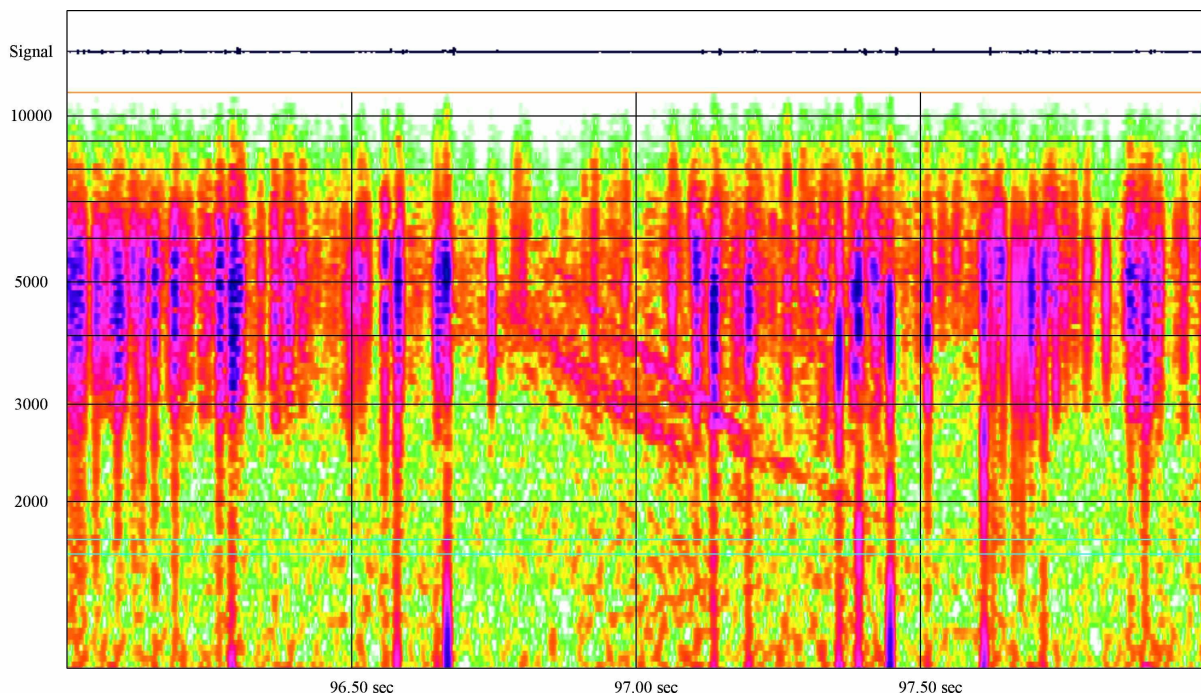


Report from the beach

10 aug. 2009,
Joachim Köppen, Kiel

Being still a bit jet-lagged from the trip to California, I took to the beach on the Baltic Sea. On my way along the beach, I stopped at places, listened to the concert of spherics, lay in the sand, looked at the sky and just did nothing. I passed by the holiday camp of Kalifornien (with the proper California state flag flying) in the late afternoon, but still nothing interesting could be heard on VLF. Finally I arrived at Schönberger Strand, where the dyke and the long stretch of sandy beach end. As this is quite far away from power lines and other noise-producing civilisation, it is one of my favourite listening spots.

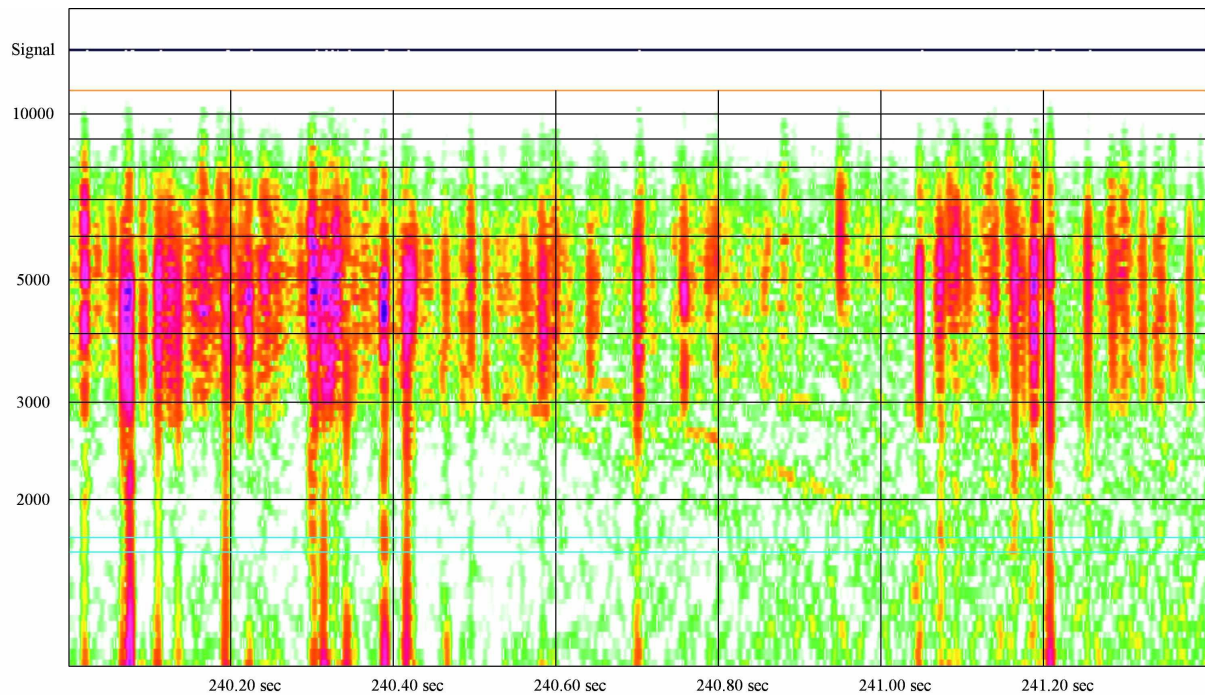
There were greyish clouds in the sky, but the predicted showers had not appeared. As sunset approached, the first tweeks could be heard, and the spherics had become louder and more crashy than at midday. Probably there were thunderstorms somewhere. Then I thought that I heard a faint swishing sound, and I turned on the tape recorder. Soon – at 1956 CEST – I got the first whistler (here shown in inverted colours of the screenshot):



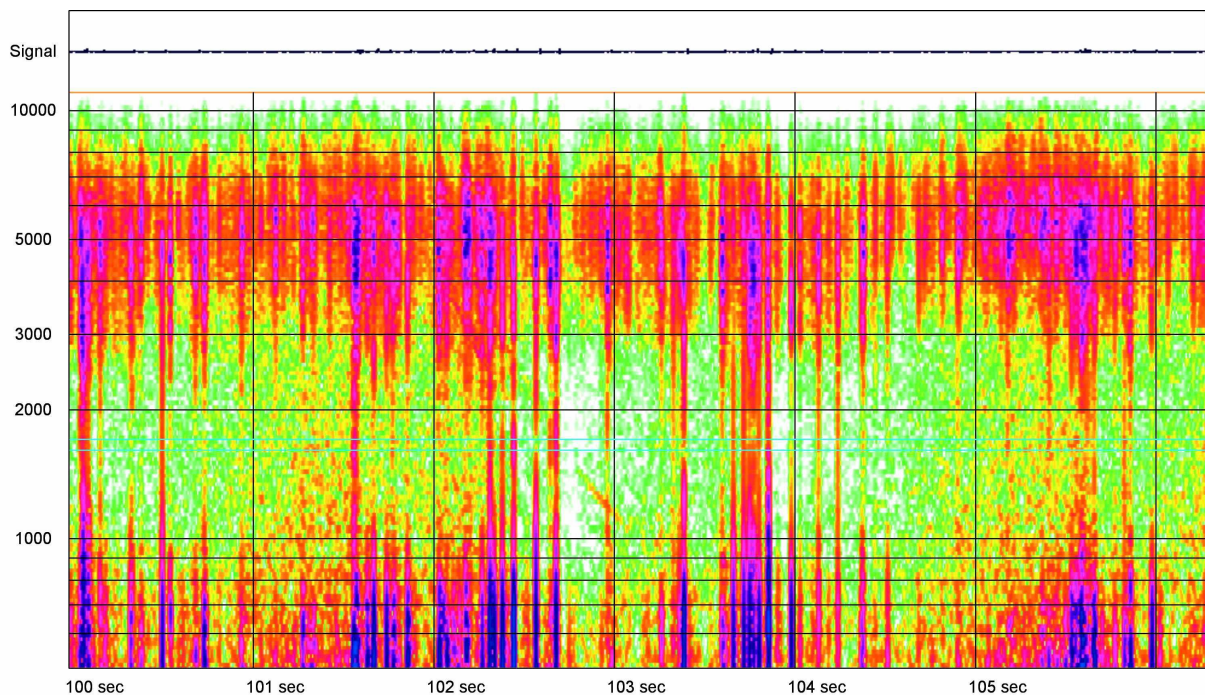
In this screenshot I use the logarithmic scale for the frequency axis, running from 1000 to 11000 Hz. This display mode is useful for whistlers, as their frequency drops nearly as the square root of the time; hence they show up as nearly straight lines, going down with a certain slope, which can easily be measured.

A group of several whistlers, which started at 6 kHz, took about 0.5 seconds to go down to 2 kHz. This speed is typical in Europe for single hop whistlers southern Africa. I had observed this kind just the day before, so I was curious whether the propagation conditions were such as permitting European thunderstorms to create whistlers which one would hear as double-

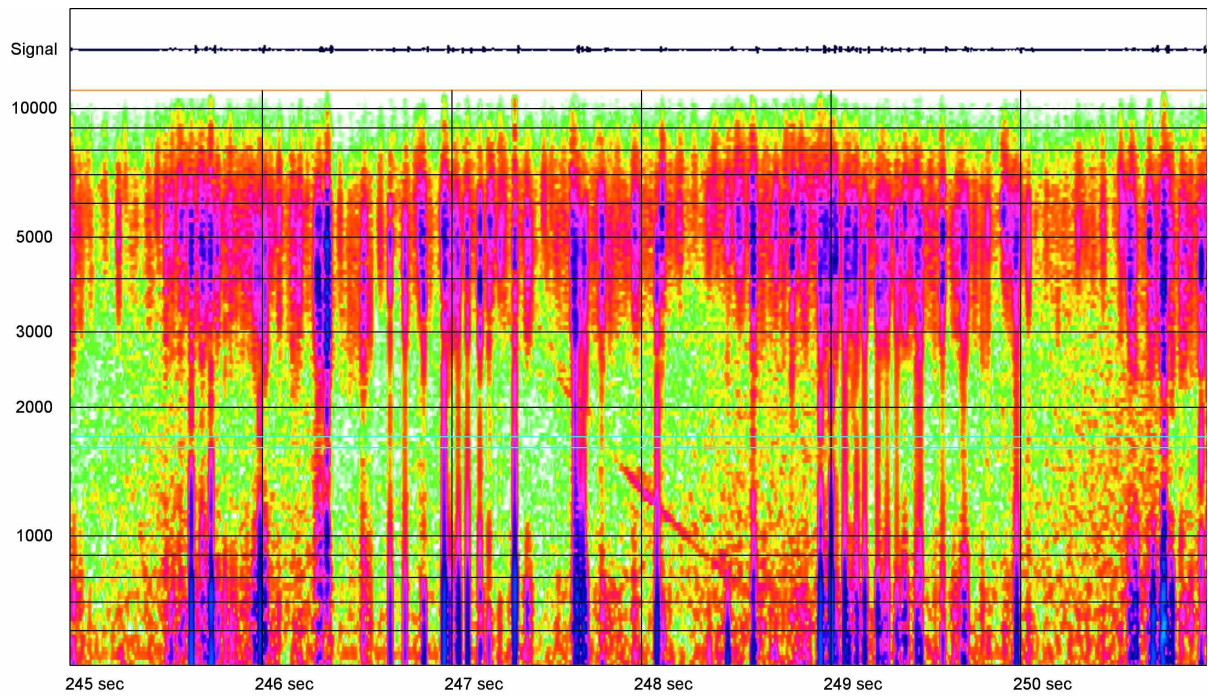
hop ones. At 1959, a few minutes later, I captured another group of faint whistlers, again of the one-hop variety:



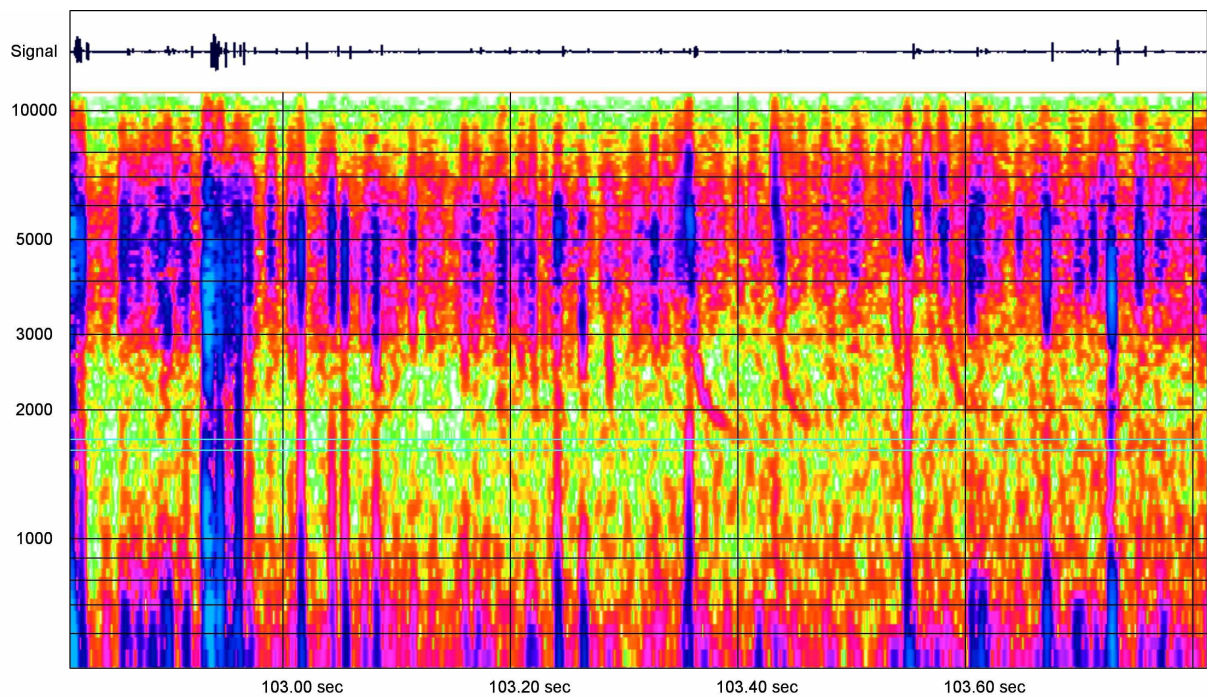
Half an hour later, at 2013 – and having walked along the beach a bit further – I heard a very faint swish. The analysis shows that it is a short but pure tone whistler:



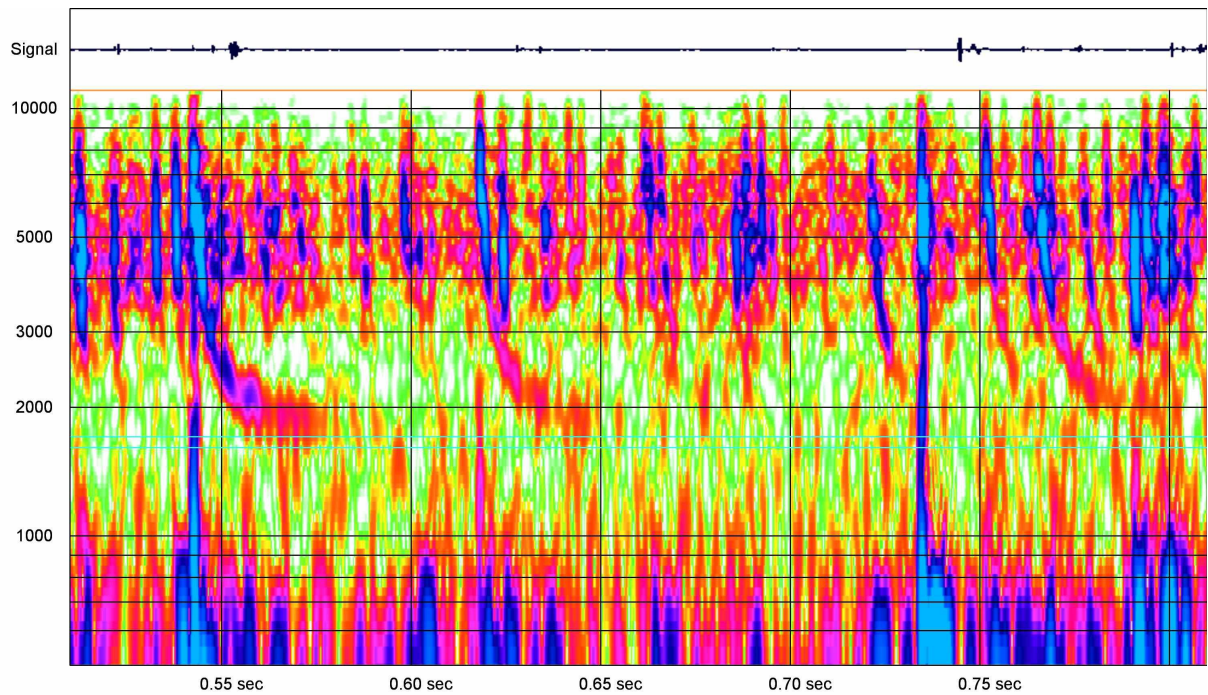
A few similar ones were then followed at 2016 by a rather long whistler, starting at about 6 kHz and then sweeping all the way down to 700 Hz. Again, the speed was characteristic of a single hop:



I waited another half hour, watching more numerous tweeks making their way through the roaring loudness of the spherics (at 2109):

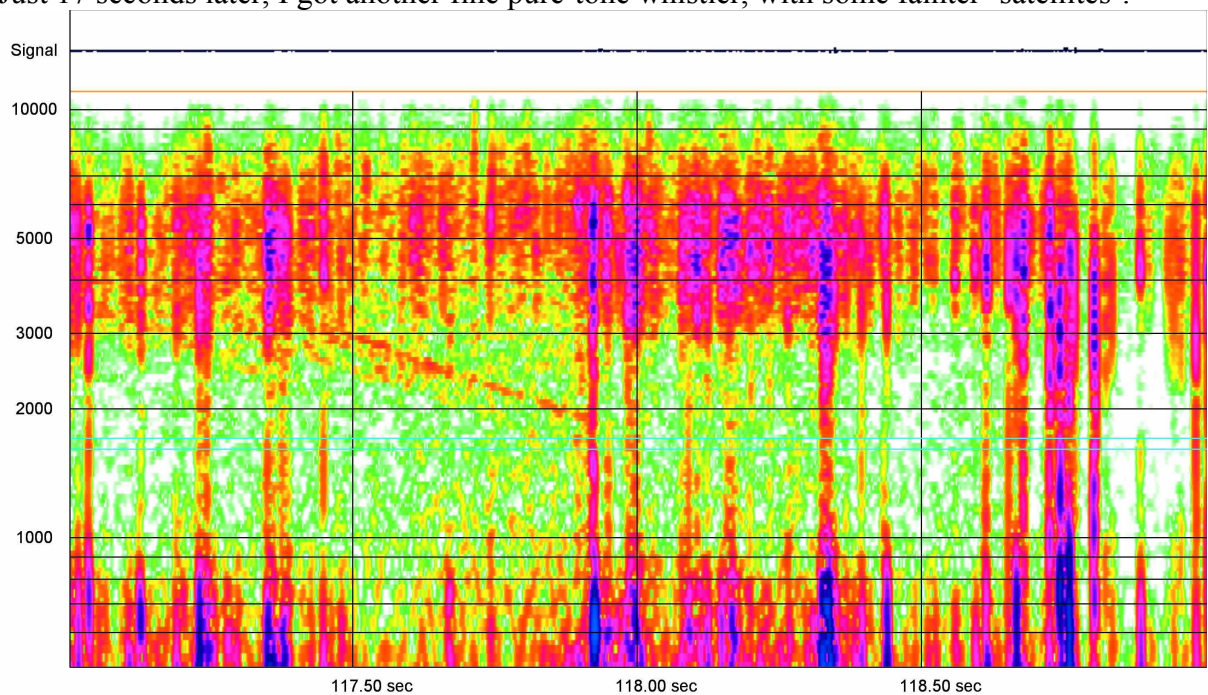


Let us look more closely at the three tweeks between 100.40 and 100.60 sec, as they appear to differ in the rate at which their frequency decreases:

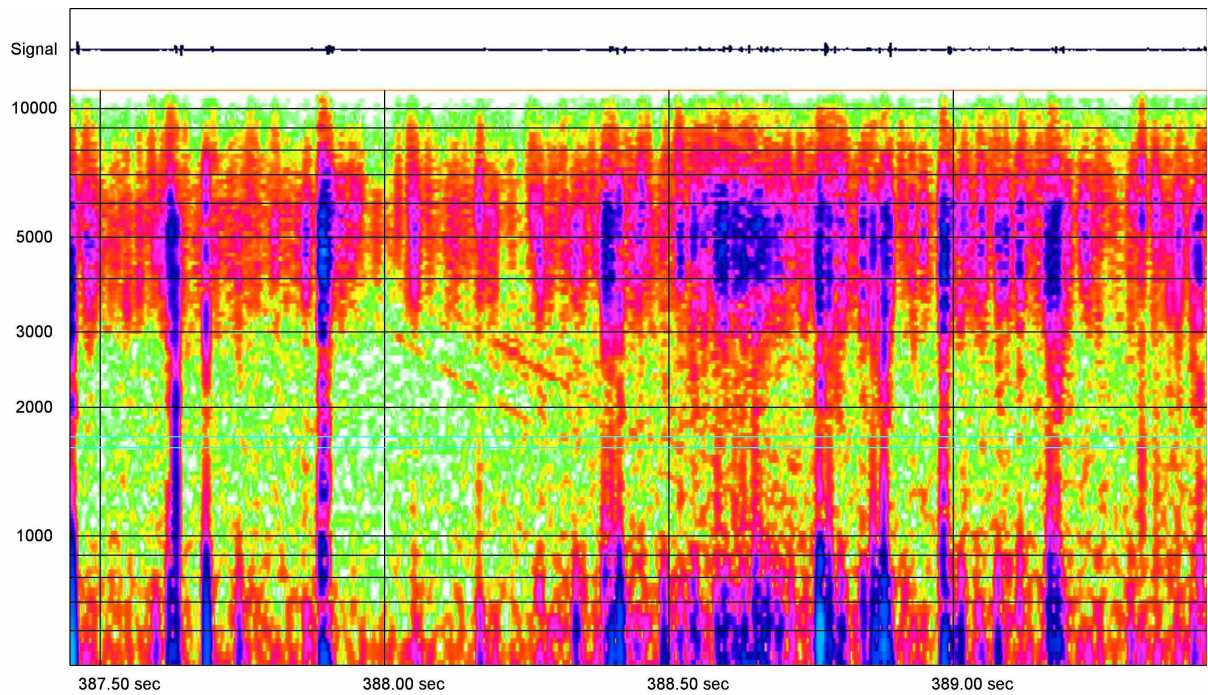


If one measures the times of passing from 5 kHz down to 3 and 2 kHz, one gets 3 and 15 msec, respectively, for all three tweeks. Thus, they must come from nearly the same distance. With a very crude model one gets a distance of 7000 km and the altitude of the ionosphere of 90 km. A more careful analysis would be promising!

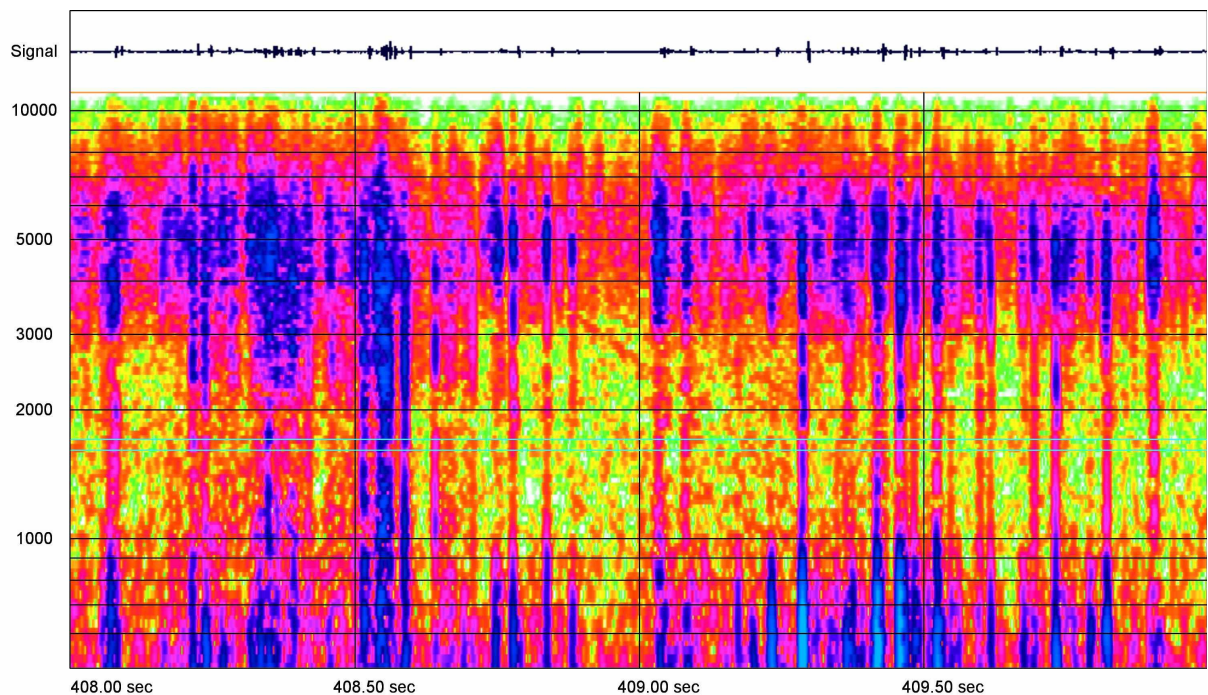
Just 17 seconds later, I got another fine pure-tone whistler, with some fainter ‘satellites’:



It took several minutes until another whistler came. This time, at 2113, a group of at least two arrived. At first sight, the second one seems to be a bit slower, but more careful comparison shows that both have the same speed, and that they are – again – single hop whistlers.



The last one I captured that evening , at 2114, was almost buried under spherics and tweeks. I switched off and hurried to the bus to take me home.



In summary, I heard only single-hop whistlers, originating from lightning in southern Africa, but all the heavy summer lightning from Europe did not produce any two-hop whistlers. One explanation could be that while the propagation conditions were favourable for whistlers, either the absorption along the long path was too strong or the reflection of radio waves at the ionosphere was not strong enough to permit whistlers to make another hop. This day was quite different from previous days on the beach, as in summer I mostly hear two-hop whistlers... every day one finds something new!