PRELIMINARY ANALYSIS OF DATA
FROM THE AFTERSHOCK DEPLOYMENT
IN VAN AND ERCİŞ , TURKEY

AFTERSHOCKS WITH M≥4.0

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Istanbul, Turkey

December 2011
SUMMARY

Following the destructive M=7.2 Van Earthquake of 23 October 2011 in Eastern Turkey, we have deployed eight strong motion monitoring equipment to the region to record aftershocks.

Four of the stations were installed in the city of Van, and the remaining four in the city of Erciş, which suffered the most damage and loss of life. The stations in each city are arranged such that one of the stations is located on a stiff soil or a rock site to be used as the reference station, and the remaining three in the flat urban area forming a triangle.

The eight-station network has recorded a large number of aftershocks, including the destructive one with M=5.6 on 9 November 2011 epicentered near the town of Edremit south of Van. Figure 1 shows the deployment regions. The locations of the eight stations in Van and Erciş can be seen Figures 2 and 3 respectively. Descriptive information on the stations is summarized in Table 1.

This document reports on the records from earthquakes with M≥4.0 that were obtained until 3 November 2011 and on the events with M≥4.9 in the period of 03-21 November 2011. All together ten events are considered in this report. The events before 9 November are essentially the aftershocks of the 23 October 2011, Mw7.2 earthquake. All of the reported earthquakes were recorded by the stations in Erciş, whereas in Van only three earthquakes were recorded by two of the four stations. The records can be downloaded through links in Table 2 and Table 3. Table 2 covers events with M≥4.0 in the period of 1-3 November 2011. Table 3 are for the M≥4.9 events between 3 and 21 November 2011. The epicentral properties of all events can be found in Table 4.

Six earthquakes are selected for analysis among the presented ten. The first one is the M4.7 earthquake of 02.11.2011. The second earthquake is the Şahgeldi event, which took place on the same date with the first one, was however recorded by five stations. Processed records from the Akçift event (M4.7) can be seen in pages 11-20. The records of the Şahgeldi event (M4.4) are presented in pages 21-34. The records from the M4.9 Çolpan event are given in pages 35-44, M5.5 Vangölü in pages 45-62, Mollakasım in 63-80 and finally Bodurağaç records are given in pages 81-90.

At link http://www.koeri.boun.edu.tr/Haberler/23%20October%202011,%20Mw=7.2%20Van,%20Turkey%20Eq._6_205.depmuh, information on the 23 October 2011 earthquake can be found.
For the background information on the 9 November 2011, M5.6 earthquake please see the link http://www.koeri.boun.edu.tr/Haberler/THE%20NOVEMBER%2009,%202011%20EDREMIT-VAN,%20TURKEY%20EARTHQUAKE_6_207.depmuh.

Analysis of records from the 9 November 2011, M5.6 earthquake is covered in a separate report at link http://www.koeri.boun.edu.tr/depremmuh/deprem-raporlari/Van_Eq_aftershocks1.pdf.
Figure 1. Locations of aftershock monitoring cities, Van and Erciş
Figure 2. Locations of aftershock monitoring stations in Van
Figure 3. Locations of aftershock monitoring stations in Erciş
Table 1. Station information for the Van and Erciş deployments.

**VAN**

<table>
<thead>
<tr>
<th>STATION CODE</th>
<th>STATION COORDINATES</th>
<th>STATION LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>VNS (rock site)</td>
<td>38.33455N 43.19533E</td>
<td>Şemsibey İlkokulu</td>
</tr>
<tr>
<td>VNKIO (soil site)</td>
<td>38.33455N 43.19533E</td>
<td>Koç İlköğretim Okulu</td>
</tr>
<tr>
<td>VNTGM (soil site)</td>
<td>38.33455N 43.19533E</td>
<td>TEDAŞ Genel Müdürlüğü (Havaalanı kavşağığı)</td>
</tr>
<tr>
<td>VNKEA (soil site)</td>
<td>38.33455N 43.19533E</td>
<td>TEDAŞ Köy Elektrik Arıza (Valilik yanısı, Santral Sok.)</td>
</tr>
</tbody>
</table>

**ERCİŞ**

<table>
<thead>
<tr>
<th>STATION CODE</th>
<th>STATION COORDINATES</th>
<th>STATION LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERSFB (stiff soil site)</td>
<td>38.59996N 43.27304E</td>
<td>Erciş Şeker Fabrikası</td>
</tr>
<tr>
<td>ETR (soil site)</td>
<td>39.00880N 43.21097E</td>
<td>TEDAŞ Trafo Binası (Çınarlı Caddesi sonu)</td>
</tr>
<tr>
<td>ERKRY (soil site)</td>
<td>39.02264N 43.21426E</td>
<td>Erciş Karayolları 115. Şube Müdürlüğü</td>
</tr>
<tr>
<td>ERISF (soil site)</td>
<td>39.01398N 43.20798E</td>
<td>Yüzüncü Yıl Üniversitesi Erciş İşletme Fakültesi</td>
</tr>
</tbody>
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### Table 2. Aftershock records (01.11.2011-03.11.2011, M≥4.0)

<table>
<thead>
<tr>
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Table 3. Aftershock records (03.11.2011-21.11.2011, M≥4.9)

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<tbody>
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<td>X</td>
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</tr>
<tr>
<td></td>
<td>VNKIO 38.30957N – 43.20473E Koç İlköğretimokulu</td>
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<tr>
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<td>VNTGM 38.28571N – 43.21571E TEDAŞ Genel Müdürlüğü</td>
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<tr>
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<td>VNKEA 38.30070N – 43.23898E TEDAŞ Köy Elektrik Arıza</td>
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<td>ERCİŞ</td>
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<tr>
<td></td>
<td>ETR 39.00880N – 43.21097E TEDAŞ Trafo</td>
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<tr>
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<td>ERKRY 39.02264N – 43.21426E Karayolları 115. Şube Müd.</td>
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<td>X</td>
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<td>ERISF 39.01398N – 43.20798E 100. Yıl Üni. İşletme Fak.</td>
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Table 4. Epicentral properties (Source: UDIM-KOERI)

<table>
<thead>
<tr>
<th>Date</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Depth</th>
<th>Magnitude</th>
<th>Location</th>
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<tbody>
<tr>
<td>01.11.2011</td>
<td>38.881N</td>
<td>43.581E</td>
<td>5.0</td>
<td>4.3</td>
<td>Sağlamtaş (Van)</td>
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<tr>
<td>02.11.2011</td>
<td>38.873N</td>
<td>43.569E</td>
<td>5.0</td>
<td>4.8</td>
<td>Çakırbey (Van)</td>
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<tr>
<td>02.11.2011</td>
<td>38.856N</td>
<td>43.578E</td>
<td>5.0</td>
<td>4.7</td>
<td>Akçift (Van)</td>
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<td>02.11.2011</td>
<td>38.761N</td>
<td>43.321E</td>
<td>5.0</td>
<td>4.4</td>
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<tr>
<td>02.11.2011</td>
<td>38.939N</td>
<td>43.553E</td>
<td>5.0</td>
<td>4.1</td>
<td>Çolpan (Van)</td>
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<tr>
<td>03.11.2011</td>
<td>38.958N</td>
<td>43.588E</td>
<td>5.0</td>
<td>4.0</td>
<td>Unseli-Muradiye (Van)</td>
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<tr>
<td>06.11.2011</td>
<td>38.924N</td>
<td>43.565E</td>
<td>5.0</td>
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<tr>
<td>08.11.2011</td>
<td>38.724N</td>
<td>43.087E</td>
<td>4.3</td>
<td>5.5</td>
<td>Van Gölü (Van)</td>
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<tr>
<td>14.11.2011</td>
<td>38.678N</td>
<td>43.182E</td>
<td>3.1</td>
<td>5.2</td>
<td>Mollakasım (Van)</td>
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<td>18.11.2011</td>
<td>38.837N</td>
<td>43.870E</td>
<td>5.0</td>
<td>4.9</td>
<td>Bodurağaç (Van)</td>
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</table>
Akçift/Van Aftershock

M=4.7

02/11/2011

15:24:02

ERCİŞ RECORDS
M=4.7 AKCIJF AFTershock on 10/11/2011 at 15:24:02
Şahgeldi/Van Aftershock

M=4.4

02/11/2011

22:48:21

VAN RECORDS
M=4.4 SAKGELDI-VAN AFTERSHOCK ON 02/11/2011 AT 22:48:21

STATION UNHO

STATION INTGM
M=4.4 SAHİBİNDI-YAN AFTershock ON 02/11/2011 AT 22:48:21

**Station UNIQA FAS**

**Station INGAFAS**
M=4.4 SAHGELDI-VAN AFTERSHOCK ON 09/11/2011 AT 22:48:21

STATION YNKKO VELOCITIES

STATION YNKKO DISPLACEMENTS

TIME (s)
M=4.4 SAGELDI-VAN AFTERSHOCK ON 02/11/2011 AT 22:49:21

STATION VELOCITIES

STATION DISPLACEMENTS

T/A1
M=4.4 SAHGELDI-YAN AFTERSHOCK ON 02/11/2011 AT 22:48:21

PARTICLE MOTIONS

STATION PRED
STATION PREDM
Mw 4.9 SAHGELDI-YAN AFTershock ON 02/11/2011 AT 22:48:21

PSA FOR E DIRECTION

PSA FOR N DIRECTION

PSA FOR VERT. DIRECTION
Şahgeldi/Van Aftershock

$M=4.4$

02/11/2011

22:48:21

ERCİŞ RECORDS
M=4.4 SAHGHEDII ON 02/11/2011 AT 22:46:21

STATION EB1F

STATION EH1F

STATION EH1F/2Y

STATION EB1F/2Y

FREQUENCY (Hz)

FREQUENCY (Hz)
M=4.4 SAKGELDİ ON 02/11/2011 AT 22:48:21

STATION ETR

TIME (s)

0 5 10 15 20 25

0 0.4 0.8 1.2 1.6

uEL (m/s^2)

E-W  N-S  VER

STATION ETR

TIME (s)

0 5 10 15 20 25

-0.04 -0.02 -0.01 0 0.01 0.02 0.03 0.04

uEL (mm)

E-W  N-S  VER
M=4.4 SAHGELDI ON 02/11/2011 AT 22:48:21
M=4.4 SANIYEDA ON 02/11/2011 AT 22:48:21

STATION E/NSF

STATION E/W

TIME (h)
Çolpan/Van Aftershock

M=4.9

06/11/2011

02:43:12

ERCİŞ RECORDS
Van Gölü/Van Aftershock
M=5.5
08/11/2011
22:05:51

ERCİŞ RECORDS
Boğaziçi University  
Kandilli Observatory and Earthquake Research Institute  
Department of Earthquake Engineering

![Graphs showing seismic wave data](image-url)
Van Gölü/Van Aftershock

M=5.5

08/11/2011

22:05:51

VAN RECORDS
Boğaziçi University
Kandilli Observatory and Earthquake Research Institute
Department of Earthquake Engineering

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Mollakasım/Van Aftershock

M = 5.2

14/11/2011

22:08:15

ERCİŞ RECORDS
Mollakasım/Van Aftershock

M=5.2

14/11/2011

22:08:15

VAN RECORDS
PSA FOR E-W DIRECTION

PSA FOR N-S DIRECTION

PSA FOR V-D DIRECTION
Bodurağaç/Van Aftershock
M=4.9
18/11/2011
17:39:40

ERCİŞ RECORDS
Boğaziçi University
Kandilli Observatory and Earthquake Research Institute
Department of Earthquake Engineering

STATION KOSEF

STATION ETIR

STATION BESIK

STATION KERSIF

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