



Problems and solutions for processing strong-motion records in the Italian ITACA database



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Abstract

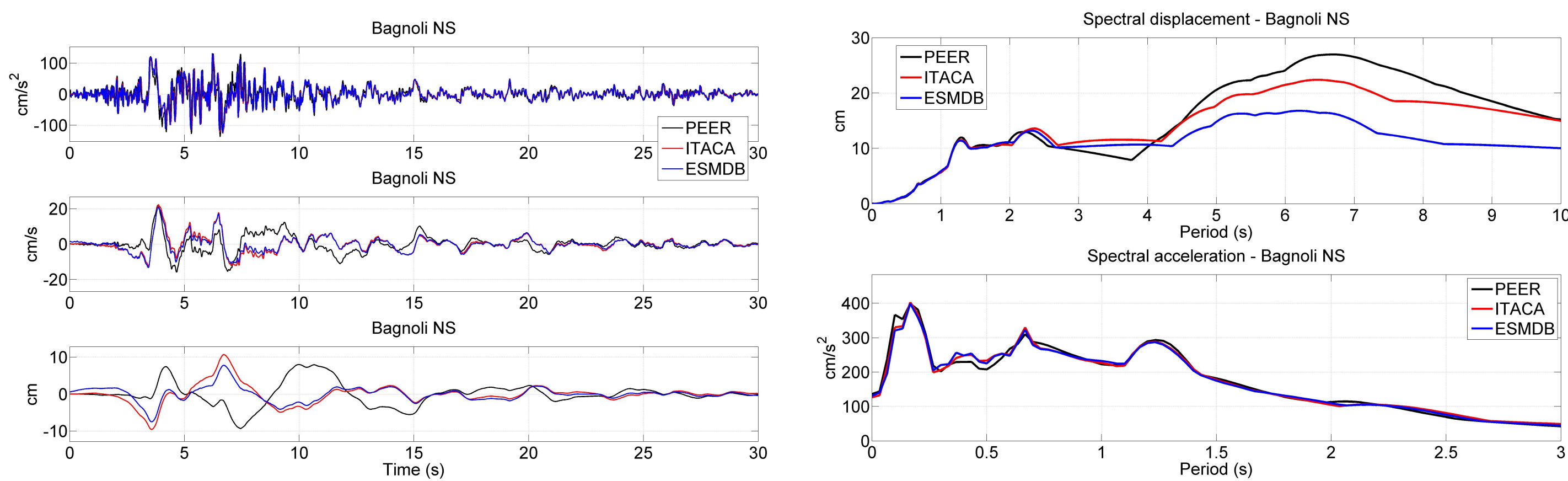
Within the revision activities of the alpha version of the ITACA Italian strong motion database, several key points have been addressed, dealing with the quality and reliability of corrected records. Namely:

- to check the accuracy and reliable frequency range of corrected records and compare them with the corresponding records available within other international databases, such as the PEER and the European Strong Motion Database;
 - to ensure the compatibility of corrected accelerograms, so that the no further correction is required to obtain by single and double integration the velocity and displacement traces;
 - to avoid whenever possible the retention of zero-pads at the beginning of the processed record, that would be inevitably erased by the end-user of the accelerogram, typically when used for computer time-consuming non linear time-history analyses;
 - to identify in ITACA the late-triggered records, typically on the S-phase, and to provide whenever possible meaningful and usable corrected waveforms from analog instruments that recorded most of the Italian earthquakes up to 1990.
- A novel procedure for processing the ITACA strong motion records has been devised with the objective of providing a rational solution to the previous problems, on one side, and, on the other side, to be robust and reliable enough to be effectively used to re-process all the ITACA records, including the most recent ones from the Parma (December 2008) and L'Aquila (April 2009) earthquakes.

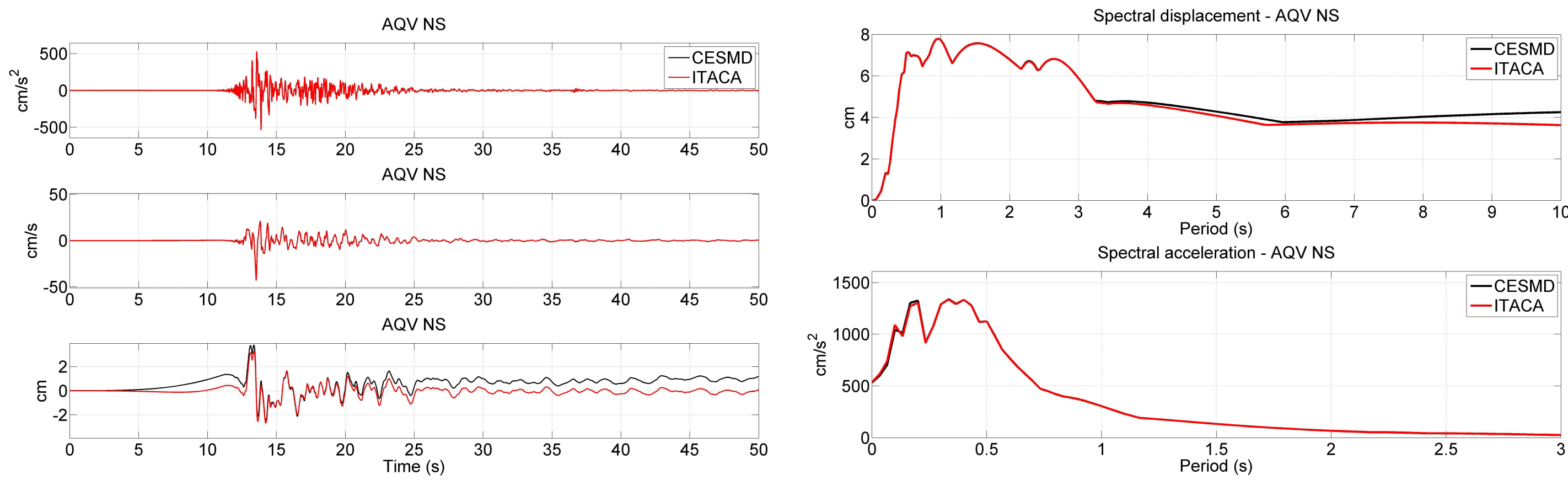
ITACA 1.0 will be published in <http://itaca.mi.ingv.it> in October-November 2009. More than 2500 three components raw records were re-processed using a novel procedure.

Comparison with records available from different sources

(a) Bagnoli record (EW component) from the Irpinia earthquake.



(b) AQV record (NS component) from L'Aquila mainshock.

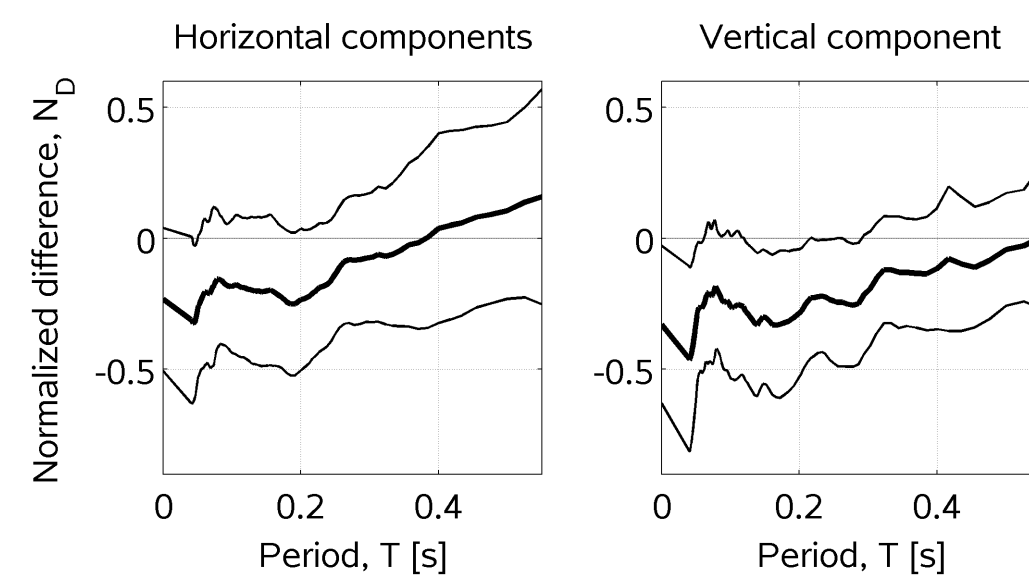


Identification and correction of late triggered events

To check the quality of late-triggered records, two co-located stations available at Nocera Umbra were used, namely NCR (analog - late triggered) and NCR2 (digital). Mean \pm Standard deviation were calculated for 8 (of 9) 3-comp. records, expressed as:

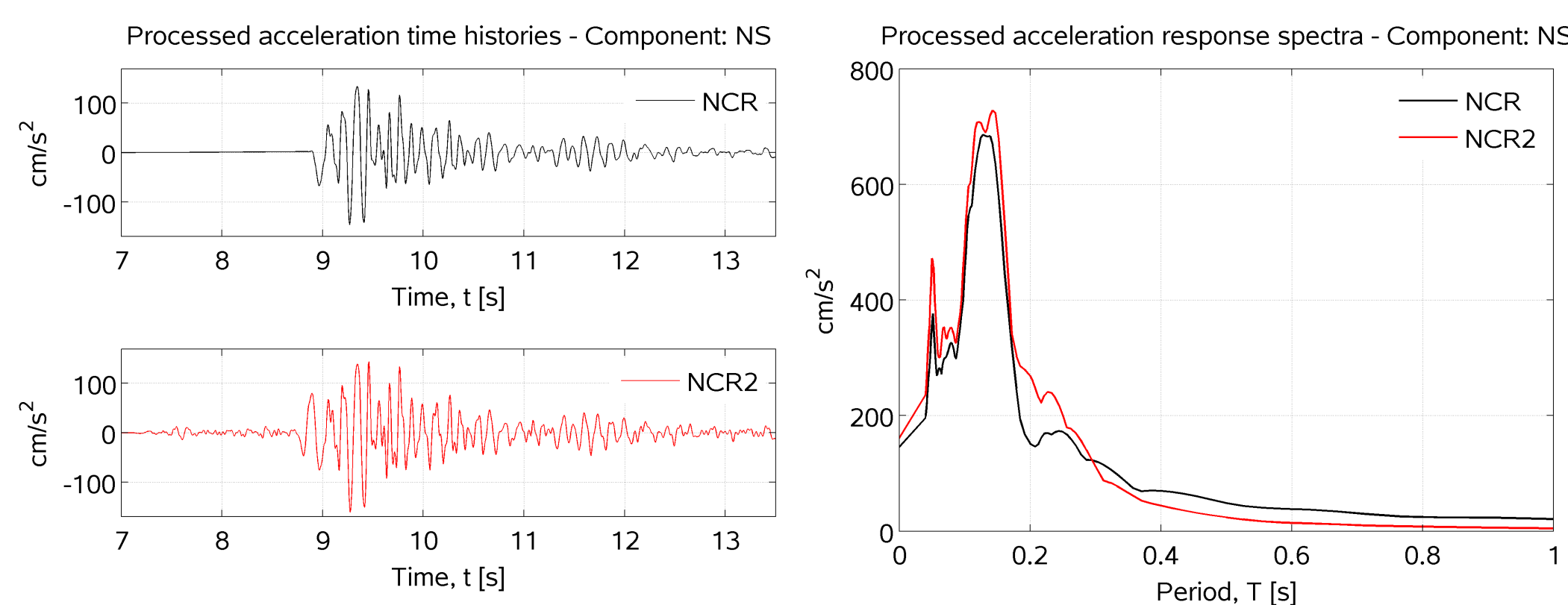
$$N_D(T) = \frac{S_A(T)^{NCR} - S_A(T)^{NCR2}}{S_A(T)^{NCR2}}$$

where $S_A(T)$ is the spectral ordinate at period T

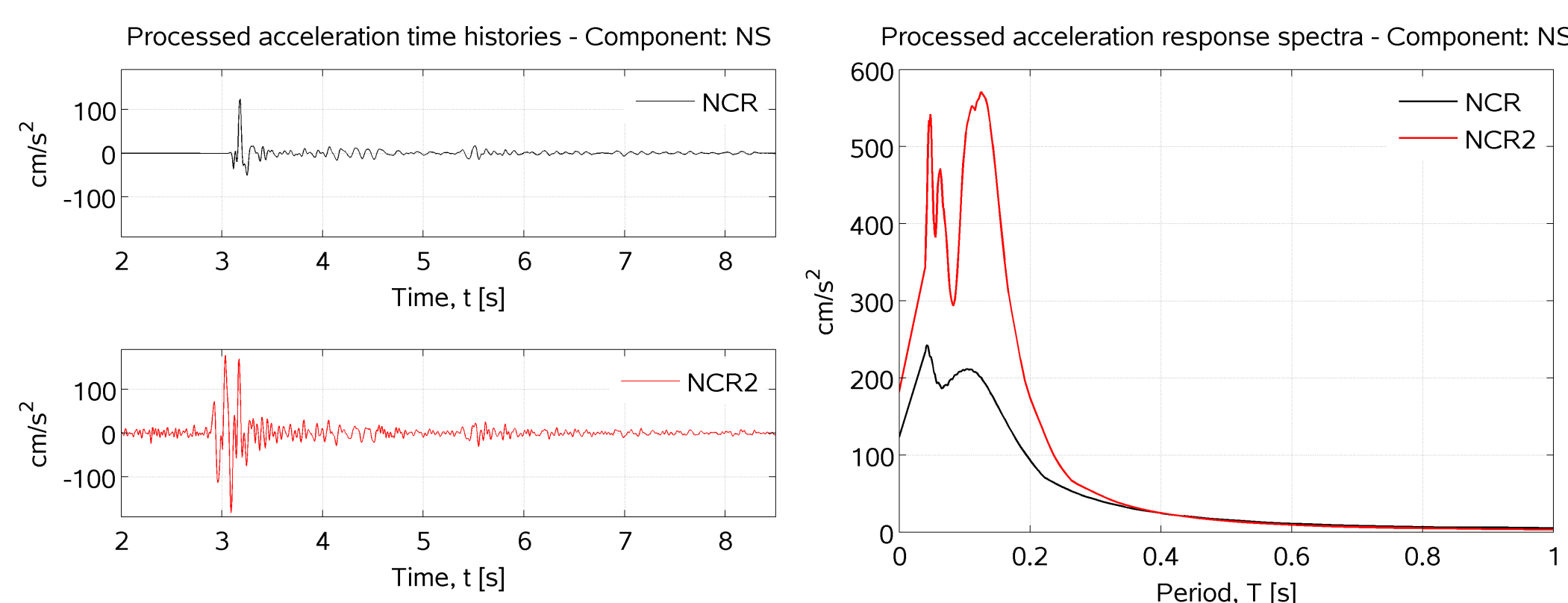


Corrected acceleration time histories and response spectra for two aftershocks of the Umbria-Marche earthquake.

(a) $M_w=4.8$, 1998-04-05 15:52



(b) $M_L=3.3$, 1997-10-14 07:54



ITACA Processing scheme

