Geophysical Research Abstracts
Vol. 13, EGU2011-12044, 2011
EGU General Assembly 2011

Experiences made using PMCC as an infrasound signal detector

Lars Ceranna (1), Alexis Le Pichon (2), and Julien Vergoz (2)
(1) BGR, B4.3, 30655 Hannover, Germany (lars.ceranna@bgr.de), (2) CEA/DAM/DIF, F-91297 Arpajon Cedex, France

The Progressive Multi-Channel Correlation (PMCC; Cansi, 1995) is an array technique which is commonly used for detecting coherent signals recorded on infrasound arrays. In 2004 PMCC has been installed at BGR for processing of the German infrasound array IS26 and has been applied to the whole data set starting in October 1999. Since then automatic bulletins of coherent transient and continuous signals have been produced. To avoid mixing of continuous signals microbarom signals with transient infrasonic recordings, two consecutive frequency bands are considered for the frequency range between 20 s and 4 Hz. Moreover, a long period band between 200 and 20 s, associated to mountain waves, has been separately analyzed. Overall approximately 1,000,000 coherent signals have been detected in this three consecutive frequency bands.

In the frame of the compliance with the Comprehensive Nuclear-Test-Ban Treaty (CTBT) a global network of infrasound arrays has been established to detect and locate atmospheric explosions. However, such explosions are expected to generate infrasound with broad frequency content. Therefore the individual PMCC bulletins containing detections of IS26, which is part of the dedicated infrasound network of the International Monitoring System (IMS), have to be merged and re-analyzed as a whole to identify broad-band signals. Since this post-processing is not straight forward it might introduce false or missed detections. Fortunately, recent studies performed at CEA have shown that already implemented versions of PMCC have benefited from the implementation of adaptive processing window duration and a log-spaced frequency bands. This configuration enables a much better detection and characterization of all received signals in their wave-front parameter space (e.g., frequency-azimuth space, frequency-trace-velocity space). The new PMCC release, including a fully configurable filtering and detection parameters, has been implemented at BGR as well, which allows a reliable detection of broad-band signals within one processing step.

We present the results of a statistical analysis of more than eleven years of infrasound data recorded at IS26. A comparison is made between the automatic detections produced by the standard BGR procedures, the re-processed detections using the optimized filtering and detection configuration parameters, as well as the bulletins provided by the International Data Centre (IDC).