

Measurement of Lightning Currents at the Säntis Tower in Switzerland

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Abstract— We describe the instrumentation of the Säntis Tower in Switzerland to measure lightning currents and lightning current derivatives. A summary of the obtained data during the first 18 months of operation is also presented.

Keywords— lightning; lightning current; instrumented tower; upward discharge; negative lightning; positive lightning; bipolar lightning.

I. THE SÄNTIS TOWER

The 124-m tall Säntis Tower (Fig. 1) is located on the top of Mount Säntis (2502-m above sea level), in the northeast of Switzerland. The tower that serves mainly as a telecommunications tower and a climate station, is by far the most frequently struck structure in Switzerland [1].



Fig. 1 – Säntis Tower

Lightning current waveforms and their time-derivatives are measured at two different heights (24-m and 82-m AGL) using Rogowski coils and multigap B-dot sensors [2]. The analog outputs of the sensors are relayed to a digitizing system by means of optical fiber links. The system allows an over-the-Internet remote maintenance, monitoring and control. More details on the measurements sensors and instrumentation system can be found in [1] and [2].

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In 2013-2014, a certain number of updates were made to the overall measuring system, including the replacement of National Instruments PCI digitizers by PXI systems, and the update of the data acquisition software.

II. OBTAINED DATA

Since the instrumentation of the tower (May 19, 2010) until January 1, 2014, more than 350 flashes were successfully recorded at the Säntis tower. A total of 200 flashes recorded during the first 18 months of operation of the tower were recently analysed [3,4]. All of them were apparently of upward type, including 30 positive flashes.

An example of a current waveform associated with a positive flash is presented in Fig. 2 [4]. The peak current is 93 kA and the transferred charge to ground is about 405 C.

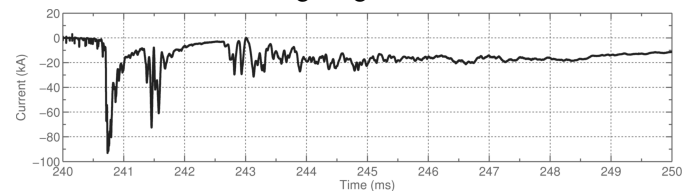


Fig. 2 - Example of a current waveform associated with a positive flash that occurred on August 3, 2011 at 11:51. Adapted from [4].

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