

# DETECTION OF HARDWARE FAILURES AT INTERMAGNET STATIONS: APPLICATION OF ARTIFICIAL INTELLIGENCE TECHNIQUES TO GEOMAGNETIC RECORDS STUDY

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INTERMAGNET global network consists of 114 observatories around the world, which monitor the Earth's magnetic field in real time. Data from geomagnetic observatories represent time series.

In spite of high quality of measuring instruments all of them are subjected to external impact, which affects the quality of records. Figure 1 illustrates examples of the most common failures, which have to be eliminated prior to further handling of obtained observations.

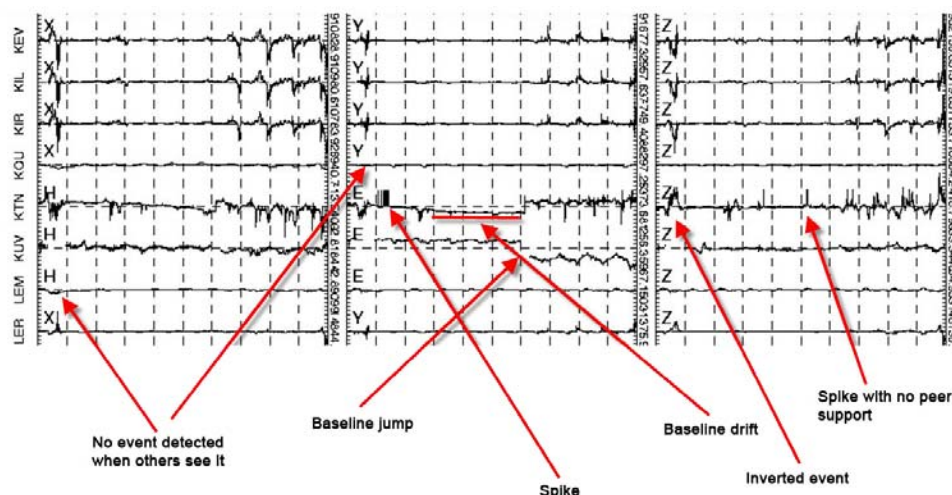


Figure 1. Examples of magnetometer hardware failures reflected on records.

The present work is devoted to detection of “Spike”, “Baseline jump” and “Baseline drift” failures on records. A search is implemented in the framework of a new geoinformatics approach entitled Discrete Mathematical Analysis developed at the Geophysical Center of RAS. It is based on fuzzy logic methods and intended for study of multidimensional data sets time series.

Failures on records are treated as anomalies of particular shapes: e.g., jump/spike is an anomaly on a record leading/not leading to its baseline shift. Preliminarily anomalies on records are detected by FCARS algorithm (Fuzzy Comparison Algorithm for Recognition of Signals). A further search of spikes, baseline jumps and baseline drifts among them is done by additional testing, which uses Discrete Mathematical Analysis technique.

Time-series study, artificial intelligence

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