

Appendix 1

Complete tree model upon which Fig. 7 is based.

Classification tree:

```
tree(formula = chng.struc ~ max.to.av + chng.temp + elevation + chng.lndus,
      data = points.100m.apart.below.2000m.inc.vs.no.change.1, na.action =
      na.exclude, mincut = 5, minsize = 10, mindev = 0.01)
```

Number of terminal nodes: 119

Residual mean deviance: 0.9704 = 880.1 / 907

Misclassification error rate: 0.2125 = 218 / 1026

node), split, n, deviance, yval, (yprob)

* denotes terminal node

- 1) root 1026 1409.000 0 (0.55650 0.44350)
- 2) elevation<1580.5 111 67.210 0 (0.90990 0.09009)
- 4) elevation<1560.5 68 10.420 0 (0.98530 0.01471) *
- 5) elevation>1560.5 43 44.120 0 (0.79070 0.20930)
- 10) elevation<1567.5 16 21.930 0 (0.56250 0.43750)
- 20) elevation<1565.5 10 10.010 0 (0.80000 0.20000) *
- 21) elevation>1565.5 6 5.407 Increase (0.16670 0.83330) *
- 11) elevation>1567.5 27 14.260 0 (0.92590 0.07407)
- 22) elevation<1570.5 11 0.000 0 (1.00000 0.00000) *
- 23) elevation>1570.5 16 12.060 0 (0.87500 0.12500) *
- 3) elevation>1580.5 915 1268.000 0 (0.51370 0.48630)
- 6) chng.lndus:0 761 1042.000 0 (0.56640 0.43360)
- 12) elevation<1908.5 623 862.500 0 (0.52170 0.47830)
- 24) elevation<1903.5 617 853.800 0 (0.52510 0.47490)
- 48) max.to.av<62.5 149 202.300 0 (0.58390 0.41610)
- 96) chng.temp<12.5 59 68.960 0 (0.72880 0.27120)
- 192) elevation<1665 44 56.460 0 (0.65910 0.34090)
- 384) elevation<1650 39 46.400 0 (0.71790 0.28210)
- 768) elevation<1636 30 32.600 0 (0.76670 0.23330)
- 1536) elevation<1609.5 10 13.460 0 (0.60000 0.40000) *
- 1537) elevation>1609.5 20 16.910 0 (0.85000 0.15000)
- 3074) chng.temp<11.5 9 11.460 0 (0.66670 0.33330) *
- 3075) chng.temp>11.5 11 0.000 0 (1.00000 0.00000) *
- 769) elevation>1636 9 12.370 0 (0.55560 0.44440) *
- 385) elevation>1650 5 5.004 Increase (0.20000 0.80000) *
- 193) elevation>1665 15 7.348 0 (0.93330 0.06667) *
- 97) chng.temp>12.5 90 124.700 Increase (0.48890 0.51110)
- 194) elevation<1884 84 116.400 0 (0.51190 0.48810)
- 388) elevation<1698 7 8.376 0 (0.71430 0.28570) *
- 389) elevation>1698 77 106.700 Increase (0.49350 0.50650)
- 778) elevation<1737 11 12.890 Increase (0.27270 0.72730) *
- 779) elevation>1737 66 91.250 0 (0.53030 0.46970)
- 1558) elevation<1808.5 38 51.730 0 (0.57890 0.42110)
- 3116) chng.temp<13.5 23 29.720 0 (0.65220 0.34780)
- 6232) max.to.av<37.5 11 10.430 0 (0.81820 0.18180) *
- 6233) max.to.av>37.5 12 16.640 0 (0.50000 0.50000)
- 12466) elevation<1767.5 5 6.730 Increase (0.40000 0.60000) *
- 12467) elevation>1767.5 7 9.561 0 (0.57140 0.42860) *
- 3117) chng.temp>13.5 15 20.730 Increase (0.46670 0.53330)

6234) max.to.av<37.5 7 5.742 Increase (0.14290 0.85710) *
 6235) max.to.av>37.5 8 8.997 0 (0.75000 0.25000) *
 1559) elevation>1808.5 28 38.670 Increase (0.46430 0.53570)
 3118) elevation<1821 6 0.000 Increase (0.00000 1.00000) *
 3119) elevation>1821 22 29.770 0 (0.59090 0.40910)
 6238) elevation<1871.5 17 22.070 0 (0.64710 0.35290)
 12476) elevation<1844 6 8.318 0 (0.50000 0.50000) *
 12477) elevation>1844 11 12.890 0 (0.72730 0.27270) *
 6239) elevation>1871.5 5 6.730 Increase (0.40000 0.60000) *
 195) elevation>1884 6 5.407 Increase (0.16670 0.83330) *
 49) max.to.av>62.5 468 648.700 0 (0.50640 0.49360)
 98) elevation<1651.5 107 143.400 Increase (0.39250 0.60750)
 196) max.to.av<137.5 22 27.520 0 (0.68180 0.31820)
 392) max.to.av<87.5 9 12.370 Increase (0.44440 0.55560) *
 393) max.to.av>87.5 13 11.160 0 (0.84620 0.15380) *
 197) max.to.av>137.5 85 106.300 Increase (0.31760 0.68240)
 394) chng.temp<11.5 23 31.490 Increase (0.43480 0.56520)
 788) elevation<1607.5 11 10.430 Increase (0.18180 0.81820) *
 789) elevation>1607.5 12 15.280 0 (0.66670 0.33330)
 1578) elevation<1621.5 5 0.000 0 (1.00000 0.00000) *
 1579) elevation>1621.5 7 9.561 Increase (0.42860 0.57140) *
 395) chng.temp>11.5 62 72.840 Increase (0.27420 0.72580)
 790) elevation<1602 17 23.510 Increase (0.47060 0.52940)
 1580) elevation<1592.5 8 8.997 Increase (0.25000 0.75000) *
 1581) elevation>1592.5 9 11.460 0 (0.66670 0.33330) *
 791) elevation>1602 45 45.040 Increase (0.20000 0.80000)
 1582) elevation<1618 16 7.481 Increase (0.06250 0.93750) *
 1583) elevation>1618 29 34.160 Increase (0.27590 0.72410)
 3166) elevation<1630.5 9 12.370 Increase (0.44440 0.55560) *
 3167) elevation>1630.5 20 20.020 Increase (0.20000 0.80000)
 6334) elevation<1635.5 5 0.000 Increase (0.00000 1.00000) *
 6335) elevation>1635.5 15 17.400 Increase (0.26670 0.73330)
 12670) elevation<1639.5 7 9.561 Increase (0.42860 0.57140) *
 12671) elevation>1639.5 8 6.028 Increase (0.12500 0.87500) *
 99) elevation>1651.5 361 498.100 0 (0.54020 0.45980)
 198) chng.temp<12.5 63 80.200 0 (0.66670 0.33330)
 396) elevation<1750.5 58 75.930 0 (0.63790 0.36210)
 792) max.to.av<1612.5 30 34.790 0 (0.73330 0.26670)
 1584) elevation<1666.5 11 10.430 0 (0.81820 0.18180) *
 1585) elevation>1666.5 19 23.700 0 (0.68420 0.31580)
 3170) max.to.av<162.5 10 13.460 0 (0.60000 0.40000) *
 3171) max.to.av>162.5 9 9.535 0 (0.77780 0.22220) *
 793) max.to.av>1612.5 28 38.670 0 (0.53570 0.46430)
 1586) elevation<1681.5 16 21.930 Increase (0.43750 0.56250)
 3172) elevation<1659 5 6.730 0 (0.60000 0.40000) *
 3173) elevation>1659 11 14.420 Increase (0.36360 0.63640)
 6346) elevation<1668.5 5 6.730 Increase (0.40000 0.60000) *
 6347) elevation>1668.5 6 7.638 Increase (0.33330 0.66670) *
 1587) elevation>1681.5 12 15.280 0 (0.66670 0.33330)
 3174) elevation<1692.5 5 5.004 0 (0.80000 0.20000) *
 3175) elevation>1692.5 7 9.561 0 (0.57140 0.42860) *
 397) elevation>1750.5 5 0.000 0 (1.00000 0.00000) *
 199) chng.temp>12.5 298 412.900 0 (0.51340 0.48660)
 398) elevation<1777 118 160.200 Increase (0.41530 0.58470)
 796) elevation<1690.5 21 27.910 0 (0.61900 0.38100)
 1592) elevation<1678.5 7 9.561 Increase (0.42860 0.57140) *
 1593) elevation>1678.5 14 16.750 0 (0.71430 0.28570)
 3186) max.to.av<1612.5 6 5.407 0 (0.83330 0.16670) *
 3187) max.to.av>1612.5 8 10.590 0 (0.62500 0.37500) *
 797) elevation>1690.5 97 128.000 Increase (0.37110 0.62890)
 1594) elevation<1725.5 37 43.180 Increase (0.27030 0.72970)
 3188) elevation<1720.5 32 39.750 Increase (0.31250 0.68750)
 6376) max.to.av<1612.5 19 19.560 Increase (0.21050 0.78950)
 12752) max.to.av<137.5 12 15.280 Increase (0.33330 0.66670)
 25504) max.to.av<87.5 5 6.730 Increase (0.40000 0.60000) *

25505) max.to.av>87.5 7 8.376 Increase (0.28570 0.71430) *
 12753) max.to.av>137.5 7 0.000 Increase (0.00000 1.00000) *
 6377) max.to.av>1612.5 13 17.940 Increase (0.46150 0.53850)
 12754) elevation<1705.5 5 6.730 Increase (0.40000 0.60000) *
 12755) elevation>1705.5 8 11.090 0 (0.50000 0.50000) *
 3189) elevation>1720.5 5 0.000 Increase (0.00000 1.00000) *
 1595) elevation>1725.5 60 82.110 Increase (0.43330 0.56670)
 3190) elevation<1763 48 66.460 Increase (0.47920 0.52080)
 6380) chng.temp<13.5 41 56.230 Increase (0.43900 0.56100)
 12760) elevation<1757.5 35 47.110 Increase (0.40000 0.60000)
 25520) elevation<1747 26 35.890 Increase (0.46150 0.53850)
 51040) max.to.av<212.5 13 17.320 Increase (0.38460 0.61540)
 102080) elevation<1736 5 6.730 0 (0.60000 0.40000) *
 102081) elevation>1736 8 8.997 Increase (0.25000 0.75000) *
 51041) max.to.av>212.5 13 17.940 0 (0.53850 0.46150)
 102082) elevation<1736.5 7 9.561 Increase (0.42860 0.57140) *
 102083) elevation>1736.5 6 7.638 0 (0.66670 0.33330) *
 25521) elevation>1747 9 9.535 Increase (0.22220 0.77780) *
 12761) elevation>1757.5 6 7.638 0 (0.66670 0.33330) *
 6381) chng.temp>13.5 7 8.376 0 (0.71430 0.28570) *
 3191) elevation>1763 12 13.500 Increase (0.25000 0.75000) *
 399) elevation>1777 180 245.200 0 (0.57780 0.42220)
 798) chng.temp<13.5 41 43.160 0 (0.78050 0.21950)
 1596) max.to.av<1600 18 24.950 0 (0.50000 0.50000)
 3192) elevation<1841 11 12.890 Increase (0.27270 0.72730) *
 3193) elevation>1841 7 5.742 0 (0.85710 0.14290) *
 1597) max.to.av>1600 23 0.000 0 (1.00000 0.00000) *
 799) chng.temp>13.5 139 192.500 0 (0.51800 0.48200)
 1598) elevation<1881.5 107 148.200 Increase (0.48600 0.51400)
 3196) elevation<1878.5 102 141.400 0 (0.50000 0.50000)
 6392) elevation<1874.5 95 131.600 Increase (0.48420 0.51580)
 12784) max.to.av<112.5 11 12.890 Increase (0.27270 0.72730) *
 12785) max.to.av>112.5 84 116.400 0 (0.51190 0.48810)
 25570) elevation<1804.5 21 27.910 0 (0.61900 0.38100)
 51140) elevation<1801 16 21.930 0 (0.56250 0.43750)
 102280) max.to.av<1600 6 7.638 0 (0.66670 0.33330) *
 102281) max.to.av>1600 10 13.860 0 (0.50000 0.50000) *
 51141) elevation>1801 5 5.004 0 (0.80000 0.20000) *
 25571) elevation>1804.5 63 87.190 Increase (0.47620 0.52380)
 51142) elevation<1819 14 16.750 Increase (0.28570 0.71430)
 102284) elevation<1811.5 7 9.561 Increase (0.42860 0.57140) *
 102285) elevation>1811.5 7 5.742 Increase (0.14290 0.85710) *
 51143) elevation>1819 49 67.740 0 (0.53060 0.46940)
 102286) elevation<1856.5 32 43.230 0 (0.59380 0.40630)
 204572) elevation<1851.5 24 33.270 0 (0.50000 0.50000)
 409144) chng.temp<14.5 17 23.030 Increase (0.41180 0.58820)
 818288) elevation<1846.5 12 16.640 0 (0.50000 0.50000)
 1636576) max.to.av<1612.5 5 6.730 0 (0.60000 0.40000) *
 1636577) max.to.av>1612.5 7 9.561 Increase (0.42860 0.57140) *
 818289) elevation>1846.5 5 5.004 Increase (0.20000 0.80000) *
 409145) chng.temp>14.5 7 8.376 0 (0.71430 0.28570) *
 204573) elevation>1851.5 8 6.028 0 (0.87500 0.12500) *
 102287) elevation>1856.5 17 23.030 Increase (0.41180 0.58820)
 204574) elevation<1864.5 7 5.742 Increase (0.14290 0.85710) *
 204575) elevation>1864.5 10 13.460 0 (0.60000 0.40000) *
 6393) elevation>1874.5 7 8.376 0 (0.71430 0.28570) *
 3197) elevation>1878.5 5 5.004 Increase (0.20000 0.80000) *
 1599) elevation>1881.5 32 42.340 0 (0.62500 0.37500)
 3198) elevation<1886.5 5 0.000 0 (1.00000 0.00000) *
 3199) elevation>1886.5 27 37.100 0 (0.55560 0.44440)
 6398) max.to.av<1600 9 11.460 Increase (0.33330 0.66670) *
 6399) max.to.av>1600 18 22.910 0 (0.66670 0.33330)
 12798) elevation<1898 12 16.300 0 (0.58330 0.41670)
 25596) elevation<1892.5 6 7.638 0 (0.66670 0.33330) *
 25597) elevation>1892.5 6 8.318 0 (0.50000 0.50000) *

12799) elevation>1898 6 5.407 0 (0.83330 0.16670) *
 25) elevation>1903.5 6 5.407 Increase (0.16670 0.83330) *
 13) elevation>1908.5 138 149.500 0 (0.76810 0.23190)
 26) chng.temp<14.5 16 0.000 0 (1.00000 0.00000) *
 27) chng.temp>14.5 122 140.400 0 (0.73770 0.26230)
 54) chng.temp<16.5 113 134.700 0 (0.71680 0.28320)
 108) elevation<1951 52 68.270 0 (0.63460 0.36540)
 216) elevation<1946 47 58.870 0 (0.68090 0.31910)
 432) elevation<1922.5 19 25.860 0 (0.57890 0.42110)
 864) elevation<1918 9 9.535 0 (0.77780 0.22220) *
 865) elevation>1918 10 13.460 Increase (0.40000 0.60000) *
 433) elevation>1922.5 28 31.490 0 (0.75000 0.25000)
 866) elevation<1931.5 8 6.028 0 (0.87500 0.12500) *
 867) elevation>1931.5 20 24.430 0 (0.70000 0.30000)
 1734) elevation<1942 13 17.320 0 (0.61540 0.38460)
 3468) max.to.av<1575 6 5.407 0 (0.83330 0.16670) *
 3469) max.to.av>1575 7 9.561 Increase (0.42860 0.57140) *
 1735) elevation>1942 7 5.742 0 (0.85710 0.14290) *
 217) elevation>1946 5 5.004 Increase (0.20000 0.80000) *
 109) elevation>1951 61 63.200 0 (0.78690 0.21310)
 218) elevation<1954.5 7 0.000 0 (1.00000 0.00000) *
 219) elevation>1954.5 54 59.610 0 (0.75930 0.24070)
 438) chng.temp<15.5 26 22.320 0 (0.84620 0.15380)
 876) elevation<1972.5 11 12.890 0 (0.72730 0.27270) *
 877) elevation>1972.5 15 7.348 0 (0.93330 0.06667) *
 439) chng.temp>15.5 28 35.160 0 (0.67860 0.32140)
 878) elevation<1993.5 22 25.780 0 (0.72730 0.27270)
 1756) max.to.av<187.5 12 16.300 0 (0.58330 0.41670)
 3512) max.to.av<87.5 6 5.407 0 (0.83330 0.16670) *
 3513) max.to.av>87.5 6 7.638 Increase (0.33330 0.66670) *
 1757) max.to.av>187.5 10 6.502 0 (0.90000 0.10000) *
 879) elevation>1993.5 6 8.318 0 (0.50000 0.50000) *
 55) chng.temp>16.5 9 0.000 0 (1.00000 0.00000) *
 7) chng.lndus:1 154 174.300 Increase (0.25320 0.74680)
 14) max.to.av<187.5 71 95.230 Increase (0.39440 0.60560)
 28) chng.temp<12.5 5 0.000 0 (1.00000 0.00000) *
 29) chng.temp>12.5 66 85.340 Increase (0.34850 0.65150)
 58) elevation<1922 56 68.750 Increase (0.30360 0.69640)
 116) elevation<1899.5 50 64.100 Increase (0.34000 0.66000)
 232) max.to.av<112.5 34 46.070 Increase (0.41180 0.58820)
 464) elevation<1732.5 6 5.407 Increase (0.16670 0.83330) *
 465) elevation>1732.5 28 38.670 Increase (0.46430 0.53570)
 930) elevation<1769.5 5 5.004 0 (0.80000 0.20000) *
 931) elevation>1769.5 23 30.790 Increase (0.39130 0.60870)
 1862) elevation<1833.5 12 13.500 Increase (0.25000 0.75000) *
 1863) elevation>1833.5 11 15.160 0 (0.54550 0.45450)
 3726) max.to.av<37.5 5 6.730 Increase (0.40000 0.60000) *
 3727) max.to.av>37.5 6 7.638 0 (0.66670 0.33330) *
 233) max.to.av>112.5 16 15.440 Increase (0.18750 0.81250)
 466) elevation<1786.5 6 0.000 Increase (0.00000 1.00000) *
 467) elevation>1786.5 10 12.220 Increase (0.30000 0.70000) *
 117) elevation>1899.5 6 0.000 Increase (0.00000 1.00000) *
 59) elevation>1922 10 13.460 0 (0.60000 0.40000) *
 15) max.to.av>187.5 83 64.930 Increase (0.13250 0.86750)
 30) elevation<1900 73 61.890 Increase (0.15070 0.84930)
 60) elevation<1828.5 59 42.980 Increase (0.11860 0.88140)
 120) elevation<1791.5 49 40.190 Increase (0.14290 0.85710)
 240) elevation<1755 34 20.290 Increase (0.08824 0.91180)
 480) elevation<1649.5 9 9.535 Increase (0.22220 0.77780) *
 481) elevation>1649.5 25 8.397 Increase (0.04000 0.96000) *
 241) elevation>1755 15 17.400 Increase (0.26670 0.73330)
 482) elevation<1774 5 6.730 Increase (0.40000 0.60000) *
 483) elevation>1774 10 10.010 Increase (0.20000 0.80000) *
 121) elevation>1791.5 10 0.000 Increase (0.00000 1.00000) *
 61) elevation>1828.5 14 16.750 Increase (0.28570 0.71430)

122) elevation<1859 9 9.535 Increase (0.22220 0.77780) *
123) elevation>1859 5 6.730 Increase (0.40000 0.60000) *
31) elevation>1900 10 0.000 Increase (0.00000 1.00000) *