Data mining on long-term barometric data within the ARISE2 project

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The Comprehensive nuclear-Test-Ban Treaty (CTBT) led to the implementation of an international infrasound array network. The International Monitoring System (IMS) network includes 48 certified stations, each providing data for up to 15 years. As part of work package 3 of the ARISE2 project (Atmospheric dynamics Research InfraStructure in Europe, phase 2) the data sets will be statistically evaluated with regard on atmospheric dynamics.

The current study focusses on fluctuations of absolute air pressure. Time series have been analysed for 17 monitoring stations which are located all over the world between Greenland and Antarctica along the latitudes to represent different climate zones and characteristic atmospheric conditions. Hence this enables quantitative comparisons between those regions. Analyses are shown including wavelet power spectra, multi-annual time series of average variances with regard to long-wave scales, and spectral densities to derive characteristics and special events.

Evaluations reveal periodicities in average variances on 2 to 20 day scale with a maximum in the winter months and a minimum in summer of the respective hemisphere. This basically applies to time series of IMS stations beyond the tropics where the dominance of cyclones and anticyclones changes with seasons. Furthermore, spectral density analyses illustrate striking signals for several dynamic activities within one day, e.g., the semidiurnal tide.