself). Another relatively strong quake with a magnitude of 3.5 occurred on 9 November to the south of Arolla (canton of Valais) in the Swiss-Italian border region. The fact that relatively strong earthquakes can be felt far from their epicentre was shown by a magnitude-6.3 quake in Croatia, which caused significant damage in the area of its epicentre. In Switzerland, around 600 kilometres away, more than 30 people noticed and reported tremors associated with this event. Most of them were on the upper floors of relatively tall buildings at the time of the quake. For earthquakes such a long distance away, Switzerland mainly feels the long-period waves, which can rock high-rise buildings in particular.

When the more than 200 seismic stations in Switzerland are not recording the waves of an earthquake, they are measuring what is known as 'background noise'. As well as natural vibrations, triggered by storms or movements of the sea, this noise is mainly influenced by human activity such as traffic. Only general movement patterns can be detected with seismometers and not, for example, the movements of individual people or vehicles. The lockdown in March and other measures to contain the coronavirus led to a marked decrease in this background noise. This was the longest ever recorded period of lower levels of such noise. Normally, such lulls are only seen at weekends or on public holidays.

Looking at the trend for daily background noise at four locations (see graphics attached), we can see a clear decrease in each case as a result of the lockdown introduced in Switzerland on 16 March 2020. At the end of this unprecedented situation in mid-June, there is a resurgence in the levels of such noise. The background noise recorded by seismometers is unique at each station and depends, for example, on how far away certain sources of noise are. At Kleine Schanze in

Bern and Zurich's Kasernenareal, the decline as a result of the lockdown is less pronounced than elsewhere. This has to do with the fact that both of these sites are further away from busy roads than others. The smaller, recurring fluctuations that can be seen at all locations reflect differences between weekdays and weekends. This means that, even during the lockdown, background noise at the weekend was lower than from Monday to Friday.

Today 75 years ago Switzerland's last major earthquake occurred

It was already dark on 25 January 1946 when a violent earthquake with a magnitude of 5.8 shook Valais. Four people were killed, many were injured and 3,500 buildings were damaged, some of them severely. It took some time for the full extent of the quake to become clear. This was not only to do with the time at which the earthquake struck, but also with the scale of the damage and the options available at the time for evaluating seismic data. As well as causing damage to buildings, much of which only became apparent in daylight, the earthquake triggered avalanches and rockslides. In addition, the data from the few seismographs in Switzerland had to be read and analysed manually. Collecting 'felt reports' and damage reports was just as laborious, and such reports were more important back then due to the small number of instrumental records. This was the biggest Swiss earthquake in the past 150 years and the last one to claim lives. Could such an earthquake happen again and what would its impact be today?

To learn more, visit: www.seismo.ethz.ch/home/#news

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:

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