Appendix E

Polarity problems at selected stations in southern California

Note

I am fortunate to have had close contact with the Southern California Data Center. I thank Ellen Yu, Egill Hauksson, and Kate Hutton for discussions regarding the matters presented in this appendix. The key results are summarized in Table E.1.

E.1 Overview

Our tomography study for southern California has aimed to incorporate three-component waveform data from all available broadband stations for 234 earthquakes, $M_{\mathrm{w}} = 3.5$–5.5, over the time period 1998–2009. For these earthquakes we have generated synthetic seismograms using a 3D crustal model provided by the Southern California Earthquake Center, which we improved with 16 iterations in a tomographic inversion. Based on thousands of comparisons between synthetic and recorded seismograms, I have discovered a problem with the polarity of certain stations for specific epochs. The polarity problem is summarized in Table E.1 and in the following figures. I demonstrate the problematic records using the seismograms filtered at relatively long periods (bandpass 6–30 s), which are not as sensitive to possible "site effect," i.e., strong heterogeneity in the immediate region of the station. Because the station coverage in southern California is dense, it is usually possible to find a nearby station to the problematic one, in order to demonstrate the problem. One example

Table E.1: Southern California station–epochs with problematic polarity. "Earthquake dates" indicates the earliest and latest earthquakes within my dataset that exhibit the identified polarity problem on records bandpassed 6–30 s. These dates were used to identify the problematic epochs for each station.

Station	Earthquake dates		Corresponding Epochs		Channels (BH_)	Figures
	Earliest	Latest	Start	End		
CRP.CI	2003–12–25	2006–06–30	2003.297	2003.301	Z, E, N	E.1
			2003.301	2006.114		
			2006.114	2006.212		
HWB.AZ	2003–05–24	2008–07–29	2003.099	2004.056	Z, E, N	E.3–E.4
			2004.056	99999		
BVDA2.AZ	2003–05–24	2007–02–09	2003.133	2004.056	Z, E, N	E.5–E.6
			2004.056	99999		
PER.CI	2003–12–04	2009–01–31	2003.141	2003.147	E, N	E.7–E.9
			2003.147	2006.157		
			2006.157	2008.305		
			2008.305	99999		
BTP.CI	2002–10–29	2003–03–11	2002.297	2003.071	E, N	E.10–E.12
NSS2.CI	2004–09–29	2005–09–02	2004.077	2006.125	E, N	E.13–E.15
109C.TA	2004–07–14	2005–10–18	2004.125	2005.101	E, N	E.16–E.18
			2005.101	2007.242		
OSI.CI	1998-01-05	1998-10-27	1995.179(?)	2002.196(?)	E(?)	E.19–E.22

is shown in Figures E.7–E.9 for station PER.CI for an earthquake on 2008.12.06. From stations MSJ.CI to PER.CI to RVR.CI, I sweep the azimuth in a clockwise manner. The records for MSJ and RVR are similar, but the station in between, BTP, has the polarity flipped for both the transverse (T) and radial (R) components.

Most of the stations with reported polarity problems are not exhibiting the problems at present. In other words, the problems are restricted to specific epochs of the stations, and may be restricted to particular components as well (Table E.1). Of course, it is most important that the stations are providing accurate waveforms at present time, in order to properly record future earthquakes. However, it is also important that the waveforms in the past are accurate as well, since these waveforms may be used to improve the current 3D structure model or to simulate past earthquakes. In most of the cases presented below, it would be a relatively simple matter of adjusting the sign within the station response files (i.e., dataless seed files), and then the waveforms would be usable.

I also observed a problem with station amplifications for three stations recording events prior to 2000 (Section E.3). Detecting systematic amplifications is more subtle than detecting the polarity problems. An example of the amplification is shown in Figures E.23–E.25: the relative-low amplitude on all three components at VCS (Figure E.24) is not observed at stations in azimuthal directions on either side of VCS (Figures E.23 and E.25).

E.2 Station–epochs with probable incorrect polarity (Figures E.1–E.22)

- CRP.CI: Figure E.1. From the 3D synthetics, it appears that the seismograms (all three components) are "good", but flipped upsidedown. In Figure E.2, I show the effect of simply flipping the sign of `CONSTANT` in the pole-zero file. A sign flip appears to solve the problem for this station. NOTE: CRP.CI is fine as of 2006.11.03 (10215753).

- HWB.AZ: Figures E.3–E.4. From the 3D synthetics, it appears that the seismograms (all three components) are "good", only flipped upsidedown.

  There is something peculiar about HWB.AZ records. By 2008.12.06 (14408052), HWB.AZ records look great, but the PZ file is the same as before. This suggests that HWB.AZ was changed, but the dataless seed file was not updated.

- BVDA2.AZ: Figures E.5–E.6. From the 3D synthetics, it appears that the seismograms (all three components) are "good", only flipped upsidedown.

- PER.CI: Figures E.7–E.9. From stations MSJ.CI to PER.CI to RVR.CI, I sweep the azimuth in a clockwise manner. The records for MSJ and RVR are similar, but the station in between, BTP, has the polarity flipped for both the transverse (T) and radial (R) components. The earthquake occurred near Hector Mine on 2008.12.06.

- BTP.CI: Figures E.10–E.12. From stations ALP.CI to BTP.CI to OSI.CI, I sweep the azimuth in a clockwise manner. The records for ALP and OSI are similar, but the station in between, BTP, has the polarity flipped for both the transverse (T) and radial (R) components.

- NSS2.CI: Figures E.13–E.15. From stations CTC.CI to NSS2.CI to THX.CI, I sweep the azimuth in a clockwise manner. The records for CTC and THX are similar, but the station in between, NSS2, has the polarity flipped for both the transverse (T) and radial (R) components.

- 109C.TA: Figures E.16–E.18. From stations SDR.CI to 109C.TA to SDG.CI, I sweep the azimuth in a clockwise manner. It appears that something is wrong with the horizontal components for 109C.TA, though it may not be a simply sign error or switch between the E and N components.

- OSI.CI. Figures E.19 and E.22. The pattern for OSI.CI suggests that only the east component has a polarity problem, or that there was some misalignment of the horizontal components. For earthquakes from an easterly direction, the problem is more apparent on the radial component (Figures E.19 and E.20). For earthquakes from a northerly direction, the problem is more apparent on the transverse component (Figures E.21 and E.22).

  There is something peculiar about the 1998 OSI.CI records. All of the problematic records occur in 1998, but the PZ file indicates the same epoch through 2002. This suggests that OSI.CI was changed, but the dataless seed file was not updated. Also, even *between* the earliest (1998-01-05) and latest (1998-10-27) identified problematic records, there are some *good* records: 9064093 (1998-08-16) and 9065468 (1998-08-20).

Detailed list of seismograms exhibiting polarity problems

Figures E.1 and E.2 show one example for one station (CRP.CI). I will now list all the paths for which the polarity on **all three components** appears to be flipped:

1. **CRP.CI**. 9968977 9983429 10059745 10097009 10100053 10148421 14073800 14077668 14095540 14095628 14096196 14116972 14138080 14151344 14155260 14165408 14169456 14178236 14178248 14186612 14236768

2. **HWB.AZ**. 9967901 10100053 10215753 13966396 14095628 14096196 14151344 14155260 14178184 14178188 14178212 14178236 14178248 14179292 14179736 14236768 14263712 14263716 14383980

3. **BVDA2.AZ**. 9967901 10215753 10230869 13966396 14095540 14095628 14169456 14178184 14178188 14178212 14178236 14178248 14179288 14179292 14179736 14186612 14233632 14236768 14263544 14263712 14263716

Figures E.7–E.9 shows one example for one station (PER.CI). I will now list all the paths for which the polarity on the **horizontal components only** appears to be a problem:

1. **BTP.CI**. 9854597 9882325 9882329 13935988 13936812 13938812 13945908

2. **PER.CI**. 9967901 9968977 9983429 10006857 10059745 10063349 10097009 10100053 10148421 10215753 10230869 10370141 14007388 14072464 14073800 14077668 14095540 14095628 14096196 14116972 14118096 14133048 14138080 14151344 14158696 14169456 14178184 14178188 14178212 14178236 14178248 14179288 14179292 14179736 14186612 14236768 14239184 14263544 14383980 14408052 10370141 14418600

3. **NSS2.CI**. 10059745 10097009 14095628 14138080 14151344 14155260 14178184 14178188 14178248 14179292 14179736

4. **109C.TA**. 10059745 10097009 10100053 10148421 14073800 14095628 14116972 14118096 14138080 14151344 14155260 14169456 14178184 14178188 14178212 14178236 14178248 14179288 14179292 14179736 14186612

5. **OSI.CI (BHE only?)**. 3298292 (BHR) 9038699 (BHR) 9069997 (BHR) 9044650 (BHT) 9045109 (BHT) 9045697 (BHT)

Next I list all the events above in order of increasing origin time, with each problematic station listed on the following line(s). Note that these records are only the ones that I have identified directly as having a problem. I expect that records at the same stations during the same epochs would exhibit the **polarity problem** as well.

```
 9038699 1998-01-05   18:14:06  Mw 3.9   -117.7178     33.9462  12.98 km
         OSI.CI-E
 9044650 1998-03-06   07:36:35  Mw 4.0   -117.6505     36.0737   7.93 km
         OSI.CI-E
 9045109 1998-03-07   00:36:46  Mw 4.5   -117.6200     36.0912   6.99 km
         OSI.CI-E
 9045697 1998-03-08   15:28:41  Mw 3.7   -117.6133     36.0827   4.81 km
         OSI.CI-E
 3298292 1998-03-11   12:18:51  Mw 4.2   -117.2222     34.0355  16.19 km
         OSI.CI-E
 9069997 1998-10-27   01:08:40  Mw 4.4   -116.8418     34.3208   6.02 km
         OSI.CI-E
 9854597 2002-10-29   14:16:54  Mw 4.4   -116.2650     34.8068   7.89 km
        BTP.CI-EN
 9882325 2003-01-25   09:11:02  Mw 3.9   -118.6632     35.3152   4.41 km
        BTP.CI-EN
 9882329 2003-01-25   09:16:10  Mw 4.2   -118.6585     35.3128   4.12 km
        BTP.CI-EN
13935988 2003-02-22   12:19:10  Mw 4.8   -116.8460     34.3103   4.55 km
        BTP.CI-EN
13936812 2003-02-22   19:33:45  Mw 4.2   -116.8482     34.3097   4.87 km
        BTP.CI-EN
13938812 2003-02-25   04:03:04  Mw 4.0   -116.8407     34.3137   3.84 km
        BTP.CI-EN
13945908 2003-03-11   19:28:17  Mw 4.2   -116.1303     34.3582   8.08 km
        BTP.CI-EN
13966396 2003-05-24   02:04:28  Mw 4.1   -115.5538     32.9475   8.72 km
       HWB.AZ-ZEN
     BVDA2.AZ-ZEN
14007388 2003-12-04   06:15:52  Mw 3.5   -117.5664     35.6352   2.13 km
        PER.CI-EN
 9967901 2003-12-23   18:17:11  Mw 4.5   -121.0428     35.6493   7.20 km
        PER.CI-EN
       HWB.AZ-ZEN
     BVDA2.AZ-ZEN
 9968977 2003-12-25   11:50:01  Mw 4.3   -120.8385     35.5487   8.18 km
        PER.CI-EN
       CRP.CI-ZEN
 9983429 2004-02-14   12:43:11  Mw 4.5   -119.1412     35.0118  11.81 km
        PER.CI-EN
       CRP.CI-ZEN
10006857 2004-05-09   08:57:17  Mw 4.2   -120.0142     34.4135  10.97 km
        PER.CI-EN
14072464 2004-07-09   04:43:45  Mw 3.7   -115.7441     32.5392  10.37 km
        PER.CI-EN
14073800 2004-07-14   00:53:52  Mw 3.8   -116.0520     33.7152  12.20 km
        PER.CI-EN
       109C.TA-EN
       CRP.CI-ZEN
14077668 2004-07-24   12:55:19  Mw 4.0   -119.4365     34.3885   8.66 km
        PER.CI-EN
       CRP.CI-ZEN
14095540 2004-09-29   17:10:04  Mw 4.8   -120.5134     35.9528  10.69 km
        PER.CI-EN
       CRP.CI-ZEN
     BVDA2.AZ-ZEN
14095628 2004-09-29   22:54:54  Mw 4.8   -118.6292     35.3852   7.66 km
       NSS2.CI-EN
        PER.CI-EN
       109C.TA-EN
       CRP.CI-ZEN
       HWB.AZ-ZEN
     BVDA2.AZ-ZEN
14096196 2004-09-30   18:54:29  Mw 4.6   -120.5403     35.9821   9.87 km
        PER.CI-EN
       CRP.CI-ZEN
       HWB.AZ-ZEN
10059745 2004-11-13   17:39:16  Mw 3.8   -116.8413     34.3533  10.31 km
       NSS2.CI-EN
        PER.CI-EN
       109C.TA-EN
       CRP.CI-ZEN
10063349 2004-11-29   01:54:14  Mw 4.0   -120.4963     35.9437  10.19 km
        PER.CI-EN
14116972 2005-01-06   14:35:27  Mw 4.1   -117.4438     34.1272   5.04 km
        PER.CI-EN
       109C.TA-EN
       CRP.CI-ZEN
14118096 2005-01-12   08:10:46  Mw 3.9   -116.3912     33.9578   8.51 km
        PER.CI-EN
       109C.TA-EN
```

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14133048 2005-03-22   08:55:05  Mw 3.6   -116.2515     33.2884   4.74 km
        PER.CI-EN
14138080 2005-04-16   19:18:13  Mw 4.6   -119.1940     34.9987  10.16 km
       NSS2.CI-EN
        PER.CI-EN
       109C.TA-EN
        CRP.CI-ZEN
10097009 2005-05-06   02:29:09  Mw 4.0   -119.1958     35.0023  13.01 km
       NSS2.CI-EN
        PER.CI-EN
       109C.TA-EN
        CRP.CI-ZEN
10100053 2005-05-16   07:24:37  Mw 4.2   -120.4792     35.9269   9.15 km
        PER.CI-EN
       109C.TA-EN
        CRP.CI-ZEN
        HWB.AZ-ZEN
14151344 2005-06-12   15:41:46  Mw 5.1   -116.5675     33.5380  13.91 km
       NSS2.CI-EN
        PER.CI-EN
       109C.TA-EN
        CRP.CI-ZEN
        HWB.AZ-ZEN
14155260 2005-06-16   20:53:25  Mw 4.8   -117.0072     34.0612  14.19 km
       NSS2.CI-EN
       109C.TA-EN
        CRP.CI-ZEN
        HWB.AZ-ZEN
14158696 2005-06-27   22:17:33  Mw 3.6   -117.0232     34.0615  13.63 km
        PER.CI-EN
14165408 2005-07-24   12:59:42  Mw 3.8   -119.7527     33.6853   3.85 km
        CRP.CI-ZEN
14169456 2005-08-06   05:40:33  Mw 3.9   -118.0652     36.1488   3.67 km
        PER.CI-EN
       109C.TA-EN
        CRP.CI-ZEN
      BVDA2.AZ-ZEN
14178184 2005-08-31   22:47:45  Mw 4.7   -115.6207     33.1544   4.50 km
       NSS2.CI-EN
        PER.CI-EN
       109C.TA-EN
        HWB.AZ-ZEN
      BVDA2.AZ-ZEN
14178188 2005-08-31   22:50:24  Mw 4.4   -115.6098     33.1639   1.59 km
       NSS2.CI-EN
        PER.CI-EN
       109C.TA-EN
        HWB.AZ-ZEN
      BVDA2.AZ-ZEN
14178212 2005-08-31   23:07:16  Mw 4.3   -115.6157     33.1548   5.01 km
        PER.CI-EN
       109C.TA-EN
        HWB.AZ-ZEN
      BVDA2.AZ-ZEN
14178236 2005-08-31   23:27:32  Mw 4.1   -115.5924     33.1748   3.95 km
        PER.CI-EN
       109C.TA-EN
        CRP.CI-ZEN
        HWB.AZ-ZEN
      BVDA2.AZ-ZEN
14178248 2005-08-31   23:32:11  Mw 4.3   -115.5969     33.1712   5.05 km
       NSS2.CI-EN
        PER.CI-EN
       109C.TA-EN
        CRP.CI-ZEN
        HWB.AZ-ZEN
      BVDA2.AZ-ZEN
14179288 2005-09-01   13:48:25  Mw 3.8   -115.6168     33.1538   4.74 km
        PER.CI-EN
       109C.TA-EN
      BVDA2.AZ-ZEN
14179292 2005-09-01   13:50:20  Mw 4.4   -115.6064     33.1643   2.63 km
       NSS2.CI-EN
        PER.CI-EN
       109C.TA-EN
        HWB.AZ-ZEN
      BVDA2.AZ-ZEN
14179736 2005-09-02   01:27:20  Mw 5.0   -115.6295     33.1479   4.90 km
       NSS2.CI-EN
        PER.CI-EN
       109C.TA-EN
        HWB.AZ-ZEN
      BVDA2.AZ-ZEN
14186612 2005-09-22   20:24:48  Mw 4.4   -119.0247     35.0178  10.24 km
        PER.CI-EN
       109C.TA-EN
        CRP.CI-ZEN
      BVDA2.AZ-ZEN
10148421 2005-10-18   07:31:03  Mw 4.1   -116.7715     34.0182  18.32 km
        PER.CI-EN
       109C.TA-EN
        CRP.CI-ZEN
```

```
14236768 2006-06-30   00:28:06  Mw 4.1   -116.0220     33.2450   3.84 km
        PER.CI-EN
        CRP.CI-ZEN
        HWB.AZ-ZEN
      BVDA2.AZ-ZEN
14239184 2006-07-10   02:54:43  Mw 3.7   -117.1103     33.8567  16.77 km
        PER.CI-EN
10215753 2006-11-03   15:56:43  Mw 4.1   -116.0520     32.7165  14.76 km
        PER.CI-EN
        HWB.AZ-ZEN
      BVDA2.AZ-ZEN
14263544 2006-11-29   12:17:35  Mw 3.7   -115.9628     32.8423   3.37 km
        PER.CI-EN
      BVDA2.AZ-ZEN
14263712 2006-11-29   21:10:55  Mw 4.0   -115.9672     32.8385   7.16 km
        HWB.AZ-ZEN
      BVDA2.AZ-ZEN
14263716 2006-11-29   21:12:52  Mw 3.6   -115.9672     32.8377   3.43 km
        HWB.AZ-ZEN
      BVDA2.AZ-ZEN
10230869 2007-02-09   03:33:43  Mw 3.9   -116.1357     33.2220  20.99 km
        PER.CI-EN
      BVDA2.AZ-ZEN
14383980 2008-07-29   18:42:16  Mw 5.4   -117.7610     33.9530  14.23 km
        PER.CI-EN
        HWB.AZ-ZEN
14408052 2008-12-06   04:18:43  Mw 5.0   -116.4190     34.8130   6.10 km
        PER.CI-EN
10370141 2009-01-09   03:49:46  Mw 4.4   -117.3040     34.1070  14.20 km
        PER.CI-EN
14418600 2009-01-31   21:09:22  Mw 3.9   -117.7860     35.4130   8.50 km
        PER.CI-EN
```

E.3 Station–epochs with probable incorrect amplification (Figures E.23–E.29)

- VCS.CI: Figures E.23–E.25. The relative-low amplitude on all three components at VCS (Figure E.24) is not observed at stations in azimuthal directions on either side of VCS (Figures E.23 and E.25).

- SMTC.AZ: Figures E.26 and E.27. The relative-low amplitude for BHZ and BHT at SMTC.AZ (Figure E.24) is not observed at adjacent station SWS.CI (Figure E.26).

- BAR.CI: Figures E.28 and E.29. It is possible that for BAR.CI the amplification problem is only with the east component. This inference is based on the fact that the amplification is observed primarily on the transverse component for north-south paths (Figures E.28 and E.29), and it is observed primarily on the radial component for east-west paths (9075803, 9154092).

Detailed list of seismograms exhibiting amplification problems

- VCS.CI: 7112721 9044494 9044650 9045109 9064093 9064568 9069997 9070083

- SMTC.AZ: 3317364 9075803 9086693

- BAR.CI: 9075803 (R) 9154092 (R) 3320736 (T) 3321426 (T) 3321590 (T) 9085734 (T) 9109287 (T) 9109442 (T) 9109636 (T) 9110685 (T) 9112735 (T) 9114763 (T) 9114812 (T) 9114858 (T) 9117942 (T) 9119414 (T) 9140050 (T)

Next I list all the events above in order of increasing origin time, with each problematic station listed on the following line(s). Note that these records are only the ones that I have identified directly as having a problem. I expect that records at the same stations during the same epochs would exhibit the **amplification problem** as well.

```
9044494 1998-03-06   05:47:40  Mw 4.9   -117.6405     36.0778   7.17 km
      VCS.CI-ZEN
9044650 1998-03-06   07:36:35  Mw 4.0   -117.6505     36.0737   7.93 km
      VCS.CI-ZEN
9045109 1998-03-07   00:36:46  Mw 4.5   -117.6200     36.0912   6.99 km
      VCS.CI-ZEN
9064093 1998-08-16   13:34:40  Mw 4.4   -116.9232     34.1245   5.98 km
      VCS.CI-ZEN
9064568 1998-08-20   23:49:58  Mw 4.1   -117.6502     34.3737   9.51 km
      VCS.CI-ZEN
7112721 1998-10-01   18:18:15  Mw 4.2   -116.9158     34.1155   5.40 km
      VCS.CI-ZEN
9069997 1998-10-27   01:08:40  Mw 4.4   -116.8418     34.3208   6.02 km
      VCS.CI-ZEN
9070083 1998-10-27   15:40:16  Mw 3.8   -116.8455     34.3202   5.48 km
      VCS.CI-ZEN
9075803 1999-01-13   13:20:56  Mw 4.2   -115.9248     32.7190   8.00 km
      SMT.AZ-ZEN
        BAR.CI-E
9085734 1999-05-05   02:17:46  Mw 3.6   -116.3697     34.0725   2.58 km
        BAR.CI-E
9086693 1999-05-14   08:22:07  Mw 3.9   -116.3623     34.0375   3.98 km
      SMT.AZ-ZEN
3317364 1999-05-14   10:52:35  Mw 4.1   -116.3582     34.0378   4.01 km
      SMT.AZ-ZEN
3320736 1999-10-16   12:57:21  Mw 5.3   -116.2465     34.4368   7.96 km
        BAR.CI-E
9109287 1999-10-16   18:01:57  Mw 4.0   -116.3013     34.7087   6.65 km
        BAR.CI-E
9109442 1999-10-16   20:13:37  Mw 4.3   -116.2793     34.6940   3.18 km
        BAR.CI-E
9109636 1999-10-16   22:53:41  Mw 4.1   -116.3570     34.7097   9.52 km
        BAR.CI-E
9110685 1999-10-17   16:22:48  Mw 4.1   -116.1375     34.3465   3.96 km
        BAR.CI-E
9112735 1999-10-19   12:20:44  Mw 4.0   -116.3442     34.7110   9.34 km
        BAR.CI-E
3321590 1999-10-21   01:54:34  Mw 4.8   -116.3955     34.8735   3.33 km
        BAR.CI-E
9114763 1999-10-22   12:40:52  Mw 3.7   -116.2085     34.3300  11.53 km
        BAR.CI-E
9114812 1999-10-22   16:08:48  Mw 4.8   -116.4060     34.8620   3.02 km
        BAR.CI-E
9114858 1999-10-22   16:48:22  Mw 3.8   -116.3820     34.8292   5.15 km
        BAR.CI-E
9117942 1999-10-29   12:36:37  Mw 4.0   -116.2707     34.5200   2.90 km
        BAR.CI-E
3321426 1999-11-03   02:55:05  Mw 3.6   -116.2888     34.8031   6.06 km
        BAR.CI-E
9119414 1999-11-03   03:27:57  Mw 3.9   -116.3570     34.8470   5.90 km
        BAR.CI-E
9140050 2000-02-21   13:49:43  Mw 4.1   -117.2432     34.0588  16.34 km
        BAR.CI-E
9154092 2000-06-14   19:00:20  Mw 4.3   -115.5035     32.8898   8.73 km
        BAR.CI-E
```

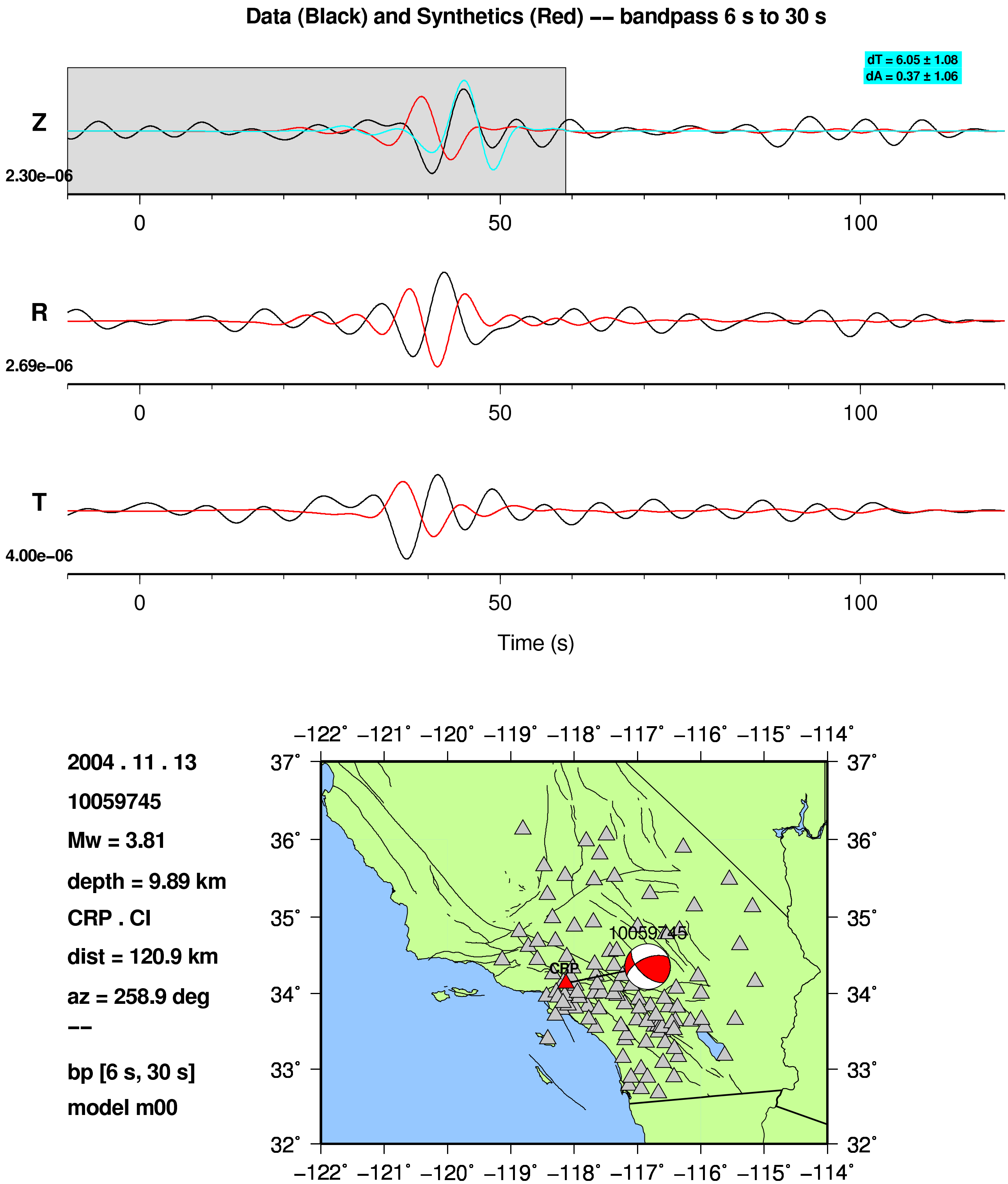


Figure E.1: Data (black) and synthetics (red), 6–30 s, from 10059745 to CRP.CI. The measurement algorithm selects a large time shift for the Rayleigh wave, but this is due to the station error, not to the source or structure. Compare with Figure E.2.

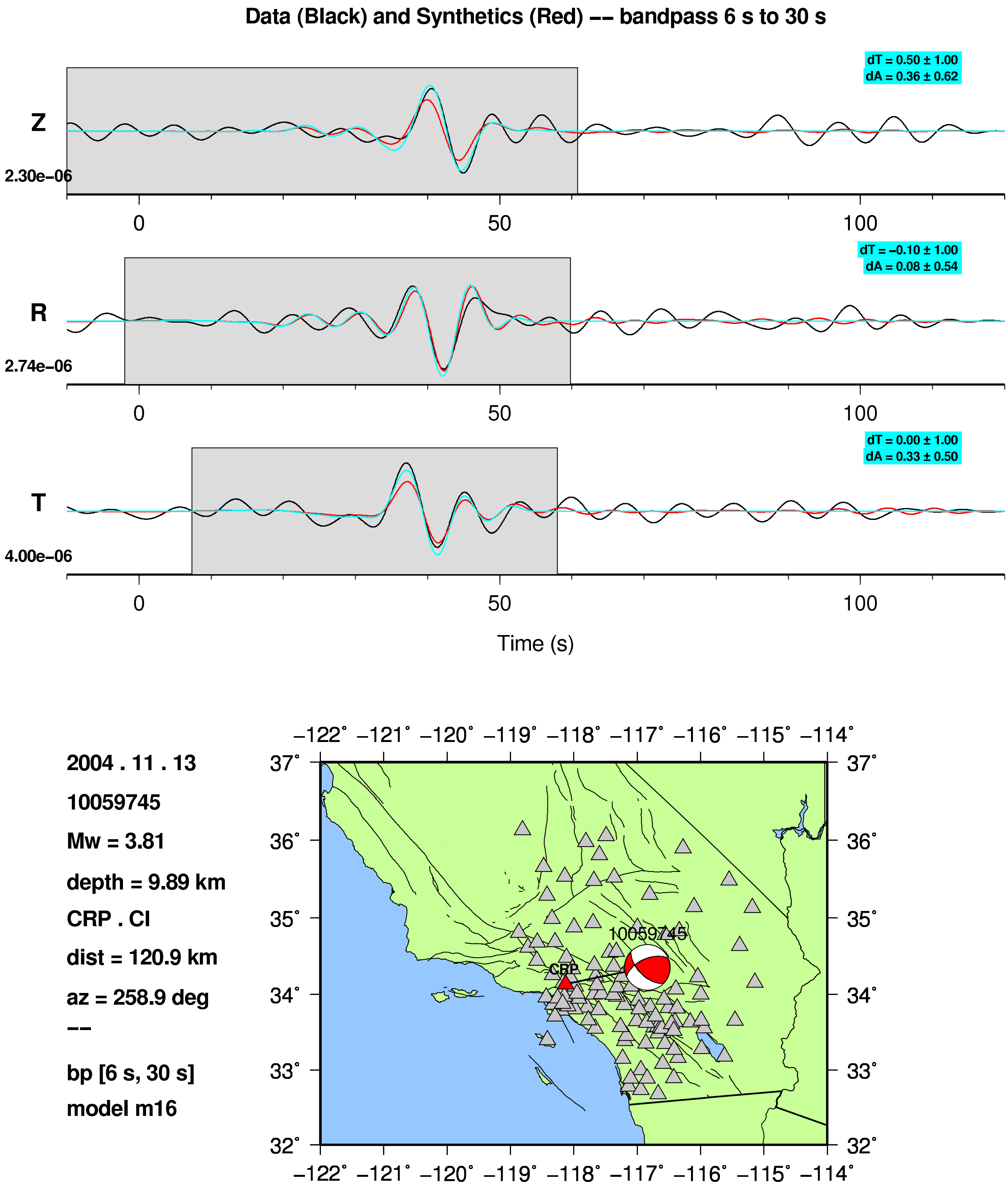


Figure E.2: Data (black) and synthetics (red), 6–30 s, from 10059745 to CRP.CI. In this case, I have flipped the sign of the constant value in the pole-zero file. Compare with Figure E.1.

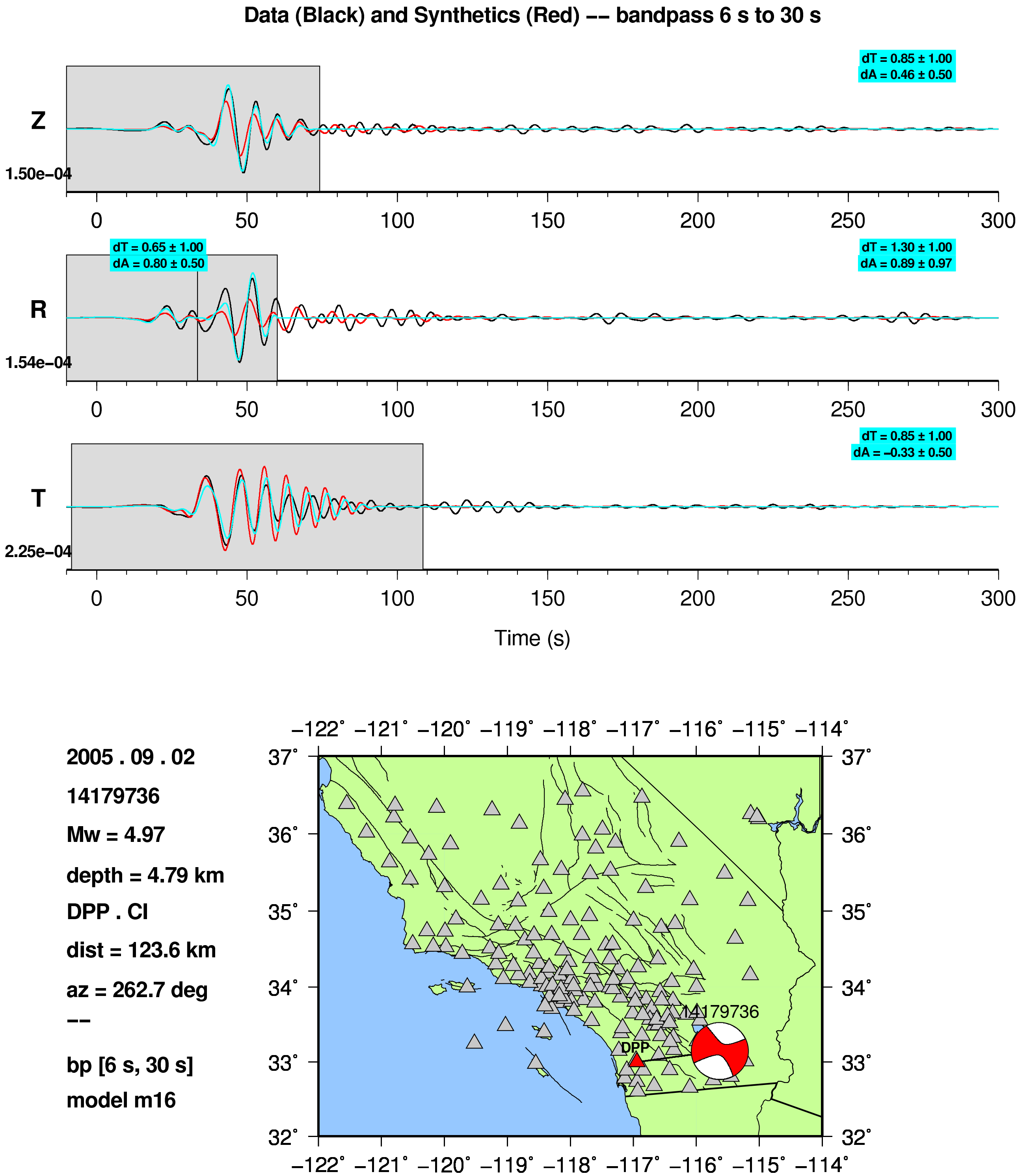


Figure E.3: Data (black) and synthetics (red), 6–30 s, from 14179736 to DPP.CI. Compare with Figure E.4.

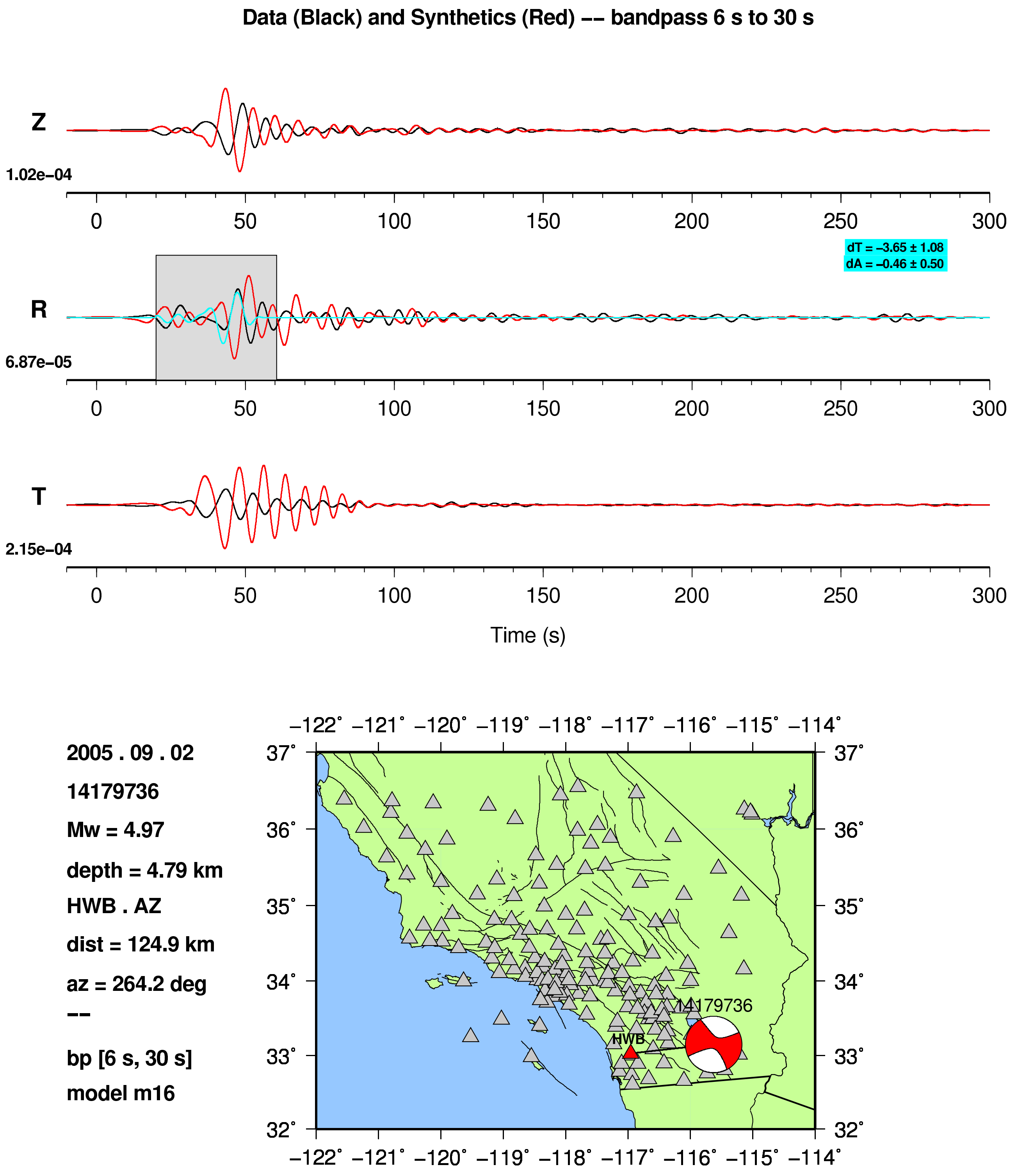


Figure E.4: Data (black) and synthetics (red), 6–30 s, from 14179736 to HWB.AZ. The measurement algorithm selects a large time shift for the radial-component Rayleigh wave, but this is due to the station error, not to the source or structure. Compare with Figure E.3.

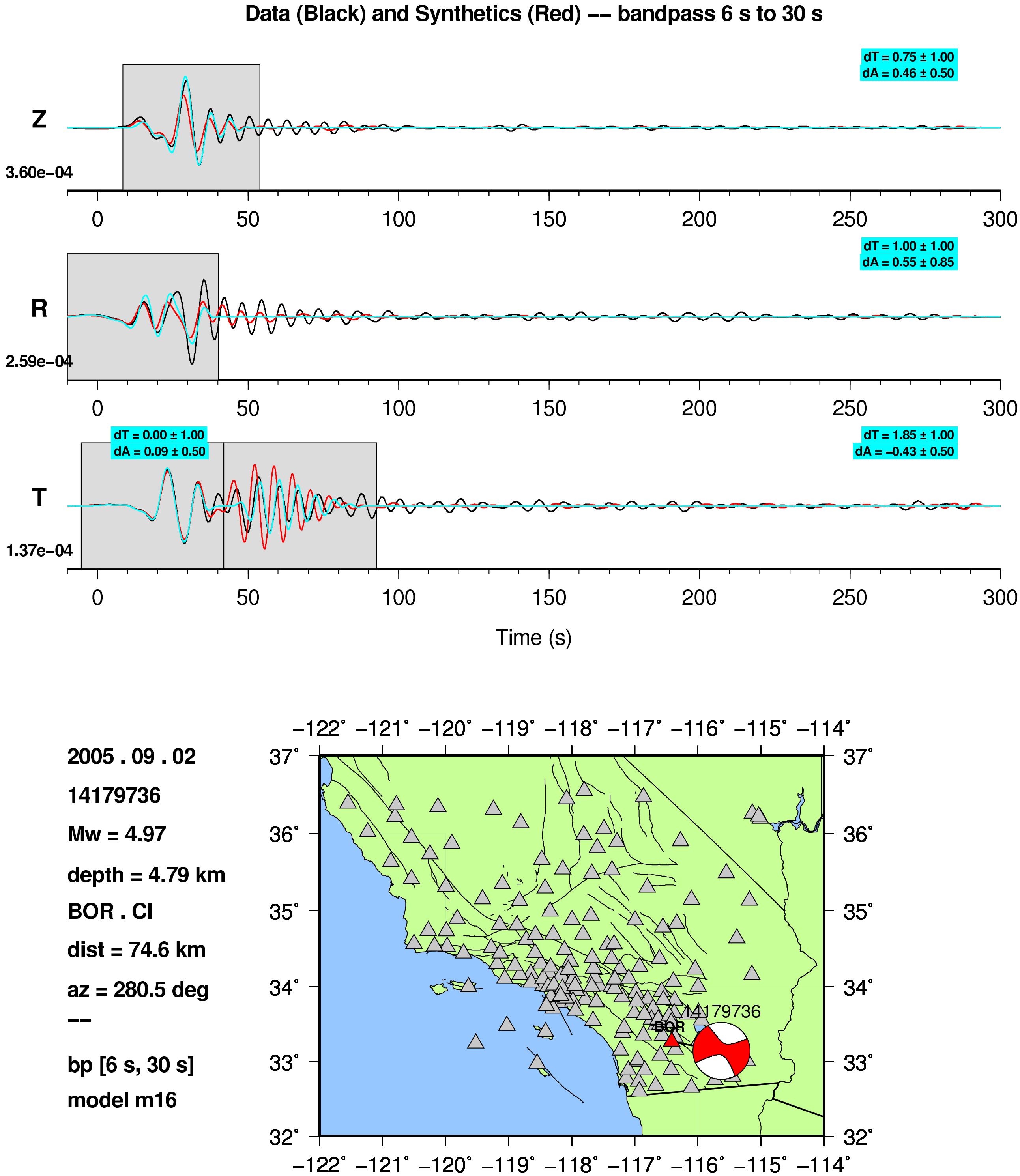


Figure E.5: Data (black) and synthetics (red), 6–30 s, from 14179736 to BOR.CI. Compare with Figure E.6.

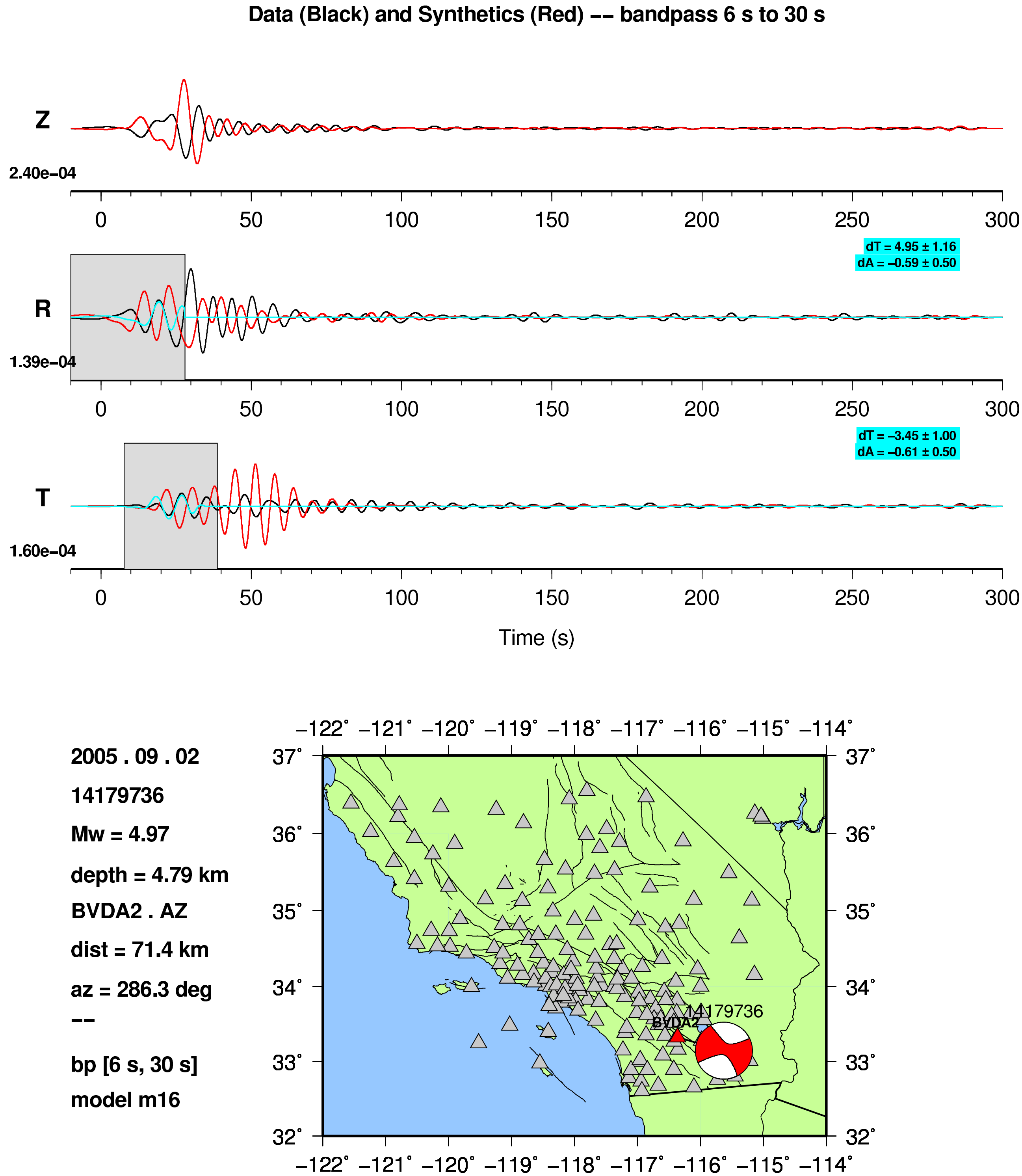


Figure E.6: Data (black) and synthetics (red), 6–30 s, from 14179736 to BVDA2.AZ. The measurement algorithm mistakenly selects the large time shifts for the Rayleigh wave, but this is due to the station error, not to the source or structure. Compare with Figure E.5.

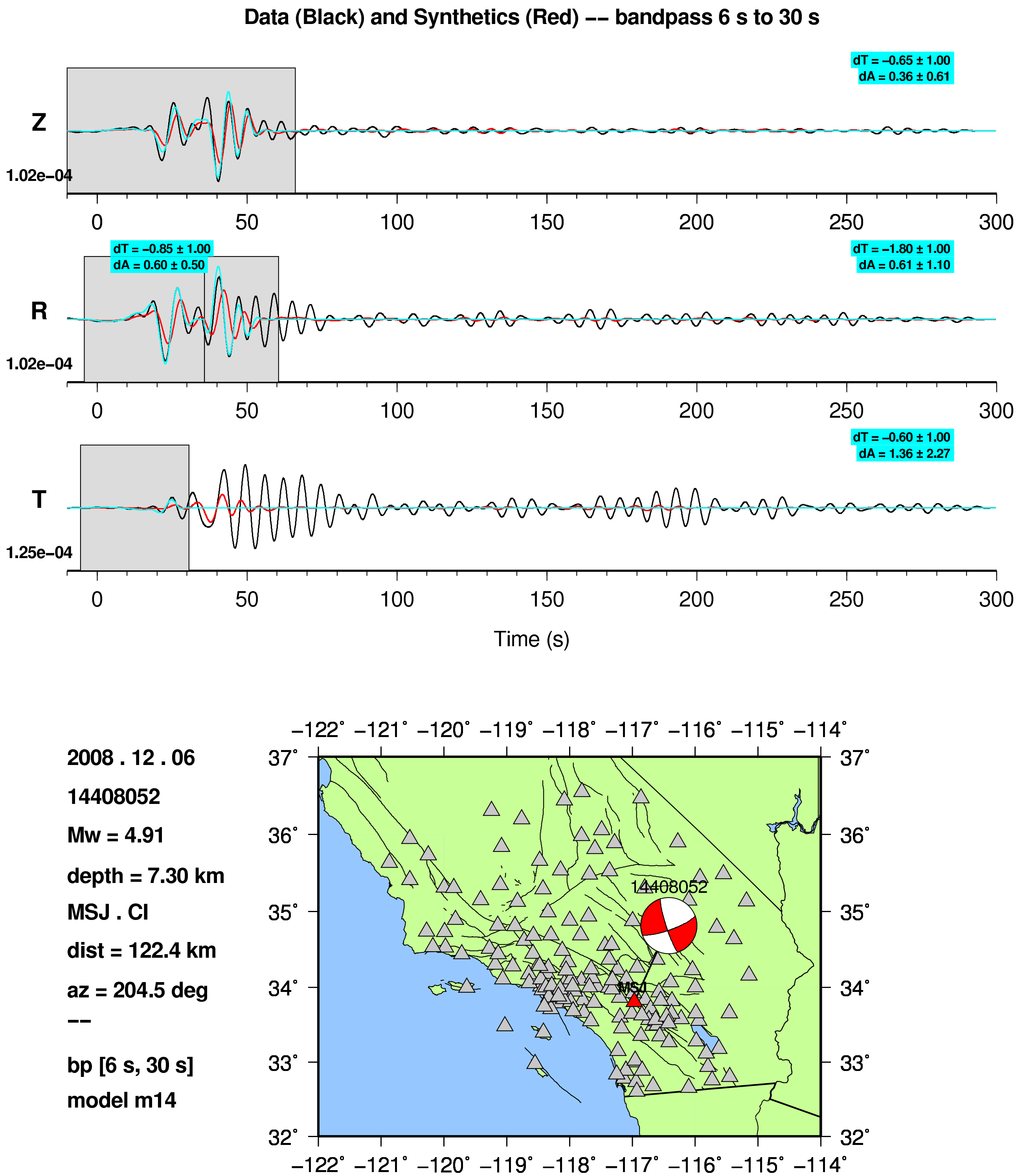


Figure E.7: Data (black) and synthetics (red), 6–30 s, from 14408052 to MSJ.CI. Compare with Figure E.8.

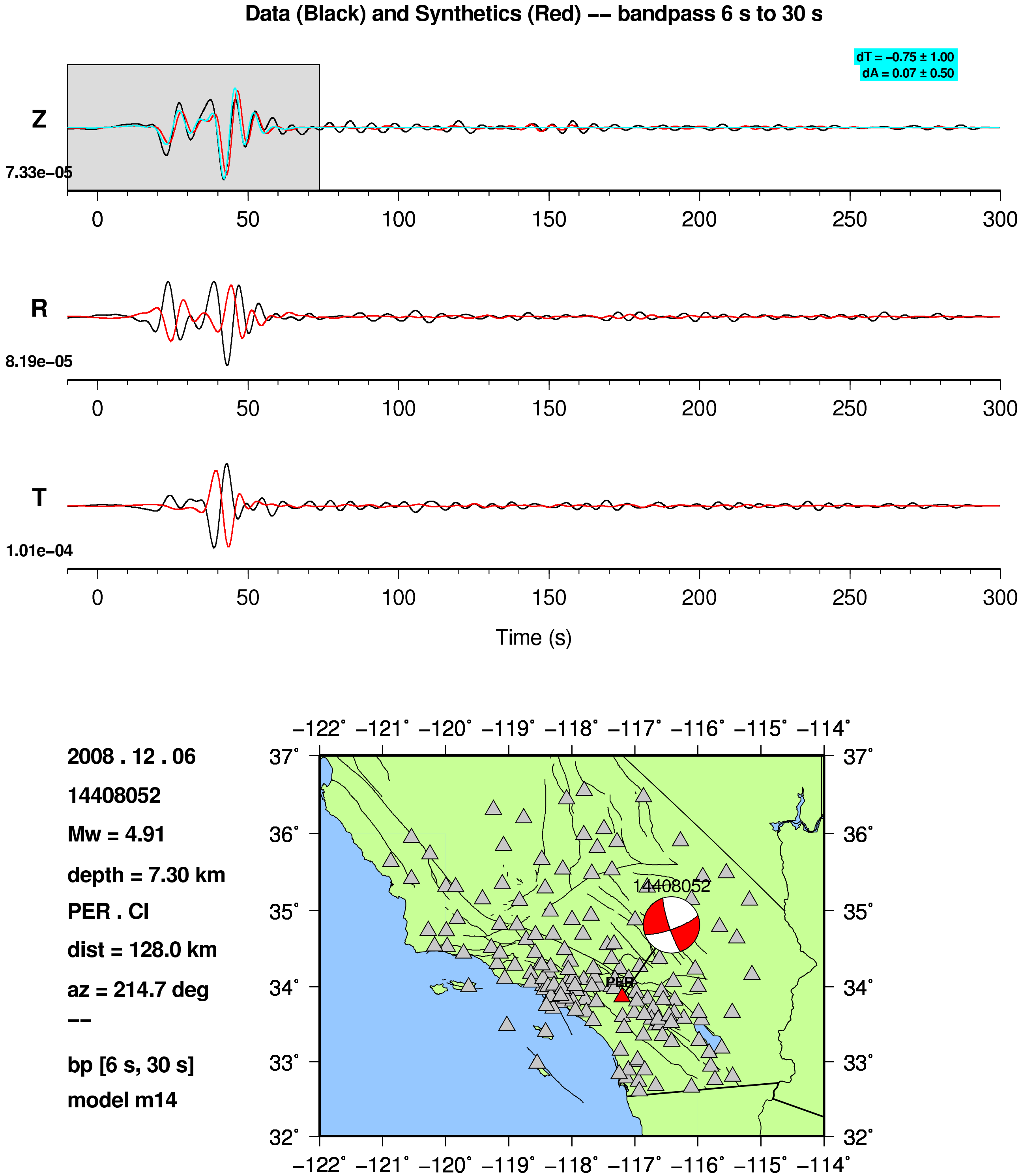


Figure E.8: Data (black) and synthetics (red), 6–30 s, from 14408052 to PER.CI. Compare with Figures E.7 and E.9.

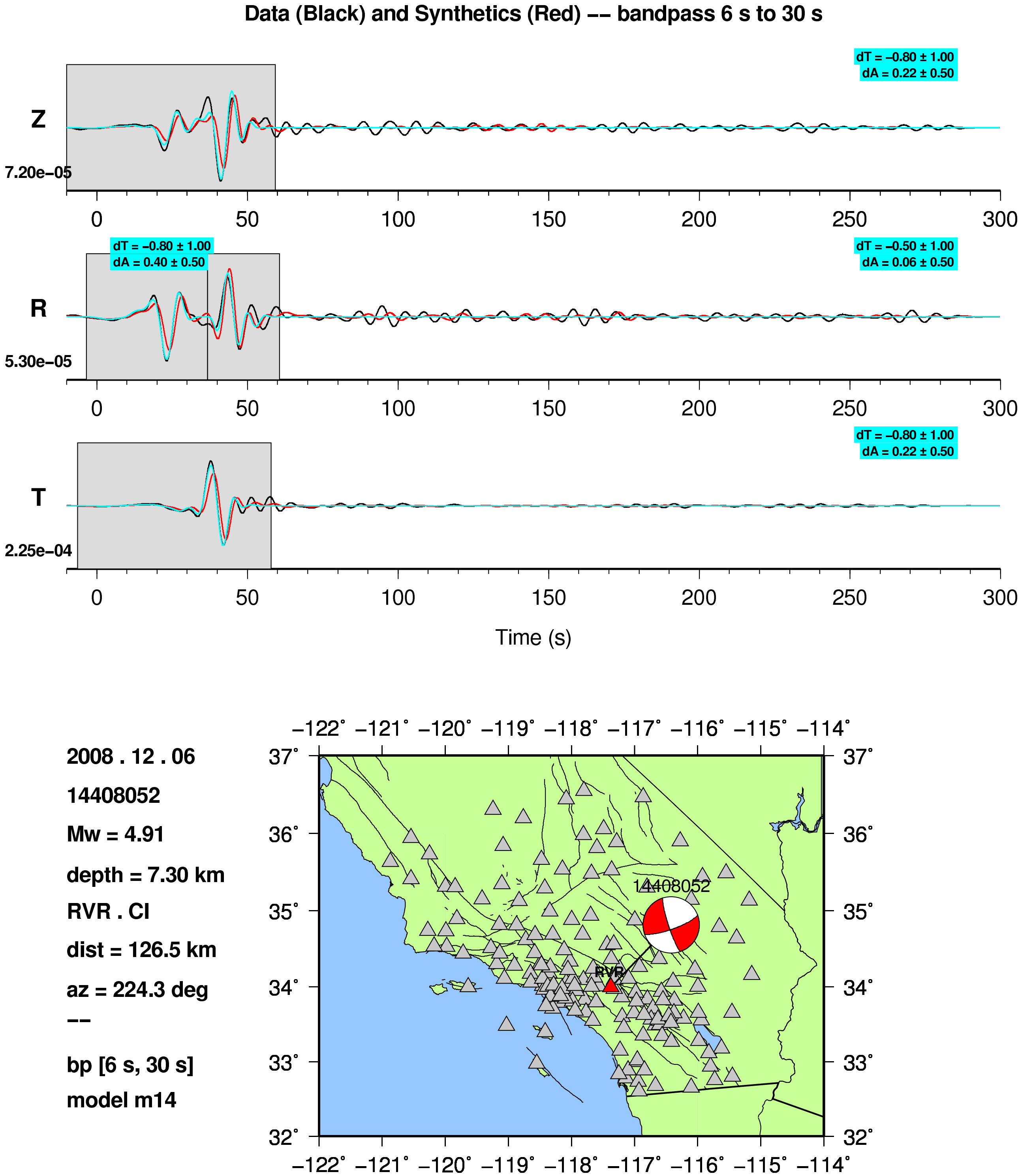
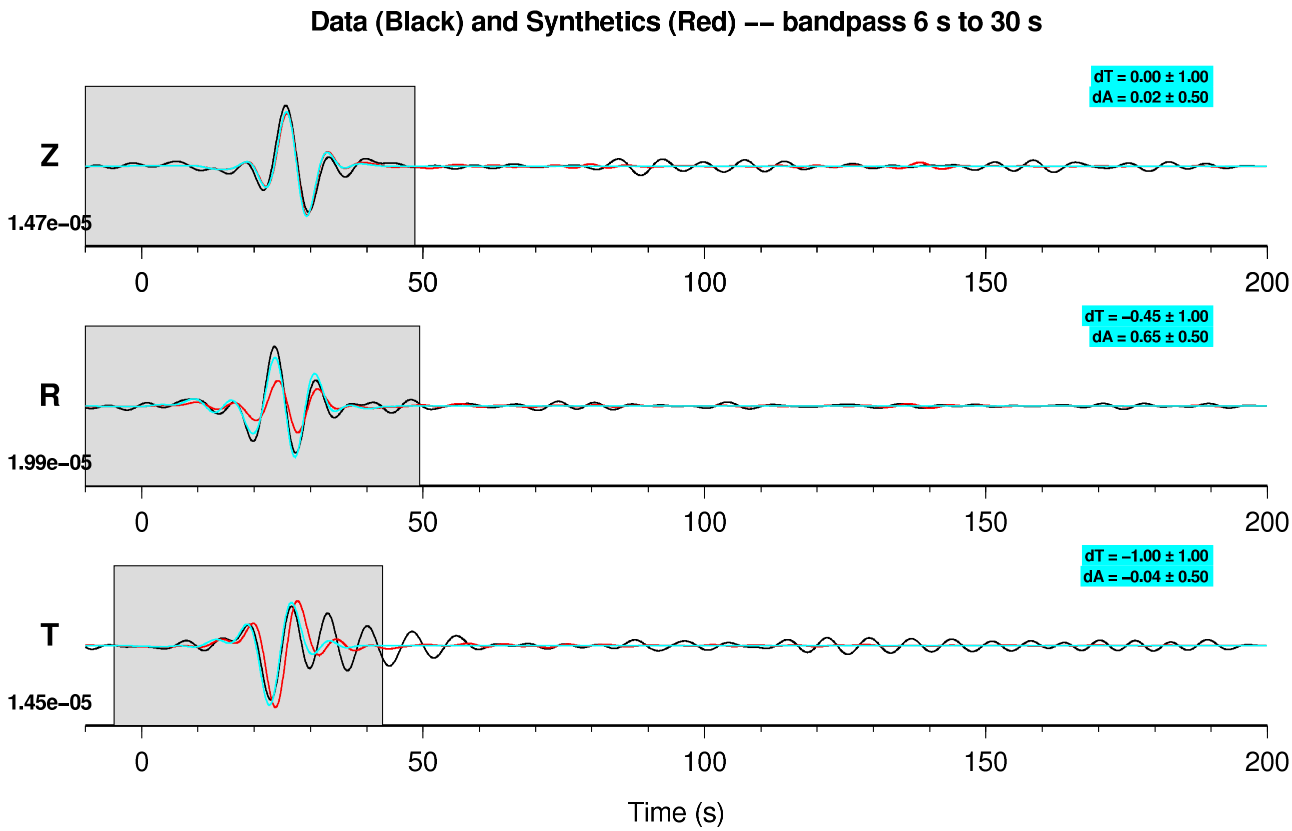


Figure E.9: Data (black) and synthetics (red), 6–30 s, from 14408052 to RVR.CI. Compare with Figure E.8.



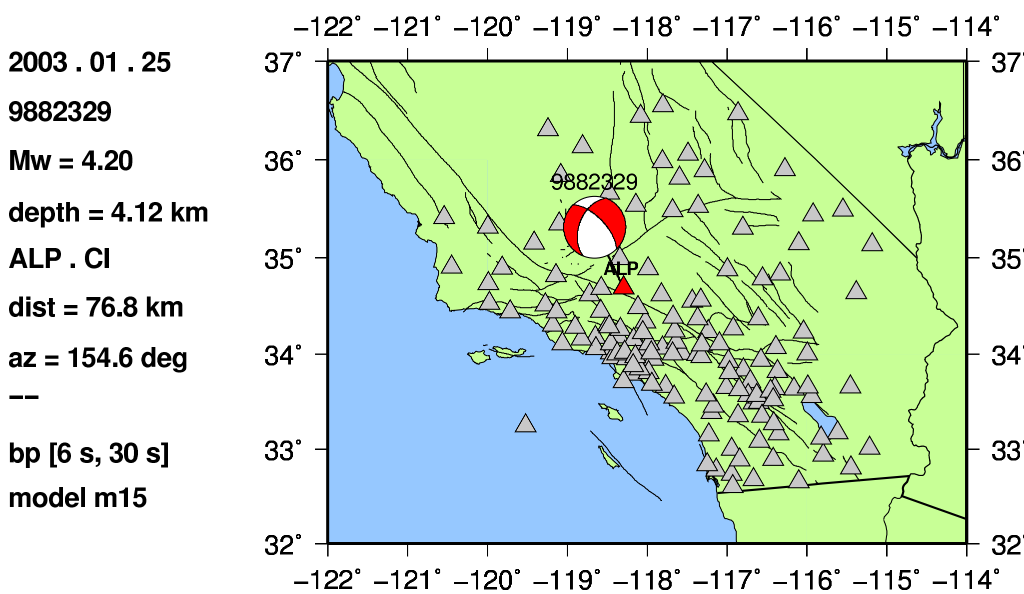
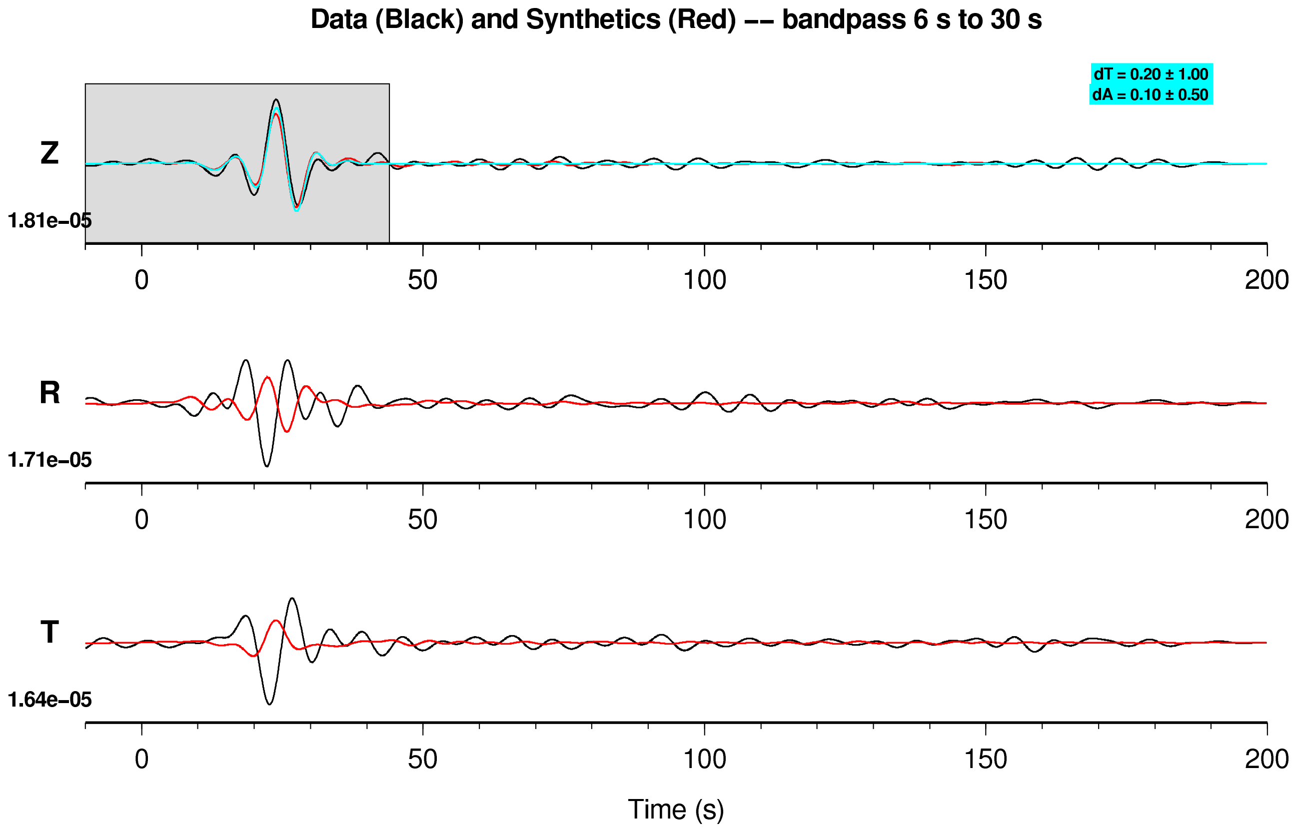


Figure E.10: Data (black) and synthetics (red), 6–30 s, from 14138080 to ALP.CI. Compare with Figure E.11.



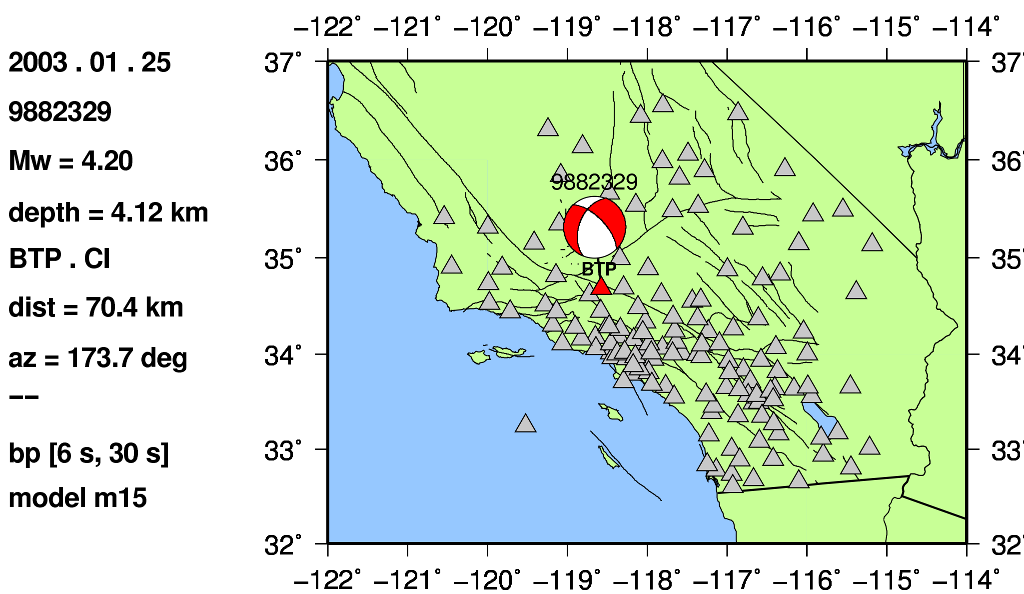
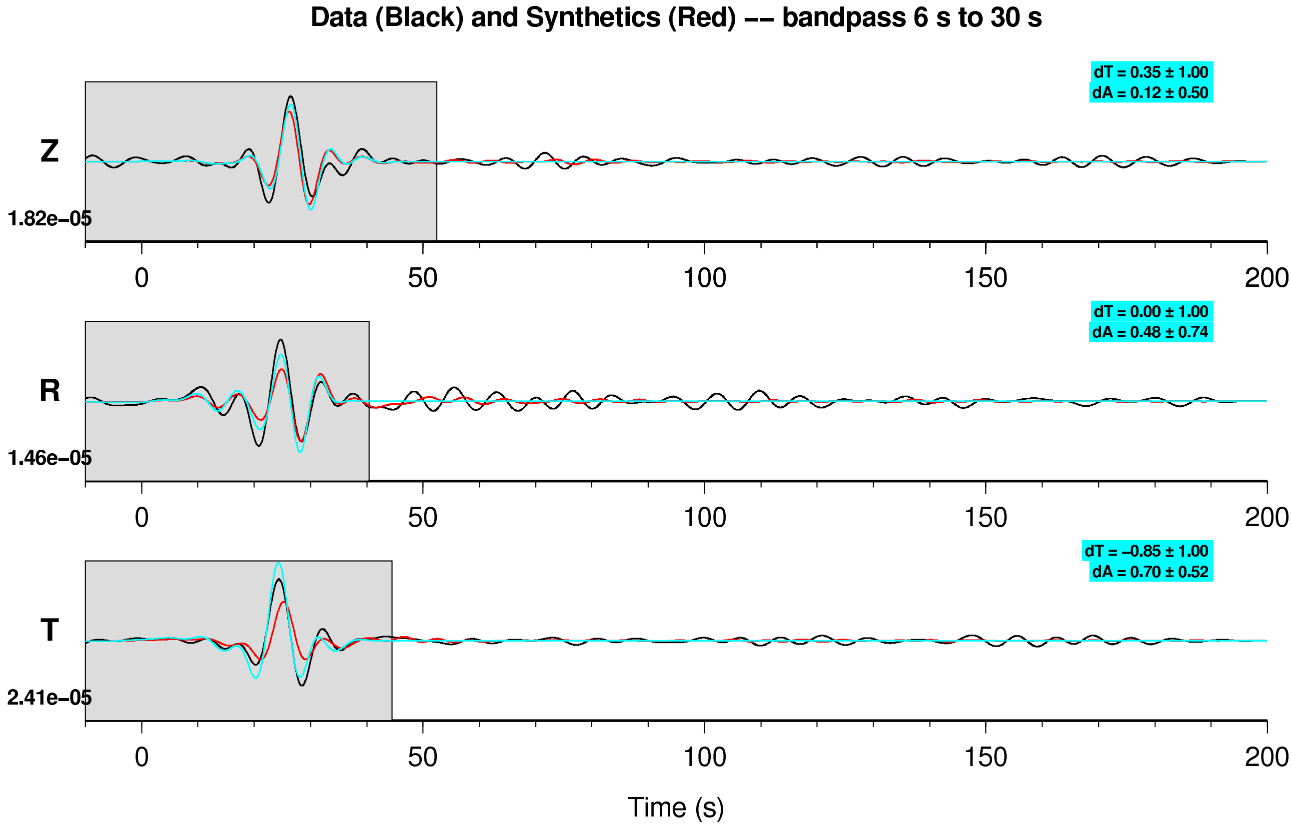


Figure E.11: Data (black) and synthetics (red), 6–30 s, from 14138080 to BTP.CI. Compare with Figures E.10 and E.12.



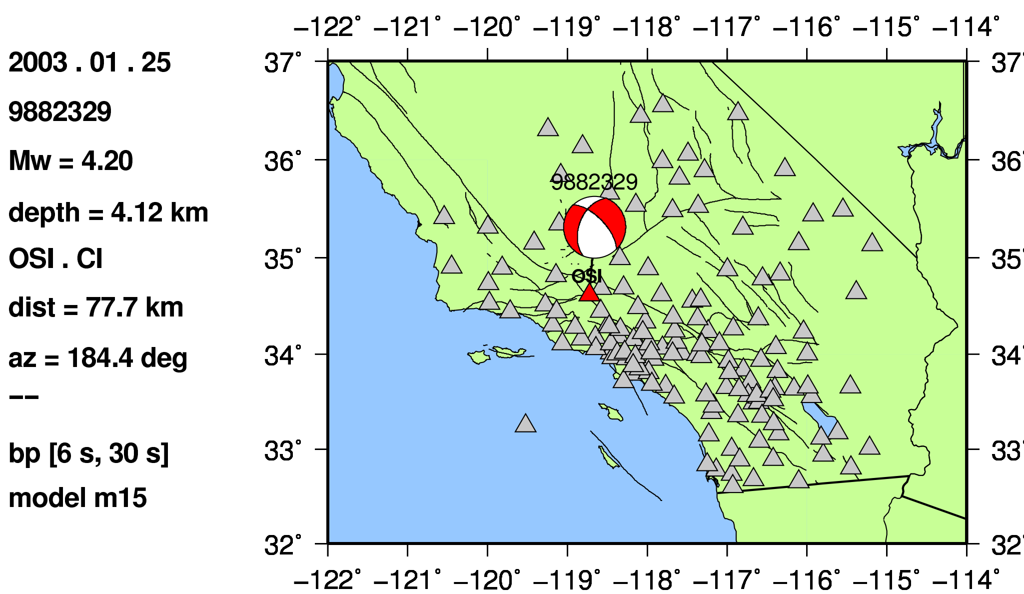


Figure E.12: Data (black) and synthetics (red), 6–30 s, from 14138080 to OSI.CI. Compare with Figure E.11.

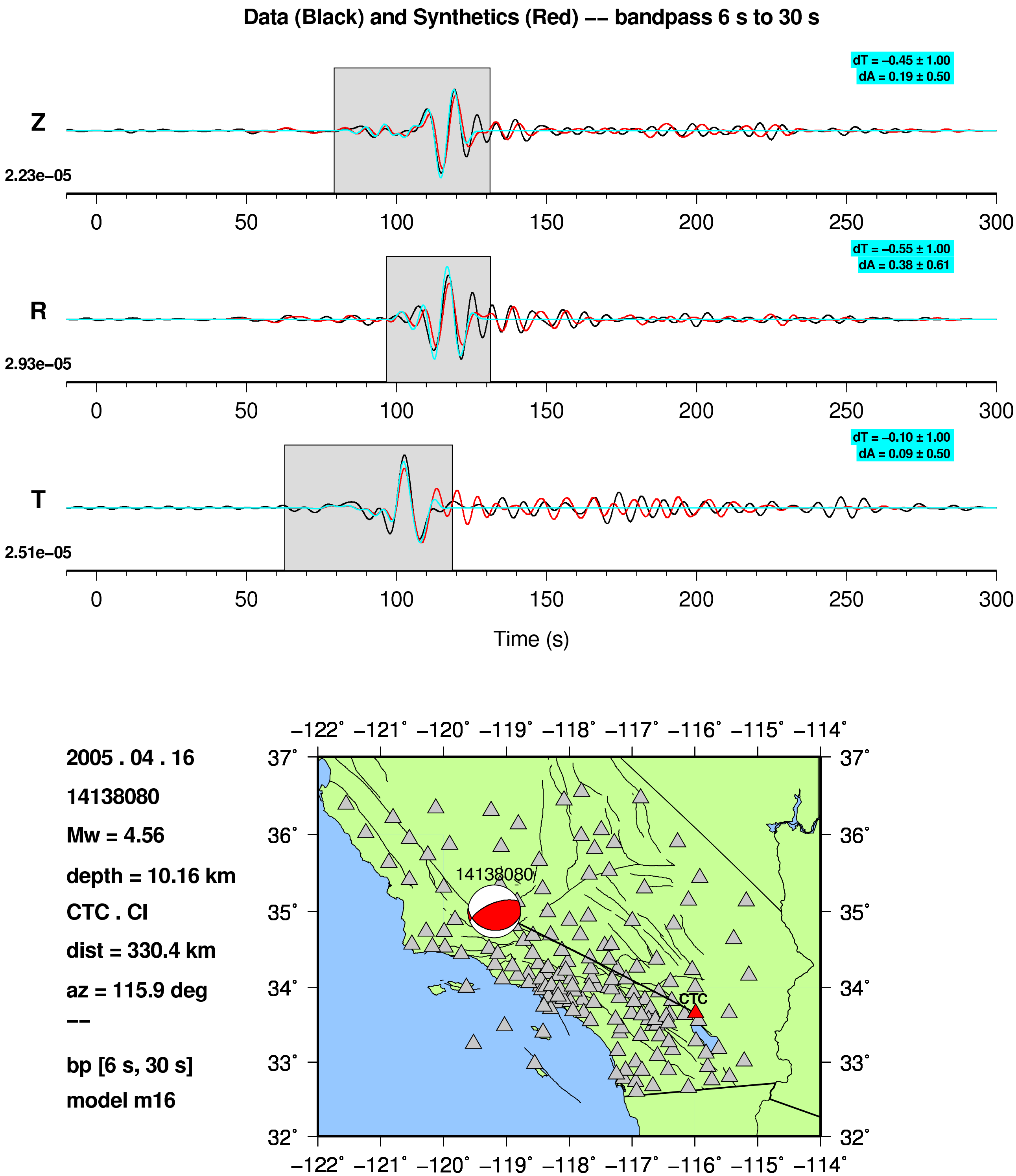
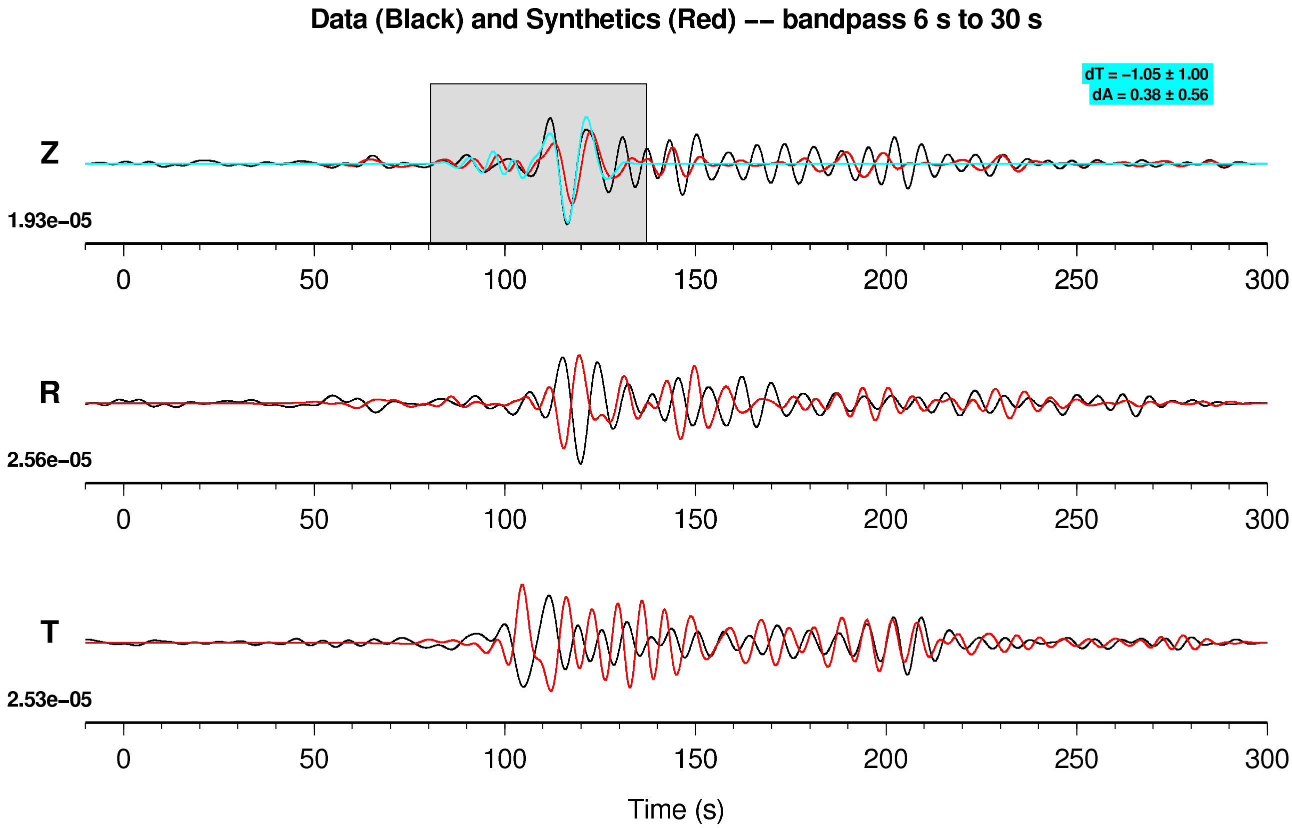


Figure E.13: Data (black) and synthetics (red), 6–30 s, from 14138080 to CTC.CI. Compare with Figure E.14.



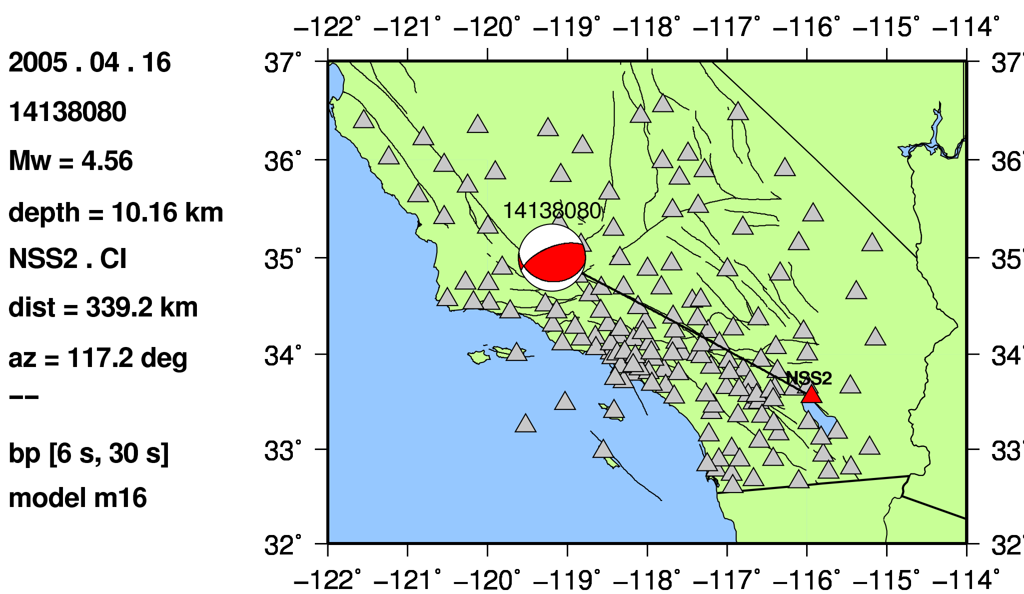
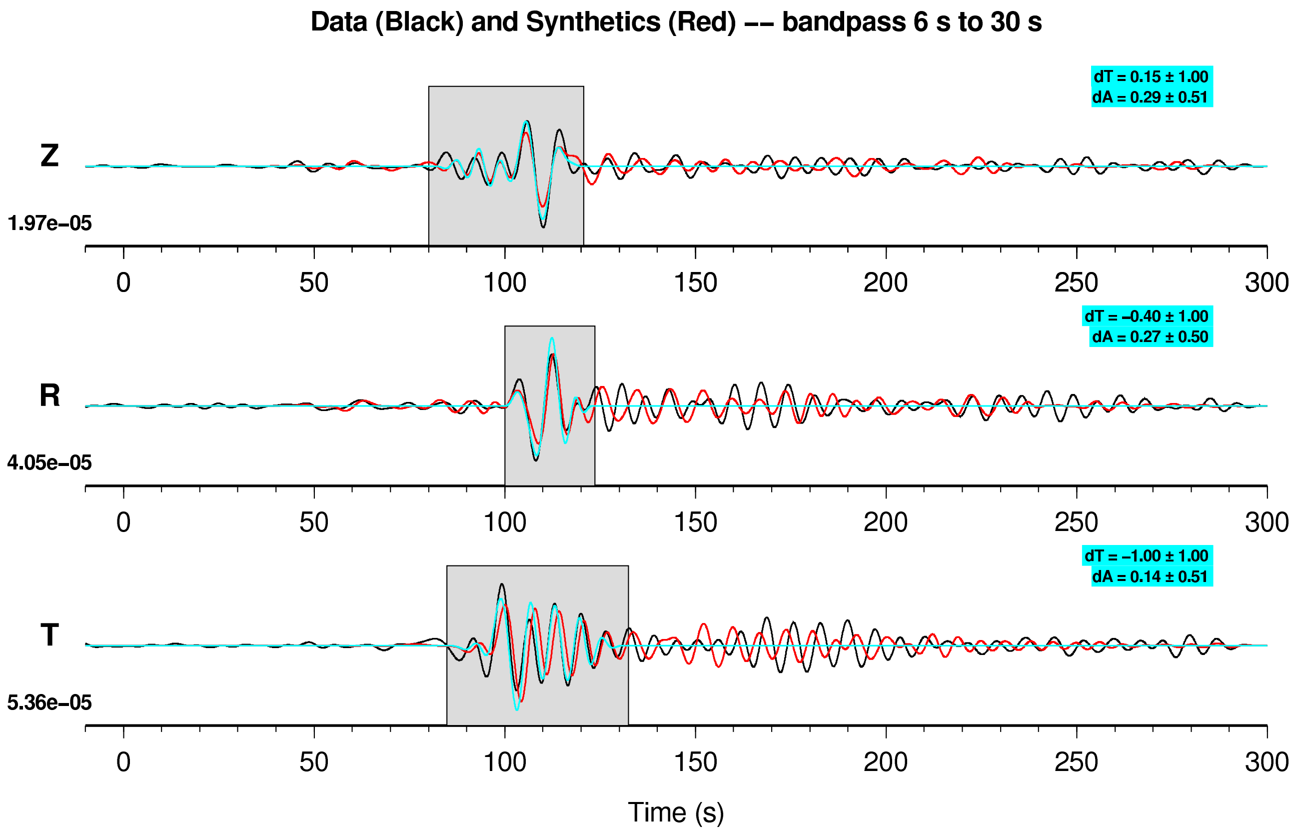


Figure E.14: Data (black) and synthetics (red), 6–30 s, from 14138080 to NSS2.CI. Compare with Figures E.13 and E.15.



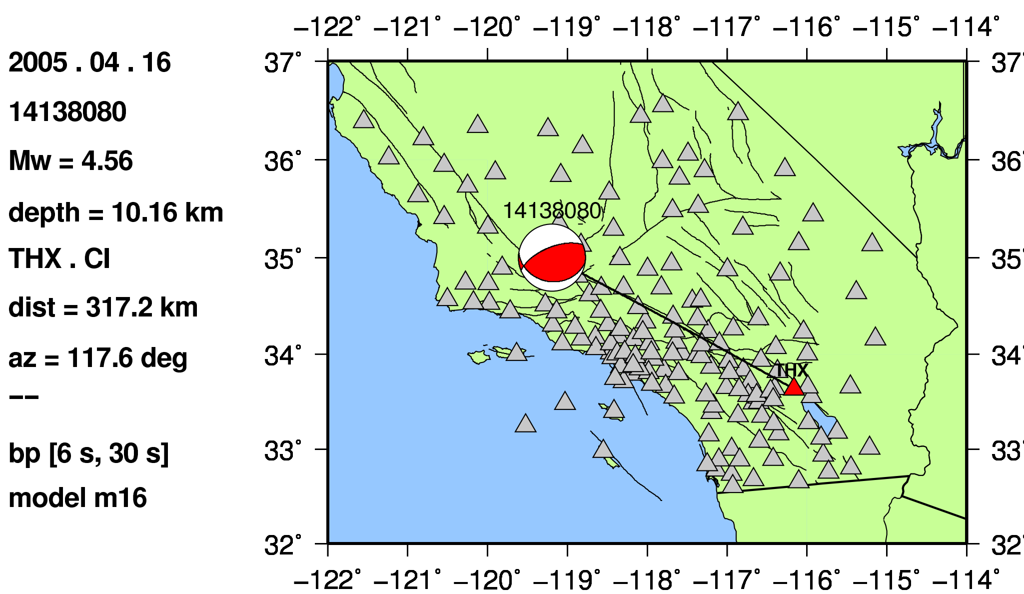


Figure E.15: Data (black) and synthetics (red), 6–30 s, from 14138080 to THX.CI. Compare with Figure E.14.

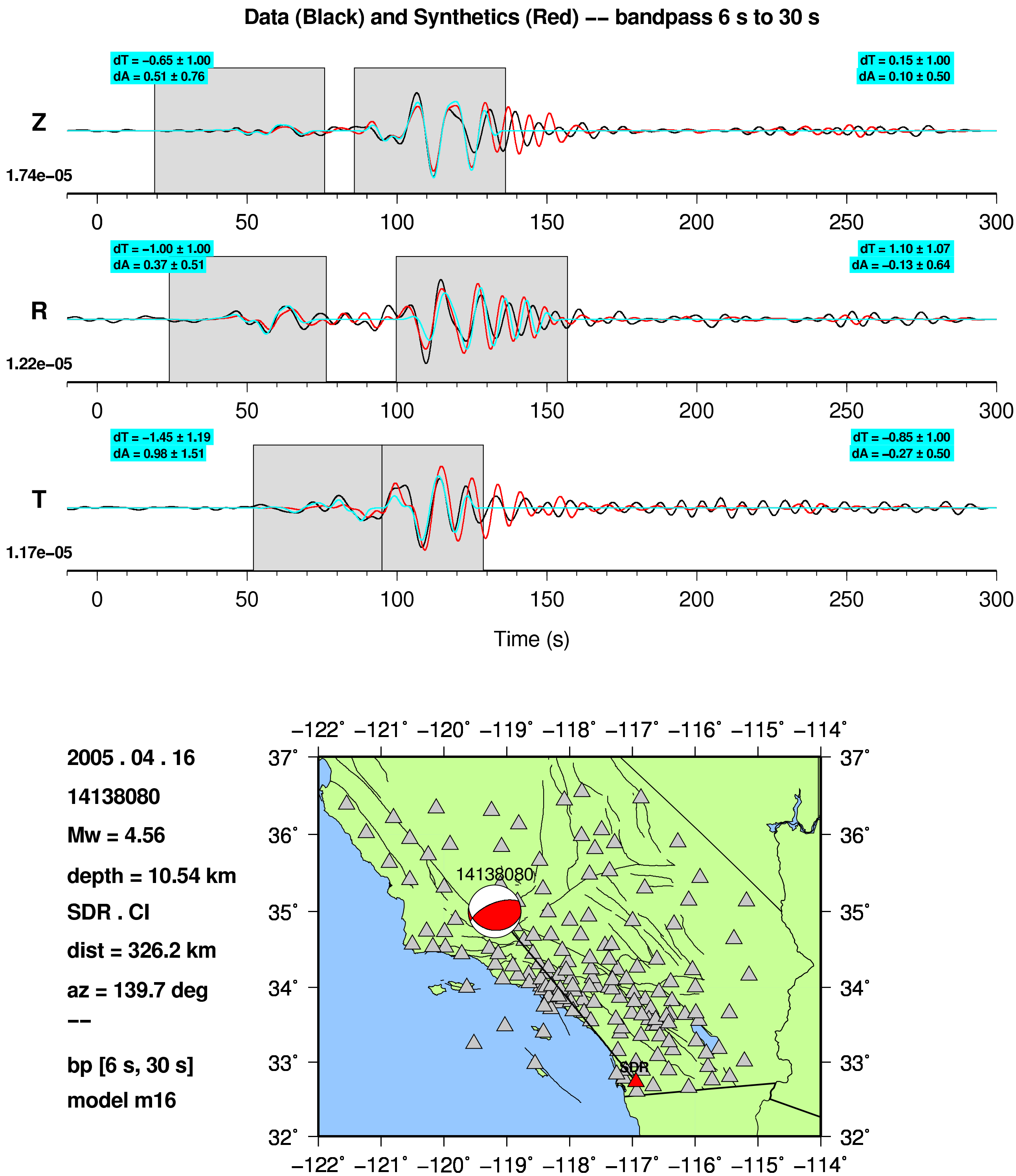


Figure E.16: Data (black) and synthetics (red), 6–30 s, from 14138080 to SDR.CI. Compare with Figure E.17.

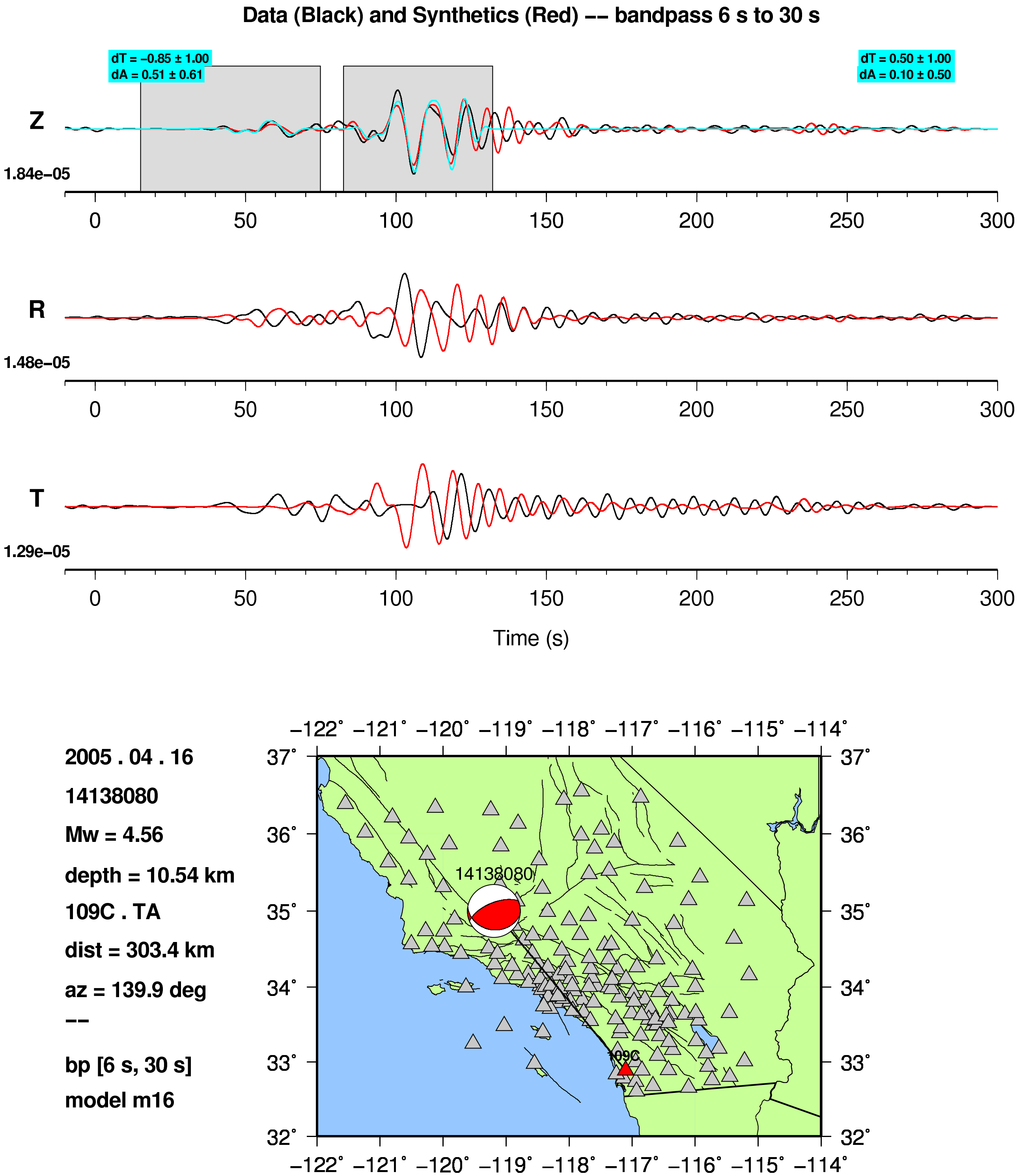
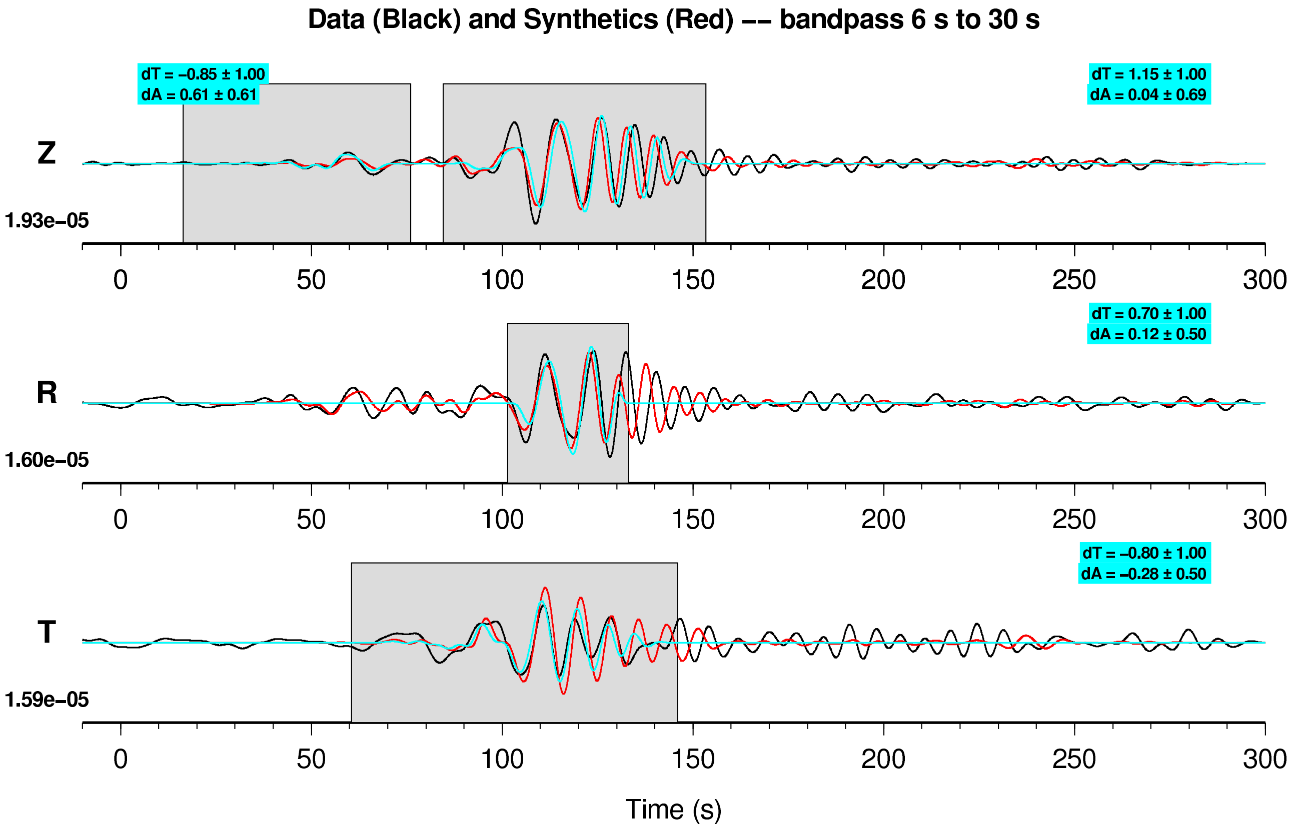


Figure E.17: Data (black) and synthetics (red), 6–30 s, from 14138080 to 109C.TA. Compare with Figures E.16 and E.18.



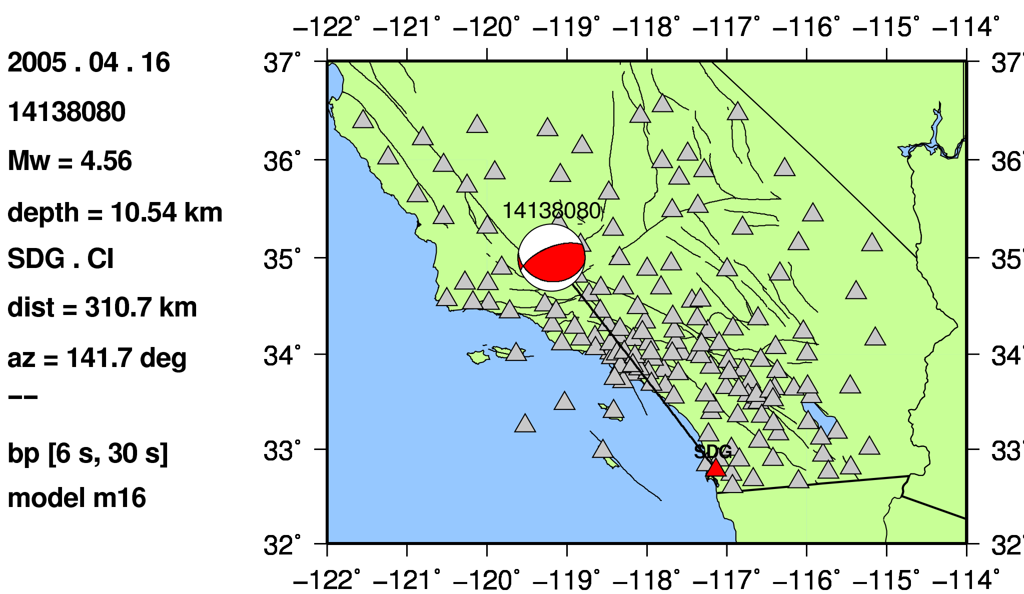


Figure E.18: Data (black) and synthetics (red), 6–30 s, from 14138080 to SDG.CI. Compare with Figure E.17.

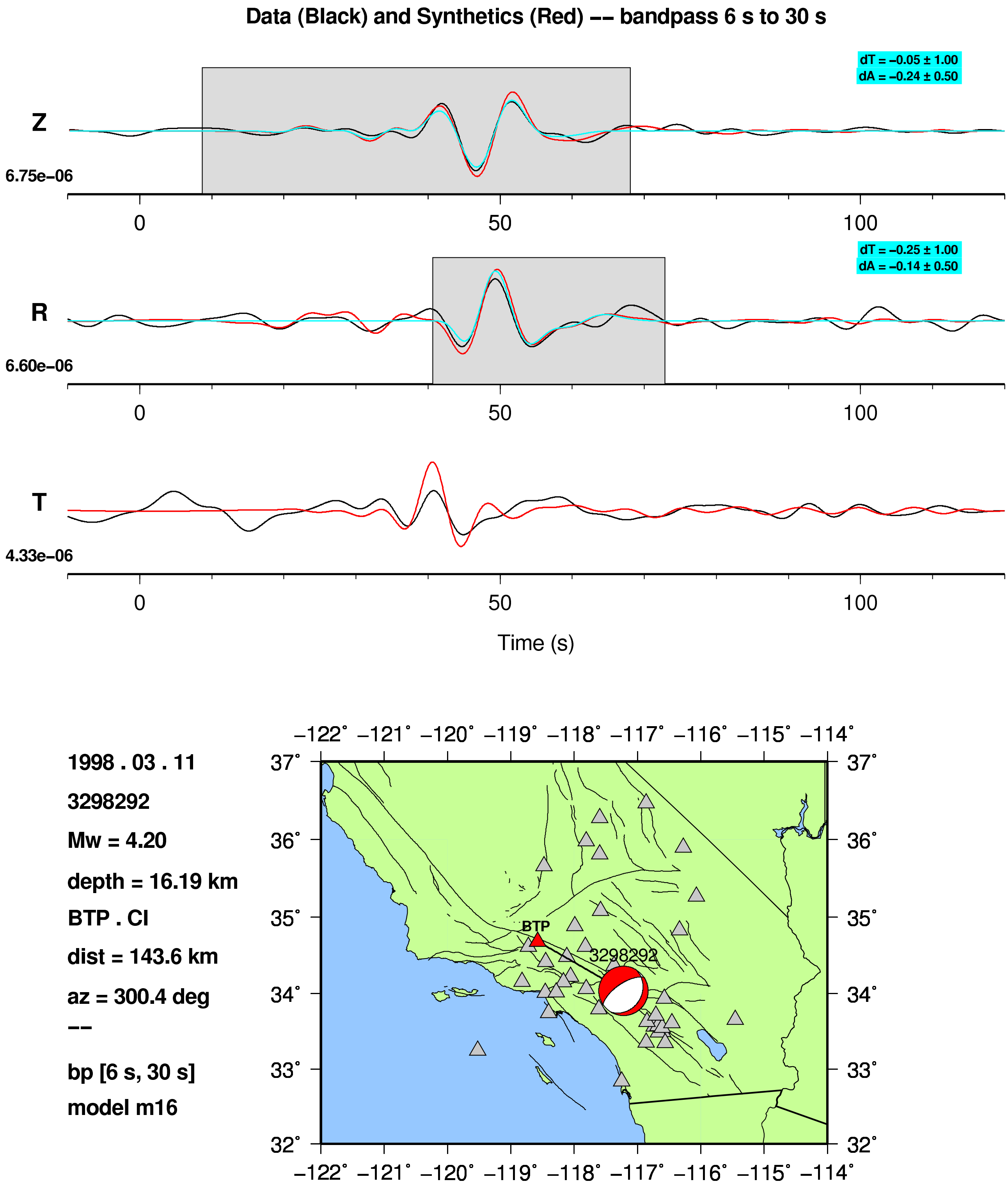
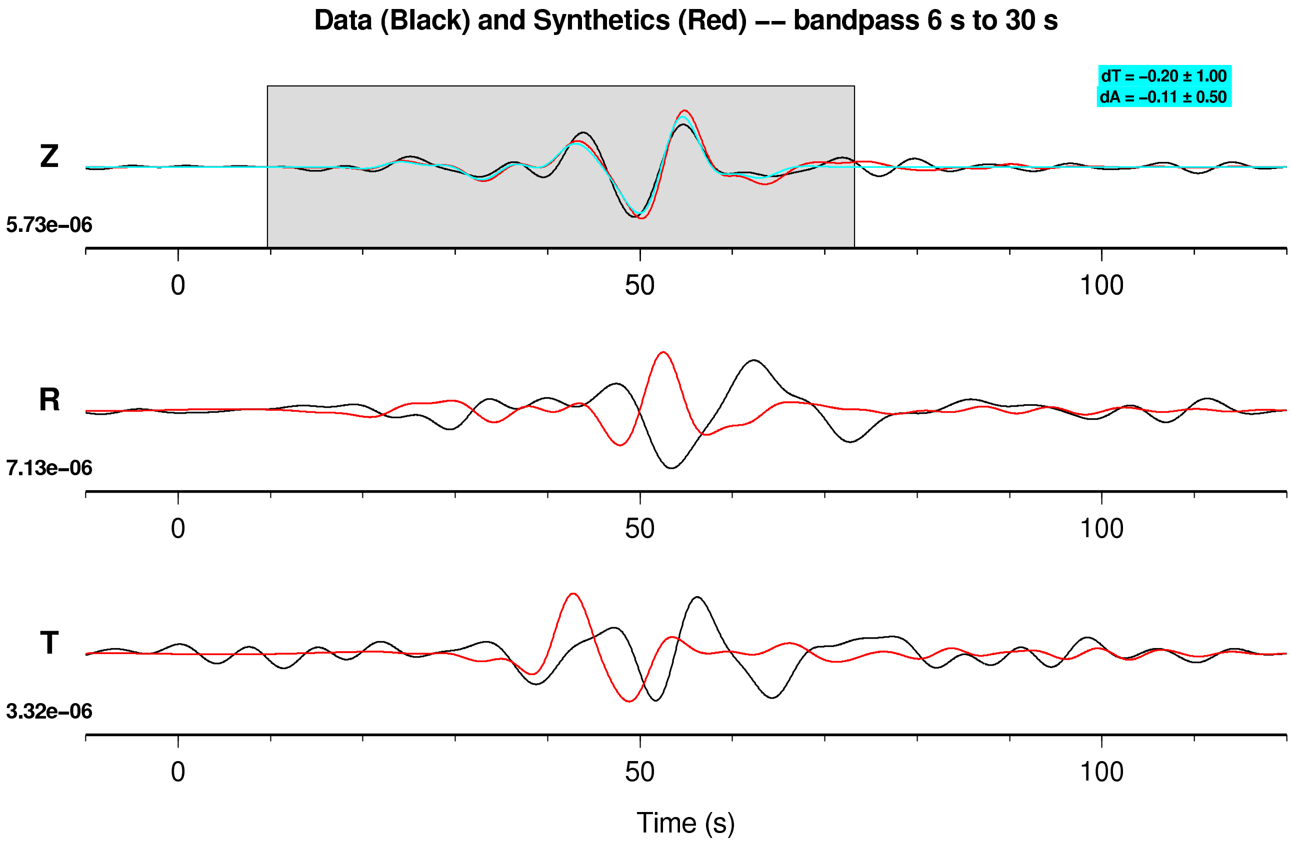


Figure E.19: Data (black) and synthetics (red), 6–30 s, from 3298292 to BTP.CI. Note that the polarity problem on this east-west-oriented path is most apparent on the radial component. Compare with Figure E.20.



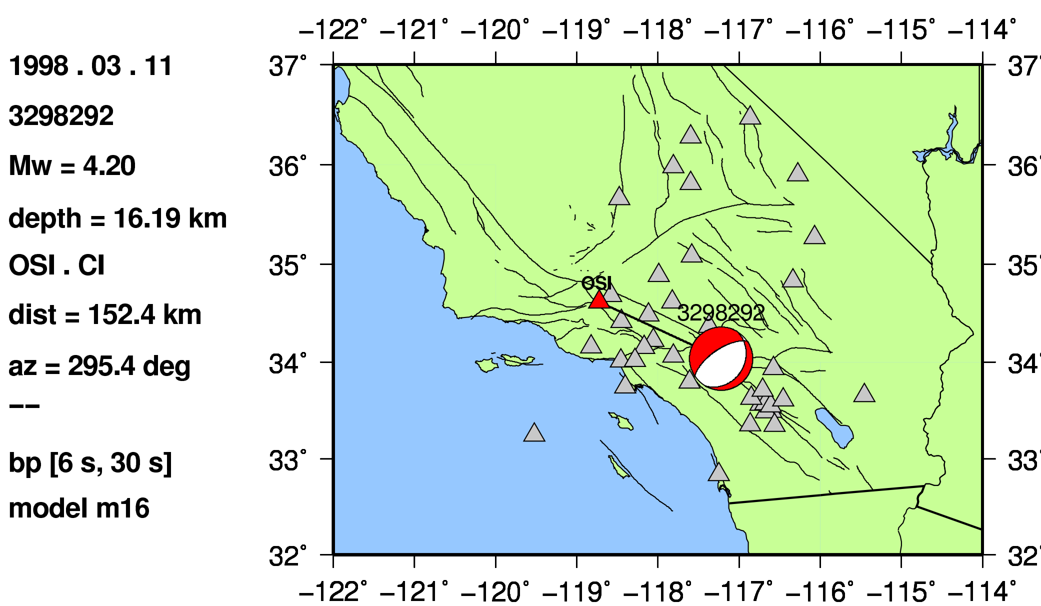


Figure E.20: Data (black) and synthetics (red), 6–30 s, from 3298292 to OSI.CI. Compare with Figure E.12.

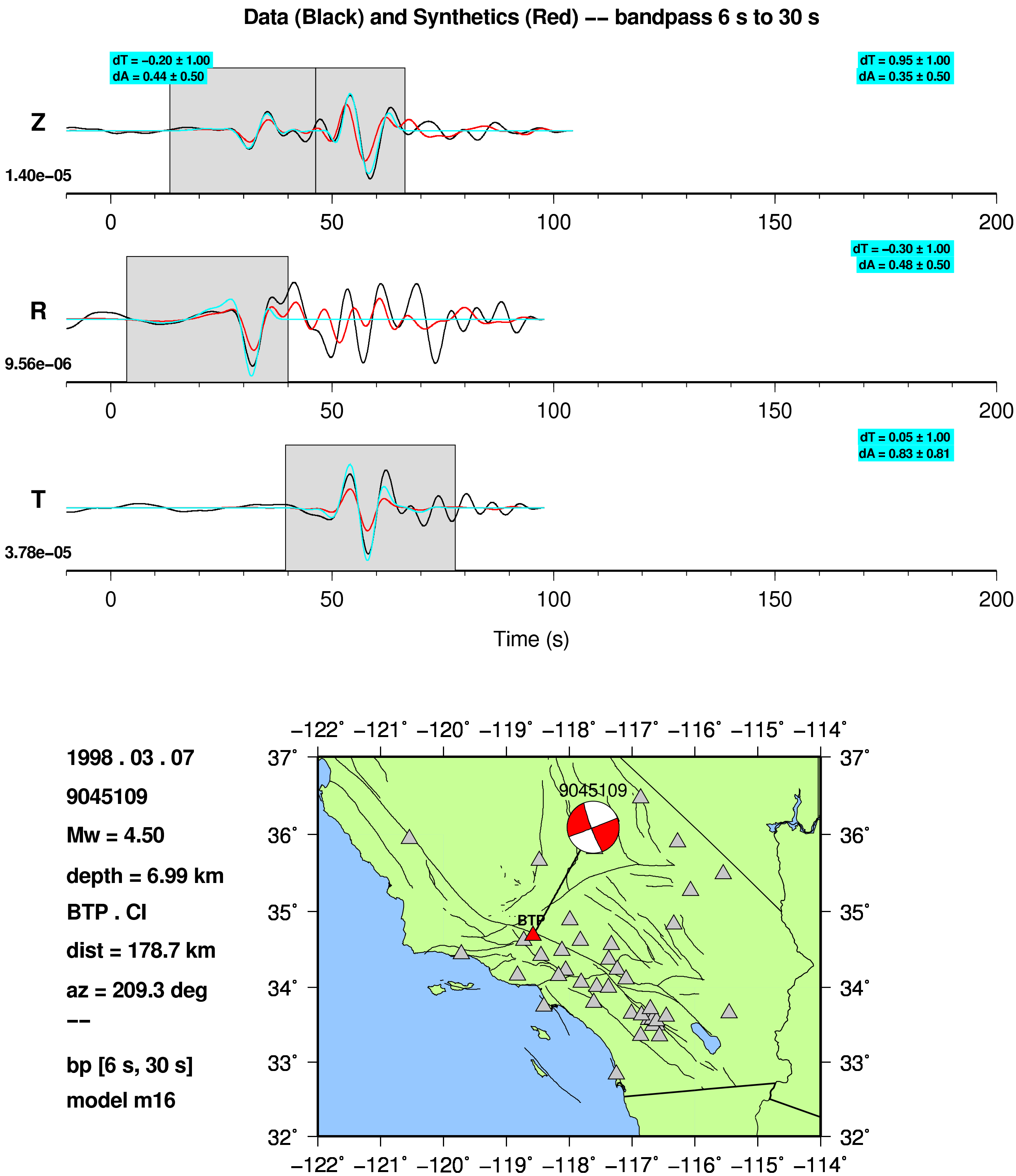


Figure E.21: Data (black) and synthetics (red), 6–30 s, from 9045109 to BTP.CI. Compare with Figure E.22.

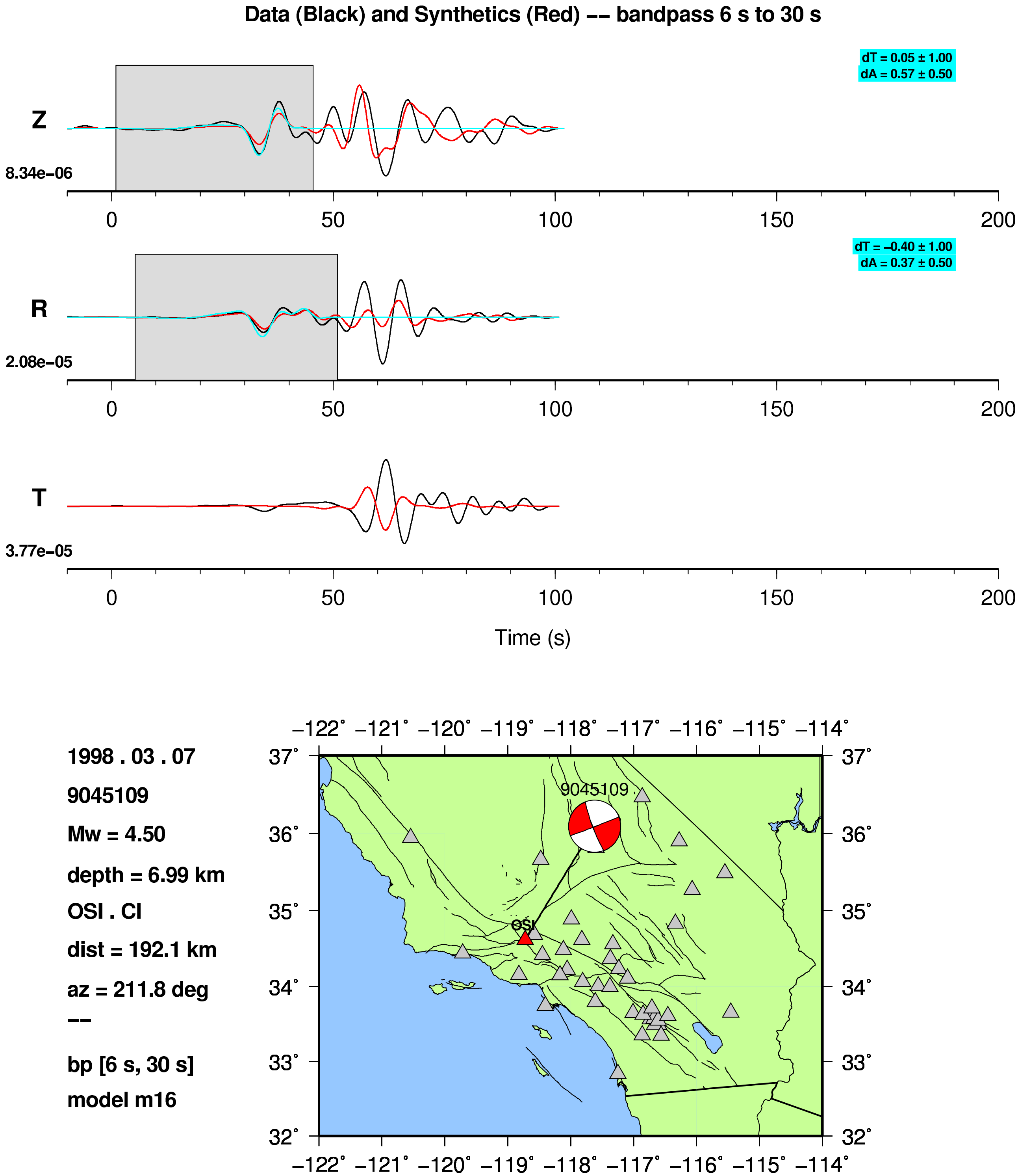


Figure E.22: Data (black) and synthetics (red), 6–30 s, from 9045109 to OSI.CI. Note that the polarity problem on this north-south-oriented path is most apparent on the transverse component. Compare with Figure E.21.

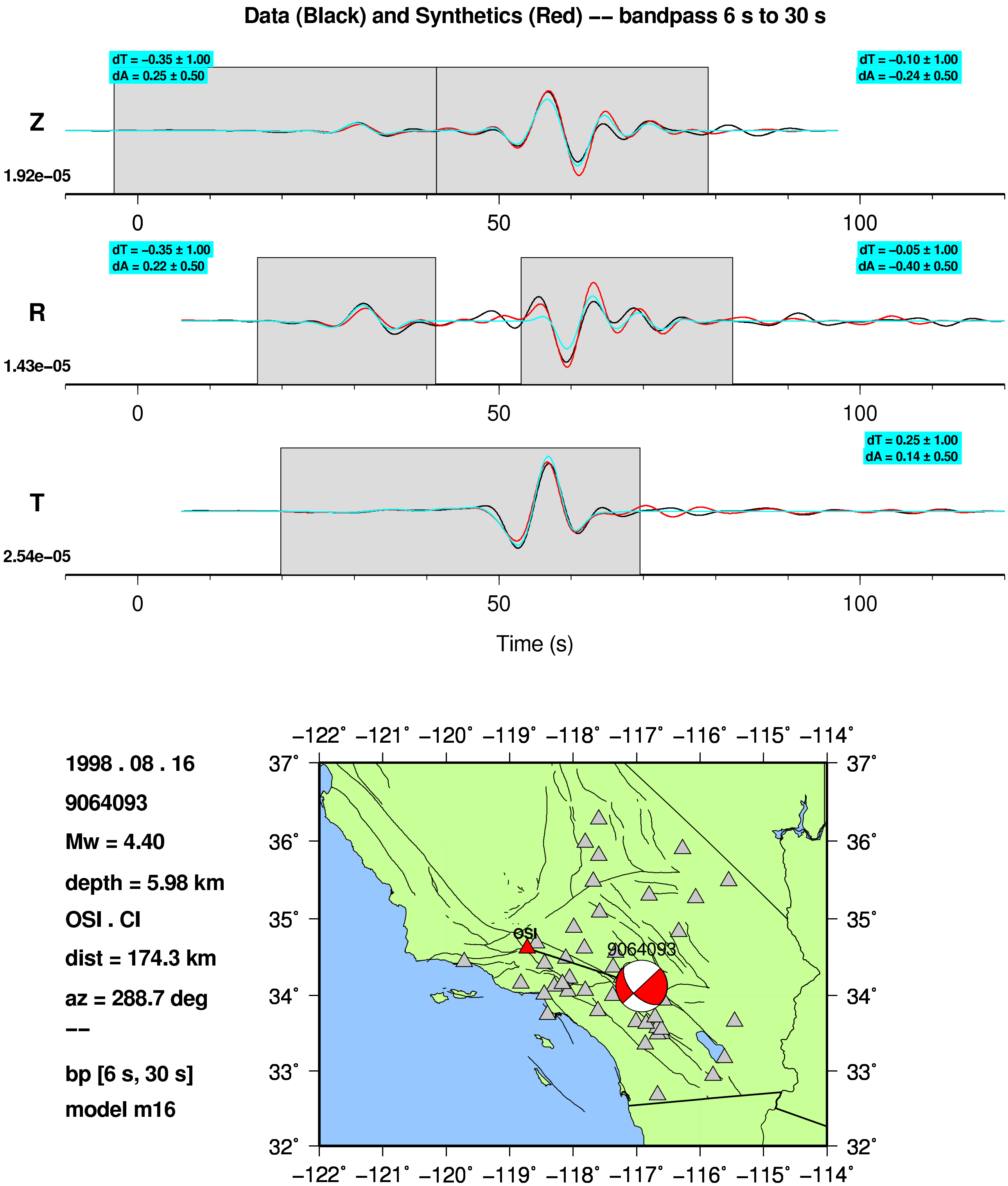
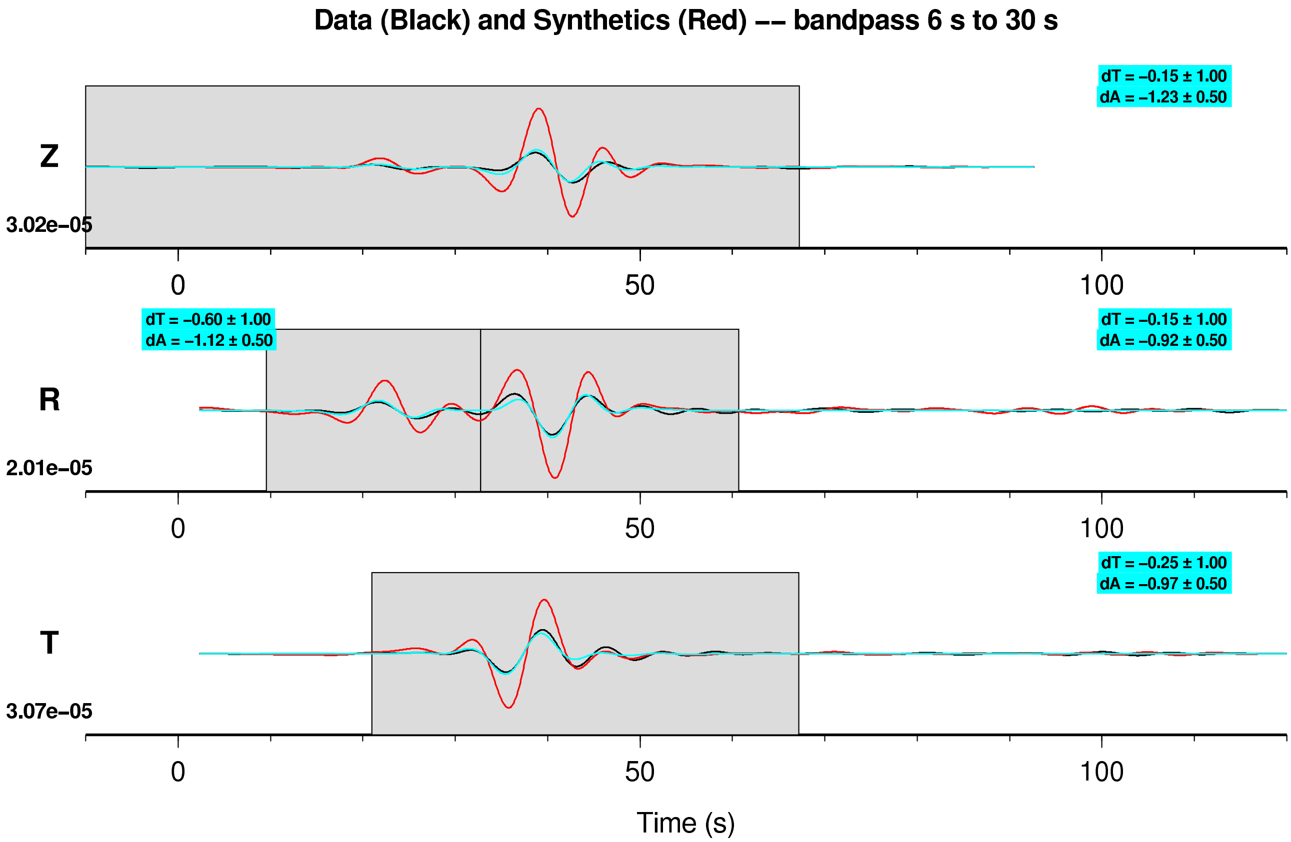


Figure E.23: Data (black) and synthetics (red), 6–30 s, from 9064093 to OSI.CI. Compare with Figure E.24.



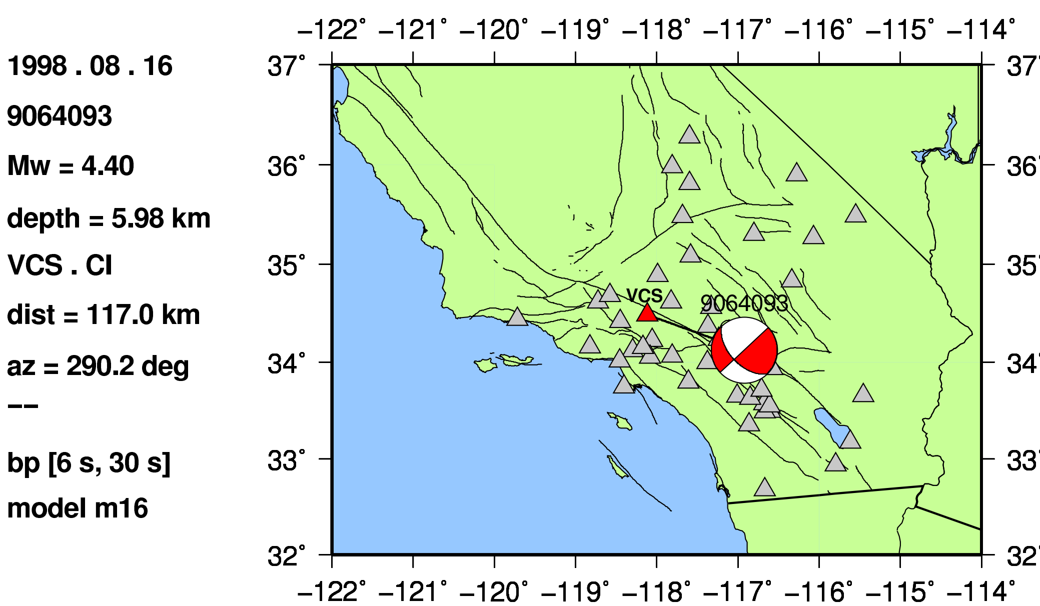
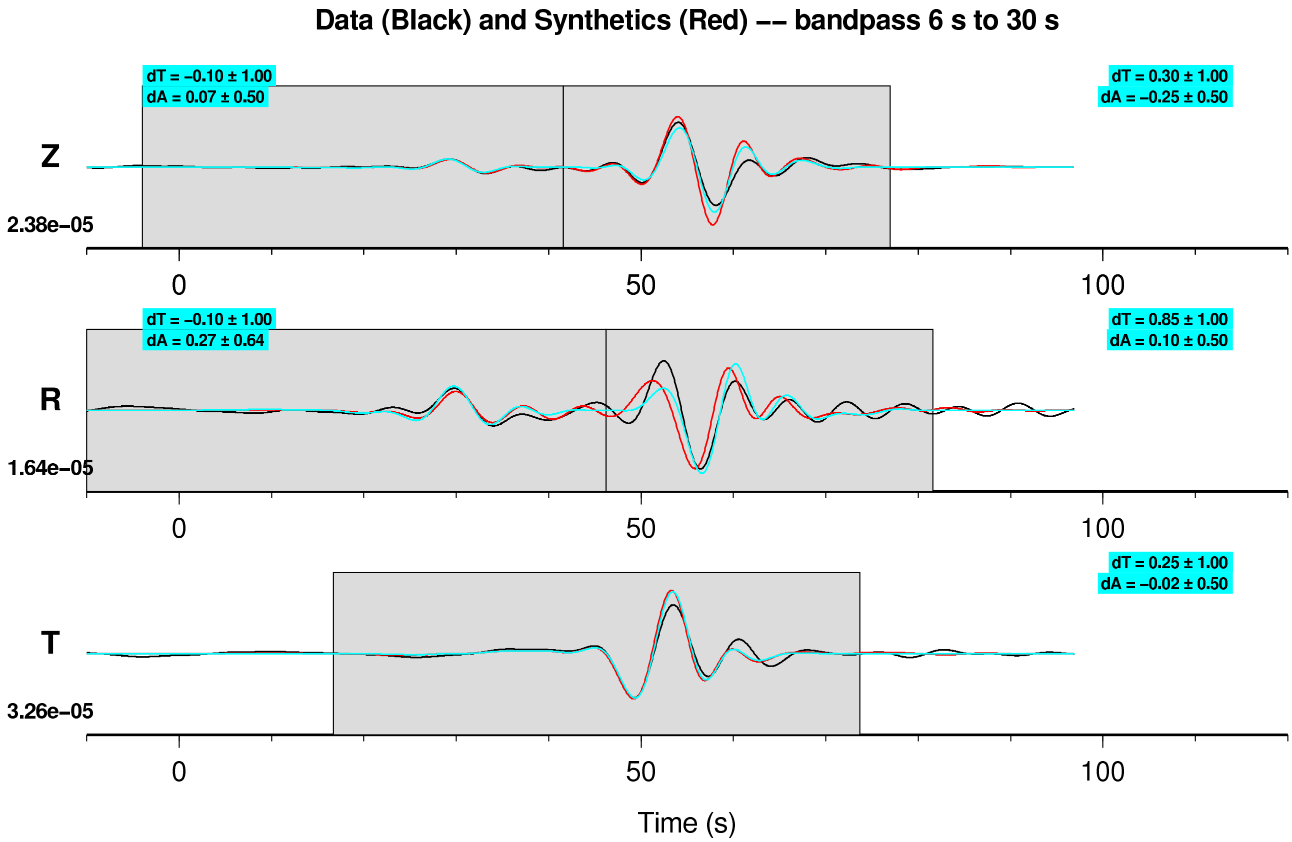


Figure E.24: Data (black) and synthetics (red), 6–30 s, from 9064093 to VCS.CI. The amplification problem is on all three components. Compare with Figures E.25 and E.23.



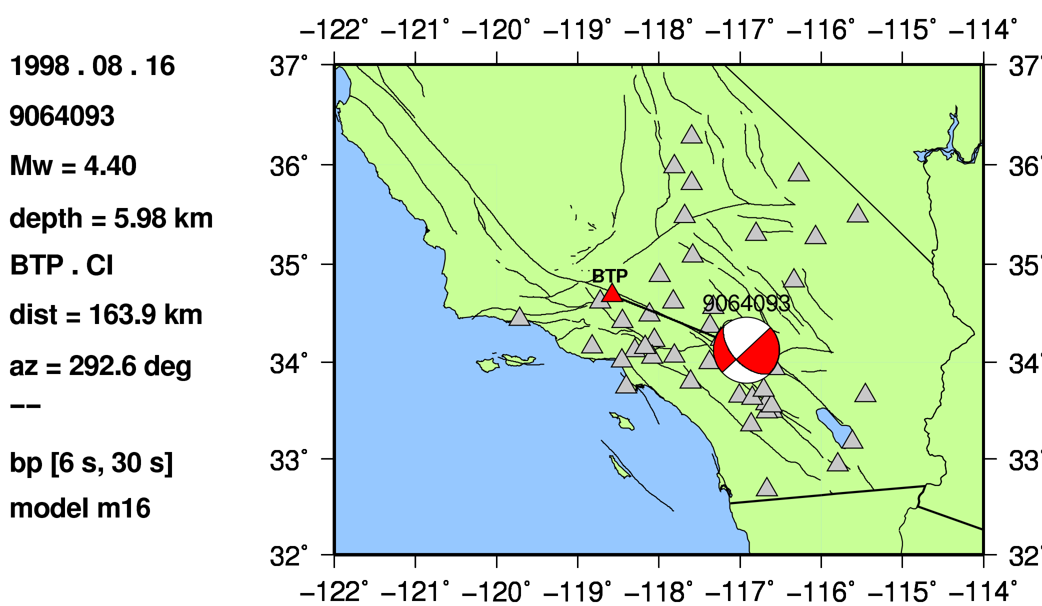
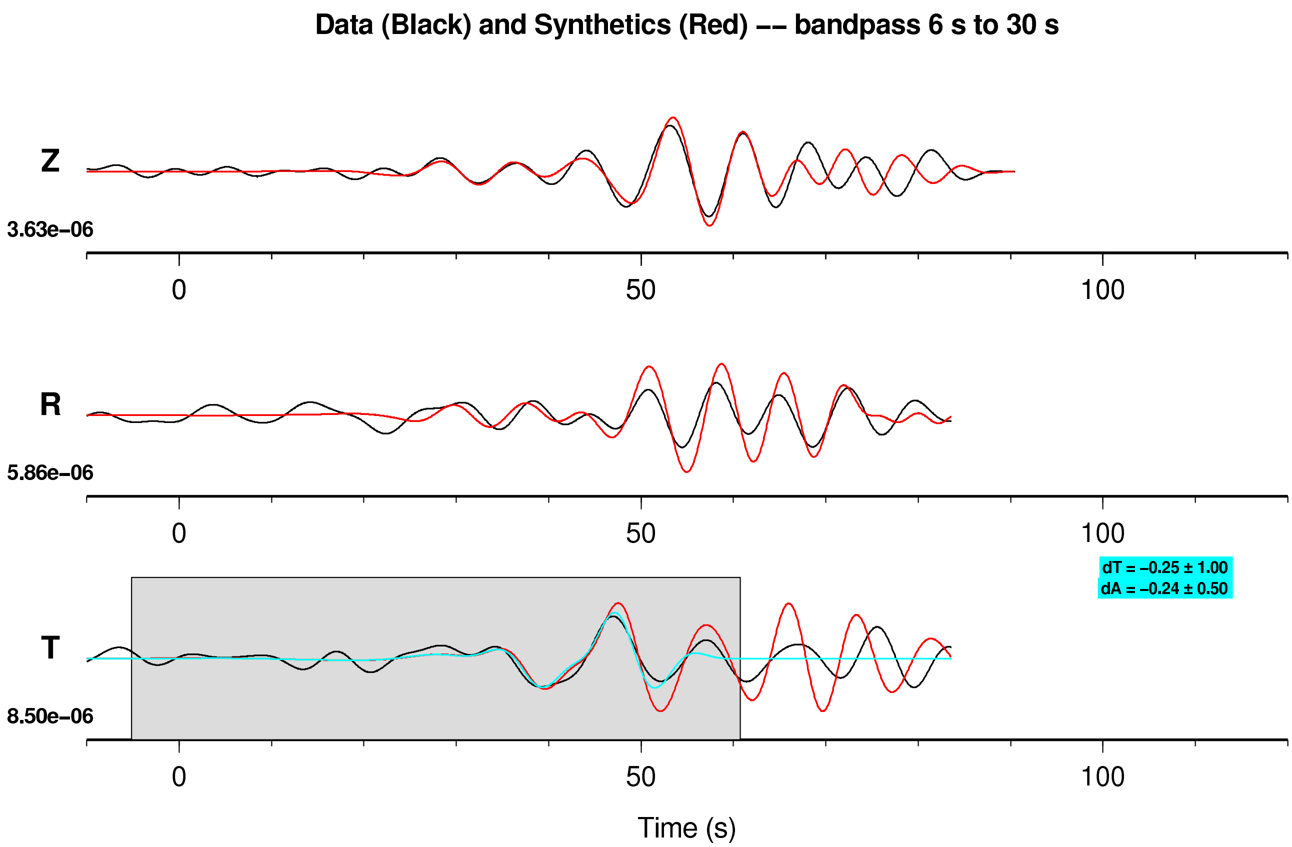


Figure E.25: Data (black) and synthetics (red), 6–30 s, from 9064093 to BTP.CI. Compare with Figure E.24.



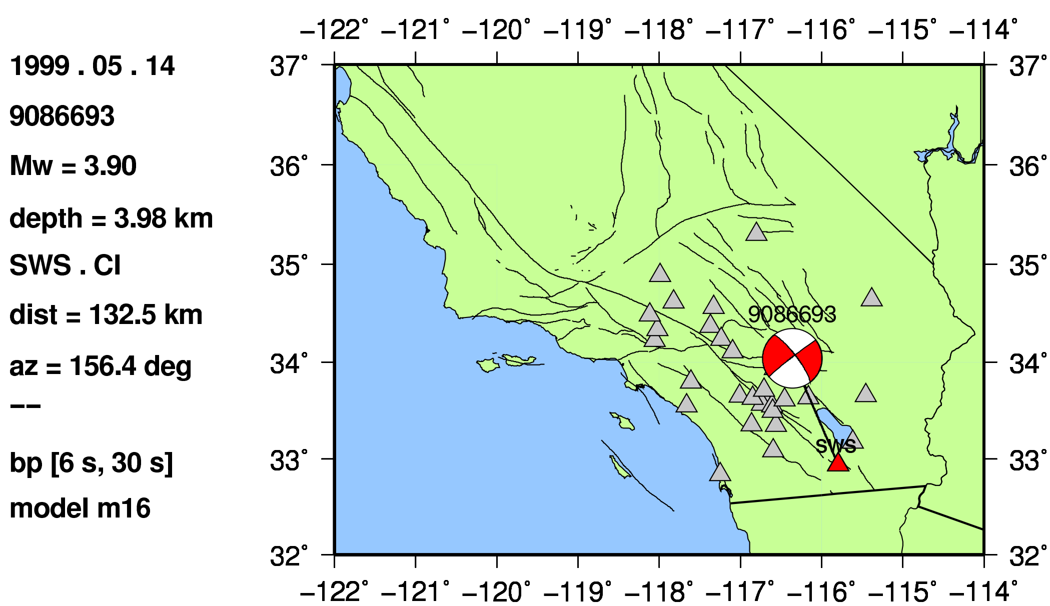


Figure E.26: Data (black) and synthetics (red), 6–30 s, from 9086693 to SWS.CI. Compare with Figure E.27.

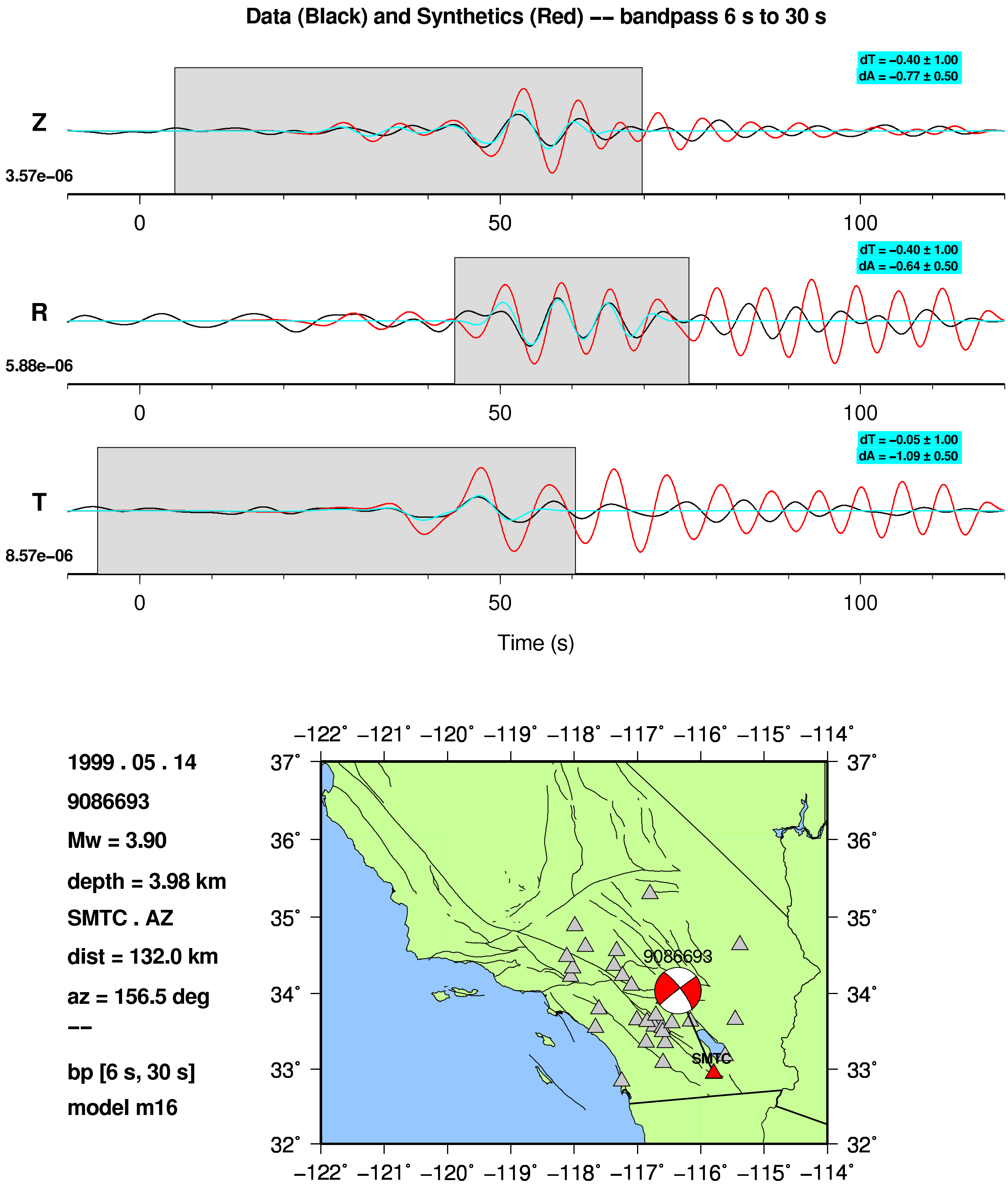
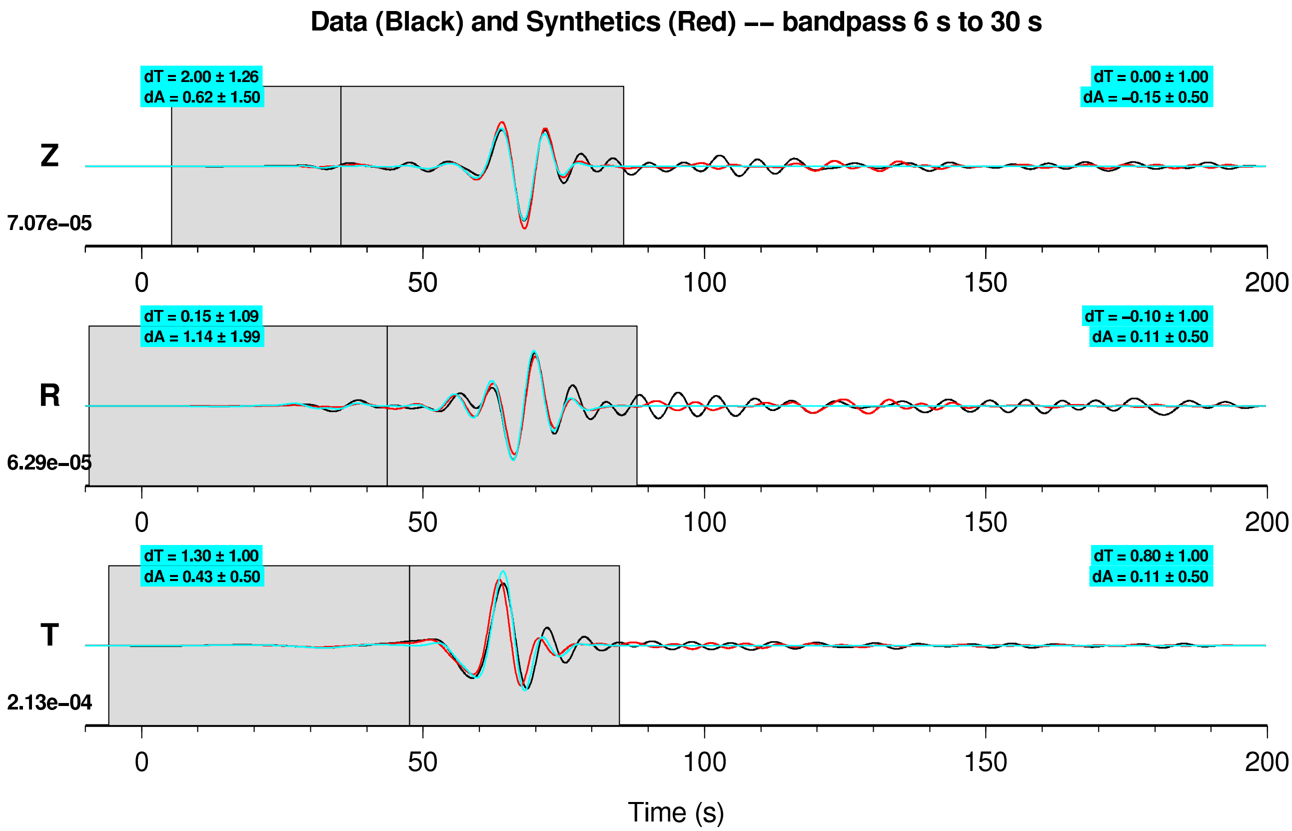


Figure E.27: Data (black) and synthetics (red), 6–30 s, from 9086693 to SMTC.AZ. The amplification problem is most apparent on the vertical and transverse components for this north-south path. Compare with Figure E.26.



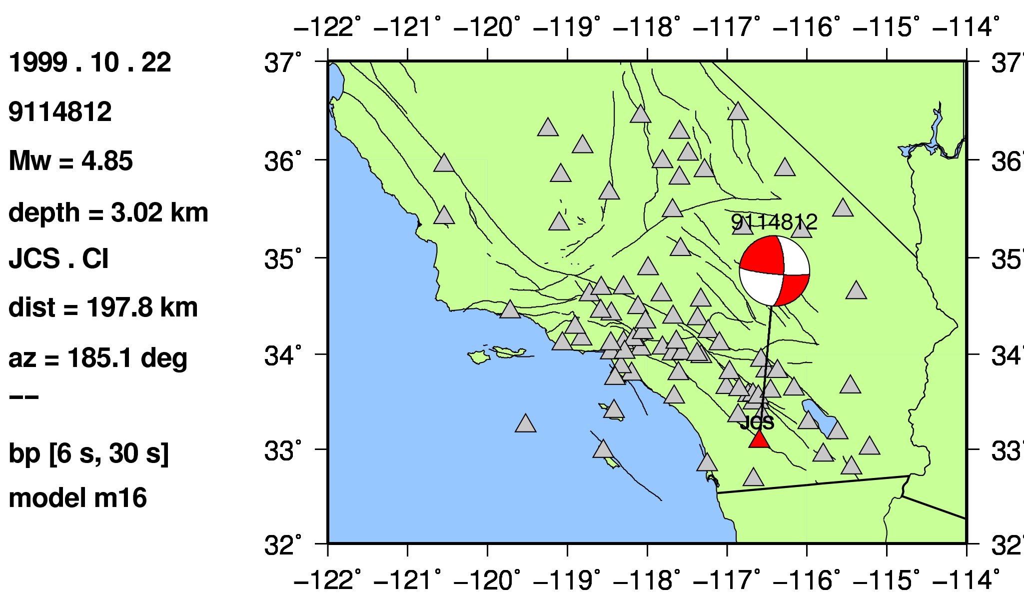
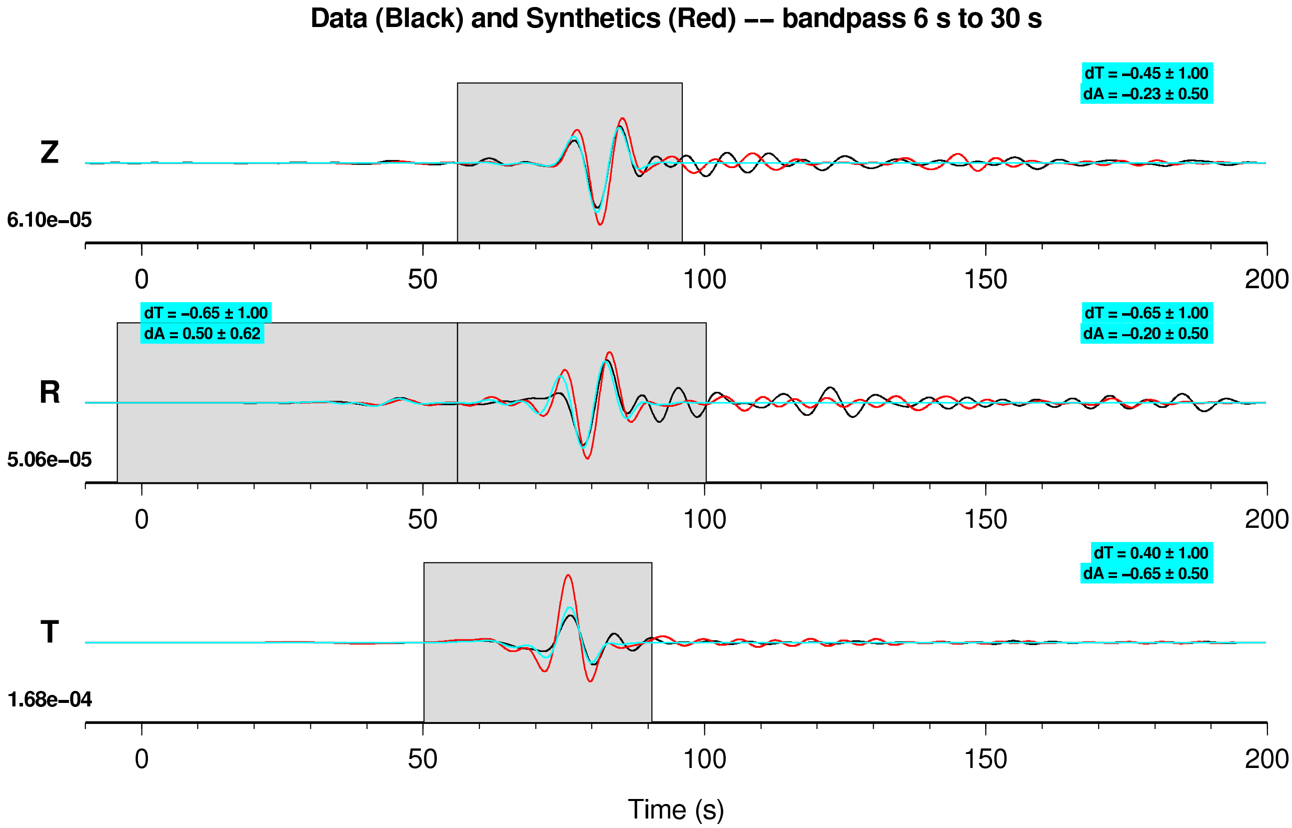


Figure E.28: Data (black) and synthetics (red), 6–30 s, from 9114812 to JCS.CI. Compare with Figure E.29.



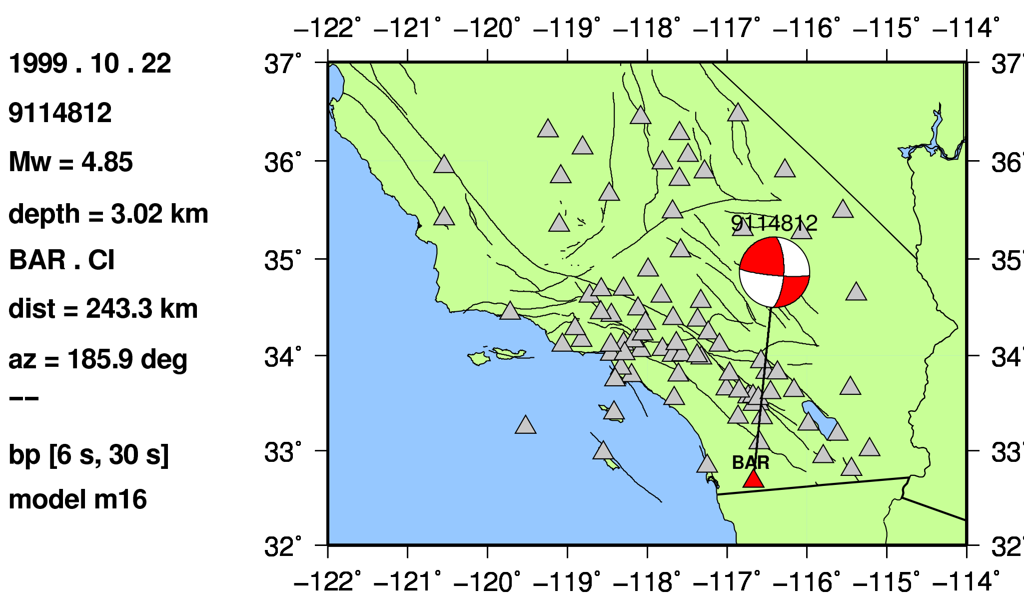


Figure E.29: Data (black) and synthetics (red), 6–30 s, from 9114812 to BAR.CI. Note that the amplification problem on this north-south-oriented path is only on the transverse component. Compare with Figure E.28.