

# Start of continuous recordings of the activity and migration behaviour of bats on a south-west exposed mountain flank near Jungfraujoch

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## 1. Project description

At least four bat species are known to perform seasonal migratory movements in Europe over distances of up to three thousand kilometers. Like seasonally migrating birds, these movements occur in autumn from NE to SW and in spring in the opposite direction, a flight direction more or less vertical to the January isotherms.

It has only recently been discovered that this migration also involves overcoming altitudes of at least 3470 m above sea level (Zingg & Bontadina 2016). As with birds, only a minority of migrating bats overcome such high altitudes. In view of the risks involved, there must obviously be circumstances where the advantages outweigh the disadvantages.

To our knowledge, the Jungfraujoch (JFJ) is still the highest of the sites where bat migration is studied.

We are currently interested in which bat species cross the JFJ in the bat season from spring to autumn and at what times. This species time pattern is likely to vary from year to year depending on the weather. We are therefore interested in a complete data collection from spring to late autumn. In 2019 we identified a location at the research station where an acoustic bat monitoring with a specialized bat detector (batlogger) can be operated continuously outside the building, with alternating current from the grid, and without maintenance.

From 9 June to 5 November 2019 we were able to successfully operate the batlogger every night from sunset to sunrise. The batlogger's software sent us daily functional checks of the various system units via an integrated GSM/GPRS module.

## 2. Results

From 9. June to 5. November (149 nights) a total of 20'503 events were triggered. The sensitive ultrasound microphone of the batlogger was exposed to harsh conditions: strong winds, rain and snowfall have led to the fact, that the batlogger, despite an acoustic filter, recorded a high incidence of interferences.

Many of these "interfering signals" have sound character and were therefore erroneously identified as bat calls and assigned to bat species by the specialised analysis software BatScope (BatScope 4.11; www.batscope.ch, Obrist & Boesch, 2018).

As a result, all the 20'500 sequences have to be viewed manually to identify the bat calls. This time-consuming work is not yet finished. However, the proportion of sequences with bat calls will reach less than 2%!

Nothing is more constant than dynamics; this is also true for bats migrating across the JFJ. Already in the last half of June, shortly after the start of the measurements (9.6.2019), bats were crossing the JFJ during eight nights.

In July there were even 12 nights with bat call sequences recorded. With Savi's pipistrelle bat *Hypsugo savii* we identified another rare bat species that had not been recorded on the JFJ in previous years. On October 27, 2019, the batlogger apparently recorded the last evidence of bats flying over the JFJ for this measuring period.

## 3. Preliminary conclusions

The bat records in the second half of June and the first half of July cannot be explained by migration, as hitherto no migration behaviour of bats has been demonstrated in Europe during this period. However, the call sequences recorded in June and July also do not contain any evidence of hunting behaviour, which would be expected during regular foraging bouts.

We must assume that the effects of climate change will also influence the wide ranging migration behaviour of bats and will change it over time. A future seamless data collection of passing bats at least at one site on the JFJ would therefore be of high interest. Currently we are considering improvements to reduce the recording of false positives. At the same time, we are preparing for an early start of the measurements already in March 2020 to be ready when the first bats emerge their hibernation sites.

**References**

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