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ייצור בולטין בעזרת רישומים רצופים של מערכת סייסמית ישראלית

RESEARCH FOR AUTOMATIC BULLETIN PRODUCTION USING ISN CONTINUOUS RECORDINGS.

Project №. 558/605/11

Progress Report 01.01.2011 - 01.06.2011

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Introduction

During the first half of 2011 the following tasks of the proposal have been carried out:

1) automatic detection of seismic signals, 2) automatic picking of P and S phases on the continuous seismic recordings, 3) automatic robust location of earthquakes, 4) estimation of magnitude.

Summary of achievements

1. Automatic detection using whitening filter, "rdet" (optimal detector) procedure and STA/LTA statistic are applied and verified on real-time and massive database recordings.
2. Automatic picking is provided with preliminary check of Signal-to-Noise ratio, estimation of arrival time using time dependent statistic of "rdet" procedure, which is followed by the multiple arrival check program. The algorithm is verified by comparison with manual solutions using ISN bulletin events.
3. Real-time location is build as a grid-search procedure, seeking for the maximum of target function, measuring likelihood of a number of arrival times. The grid-search is provided in two stages: first on static rough grid and then using dynamic fine grid around preliminary location obtained at the first stage. The local events locator is verified using real-time recordings of earthquake and explosion events. The accuracy of the local events locator is estimated as +- 4 km for events of magnitude M>=1.5. The work over the regional and teleseismic locators in real-time is in process.
4. We have build procedure of Wu and Kanamori (2008), for magnitude estimation using first 3 sec after arrival of P wave using τ_c – magnitude relationship. Experiments showed a good approximation of the regression for events with M >= 4.

In addition we have build M_w estimator, which, however, starts computations only after arrival of maximum amplitude of S waves.

Future plans

In the second half of the 2011 year we plan to carry out the following tasks:

1)Provide automatic measurement of duration magnitude

2) Earthquake- explosion discrimination will be provided on this stage using a simple statistic of P and S amplitude ratio, which often gives a good indication of the origin of the event.

3) Fault-plane solution procedure will be borrowed from Orfeus free software collection and adjusted for our conditions.

4) Finally we shall make a bulletin-form-builder for issuing automatic bulletins in the GII standard form and make their intra-net representation.