

ESTIMATES OF SEISMIC CODA LENGTH AND RELEVANT LOCAL MAGNITUDE SCALE
OBTAINED FROM K-ORDER ALPHA-SHAPES OF SEISMIC RECORDS

D. Krasnoshchekov¹, M. Nikkila², V. Polishchuk²

1. Institute of Dynamics of Geospheres, Leninsky pr. 38 korp. 1, Moscow 119334 Russia
2. Helsinki Institute for Information Technology, P. O. Box 68, FI-00014, University of Helsinki, Helsinki Finland

krasnd@idg.chph.ras.ru

The new algorithm of processing seismic records by means of k-order alpha-shapes was applied to estimate total length of seismic coda observed on seismic records of local events. Broadband records of 114 Fennoscandian events with local magnitude between 1.0 and 1.7 were processed. Each event was recorded by 4 to 20 stations of seismic network LAPNET that operated in Finland and Sweden from 01/05/2007 to 31/05/2009. The events' focal depths are not deeper than 18 km, and the epicentral distance range is 5–310 km. The seismic coda lengths were automatically measured with the help of the algorithm that builds k-order alpha-shape for a time series and outputs the smooth curve delineating the strongly oscillating analytical envelope of the original record. The coda length was measured as a time period between the first arrival of P and the moment when the output curve first crosses the mean level of pre-event seismic noise. The obtained coda durations are essentially a stepping stone toward building the local magnitude scale for Fennoscandia. The estimated linear coefficient between squared logarithm of coda duration and epicentral distance made $(-3.6 \pm 1.0) \times 10^{-3}$, which is very close to the previous estimate by Wahlstrom who obtained -2.9×10^{-3} . The standard error of coda length measurement was estimated by bootstrap technique to be within 0.5%.