Notes on Revisions to SMC2PSA_Rot_GMRot

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These notes describe two revisions to smc2psa_rot_gmrot: 1) speeding up the computations by computing the as-recorded oscillator time series and then only rotating a subset of these time series from which it is likely that the peak response will be obtained for each rotation angle; 2) resampling the time series such that the new sample interval is equal to the as-recorded sample interval divided by a power of two (the resampling is consistent with the sampling theorem, such that the Fourier spectrum is zero for frequencies above original Nyquist frequency---the resampling is done in the frequency domain, but it is equivalent to convolving the as-recorded time series by a sinc function).

To avoid confusion with the previous version of the program, the new program is called smc2psa_rot_gmrot_interp_acc_rot_osc_ts.exe (the version that reads files prepared for the NGA project by Pacific Engineering Analysis (PEA) is called nga2psa_rot_gmrot_interp_acc_rot_osc_ts.exe). This replaces the old program smc2psa_rot_gmrot.exe.

Norm Abrahamson is responsible both for the idea of how to speed up the computations and for recognizing the possible need for resampling of the time series.

To test the revisions I used a set of 24 2-component time series given to me by Brian Chiou as part of our check of the NGA-W1 flatfile values. He sent me the files in July, 2008. I cannot recall why he chose those records, but presumably it was because differences were observed in our processing for those records (so they may be "bad actors" and not typical records, which means that they may be a good set to use in testing my revisions). Some record information is given in this table:

Table 1.

f_smc	pkmtn	sps	npts	reclen(s)
A-CAT090.AT2.smc	41.355	50	1646	32.9
A-FAR000.AT2.smc	46.736	50	1157	23.1
A-FEA000.AT2.smc	69.46	200	7998	40.0
A-G01157.AT2.smc	103.357	200	2392	12.0

A-L01000.AT2.smc	34.152	200	7998	40.0
ARS270.AT2.smc	103.923	200	2079	10.4
A-SOR225.AT2.smc	134.251	50	1436	28.7
A-STC090.AT2.smc	157.977	50	2000	40.0
CHY036-E.AT2.smc	288.255	200	18000	90.0
C-XMG000.AT2.smc	318.829	200	4391	22.0
DEV000.AT2.smc	30.633	50	3051	61.0
D-OR6035.AT2.smc	98.939	200	2600	13.0
D-SCP070.AT2.smc	79.475	200	3180	15.9
FAI095.AT2.smc	36.4	50	1971	39.4
G-CHP000.AT2.smc	22.852	200	8000	40.0
GLB230.AT2.smc	317.342	100	774	7.7
H-CON180.AT2.smc	187.287	200	2555	12.8
H-FIS000.AT2.smc	59.94	200	2044	10.2
HIK000.AT2.smc	138.683	50	3900	78.0
KAS--L.AT2.smc	15.998	200	5221	26.1
MCG270.AT2.smc	86.327	200	1371	6.9
SYC135.AT2.smc	42.681	50	2297	45.9
TAF021.AT2.smc	152.992	100	5416	54.2
TOT000.AT2.smc	74.665	50	3900	78.0

Speed up of computations

The main issue I faced is how to choose the subset of the ground-motion intensity time series computed from the as-recorded accelerations (the ground-motion intensity time series can be accelerations, velocities, displacements, or oscillator response). Norm (with a bit of feedback from me) suggested choosing all values greater than $1/\sqrt{2}$ of the smaller absolute maximum ground-motion intensity measure from the as-recorded motions). When I tested this algorithm, I found that for some rotation angles the absolute maximum ground-motion intensity measure from the rotated motions could come from a different portion of the original time series than obtained using what I thought was Norm's algorithm. The algorithm I now use is:

1. Establish a level from the intensity measures (peak_y1, peak_y2) from the two as-recorded motions, using this equation:

alevel = fraction*amin1(peak_y1, peak_y2) .

2. Define the subset as all values for which the vector amplitude is greater than avalue:

if sqrt(y1_in(i)**2+y2_in(i)**2) >= alevel, add y1_in(i) and y2_in(i) to the subset.

What value should be used for “fraction”? I show results in the tables below of using fraction = 0.9, 0.7, 0.5, and 0.3, comparing the full set results with the subset results for rot00, rot50, and rot100 for pga, pgv, pgd, and psa at 0.2, 2.0, and 20.0 s. By studying those tables, it is clear that all but the rot00 values are insensitive to the choice of the fraction. Here is an example for which pgd_00 (in other words, the smallest pgd over all rotation angles) from the full set (fraction = 0.0) and the subset obtained using fraction = 0.7 differed by 15%. The records are ARS270.AT2 and ARS360.AT2 (in the results shown here, the nga-format files have been converted to smc format, with an added extension of “.smc” to the file name; these appear in the tables, so don’t get confused). The pga, pgv, and pgd values are plotted below as a function of the rotation angles, for the full set (obtained by setting fraction = 0 in the program) and the subset obtained for fraction = 0.7.

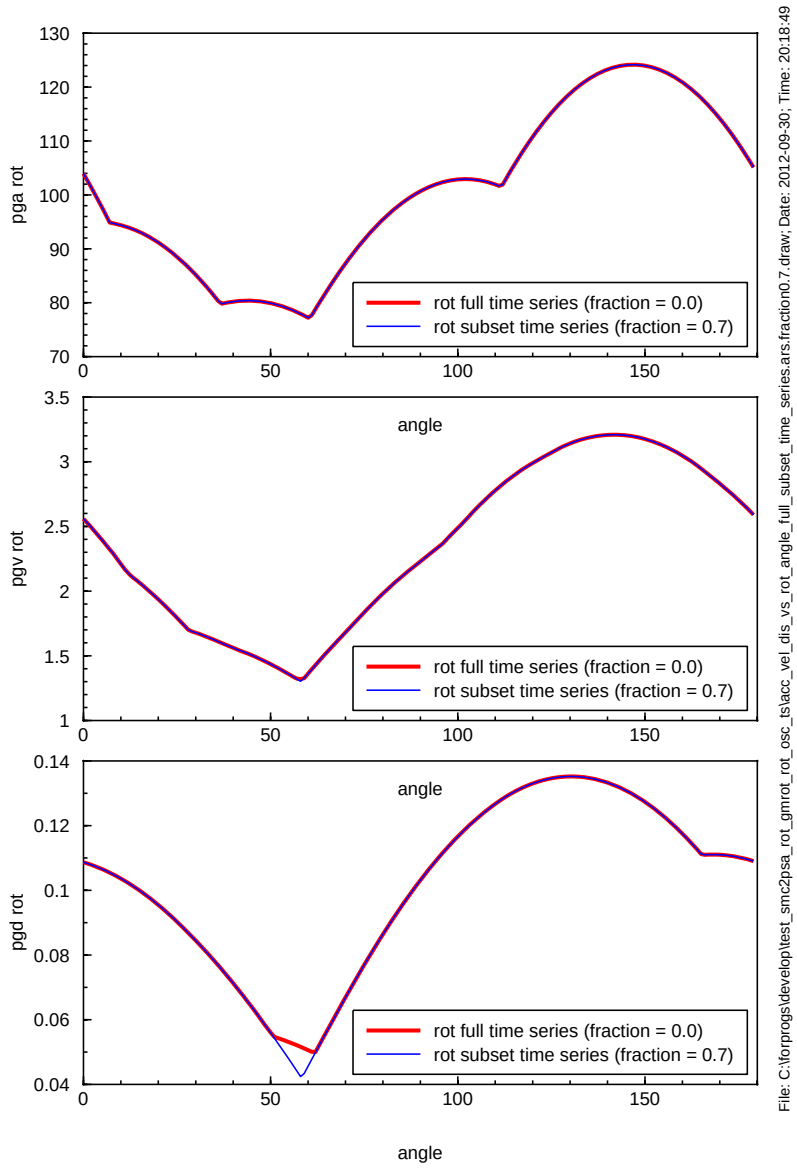

Figure 1.

It can be seen from this figure that the rot50 and rot100 values for pga, pgv, and pgd are the same for the full set of data and the subset. But pgd_rot00 differs by 15%. The reason for this is shown in the next figure.

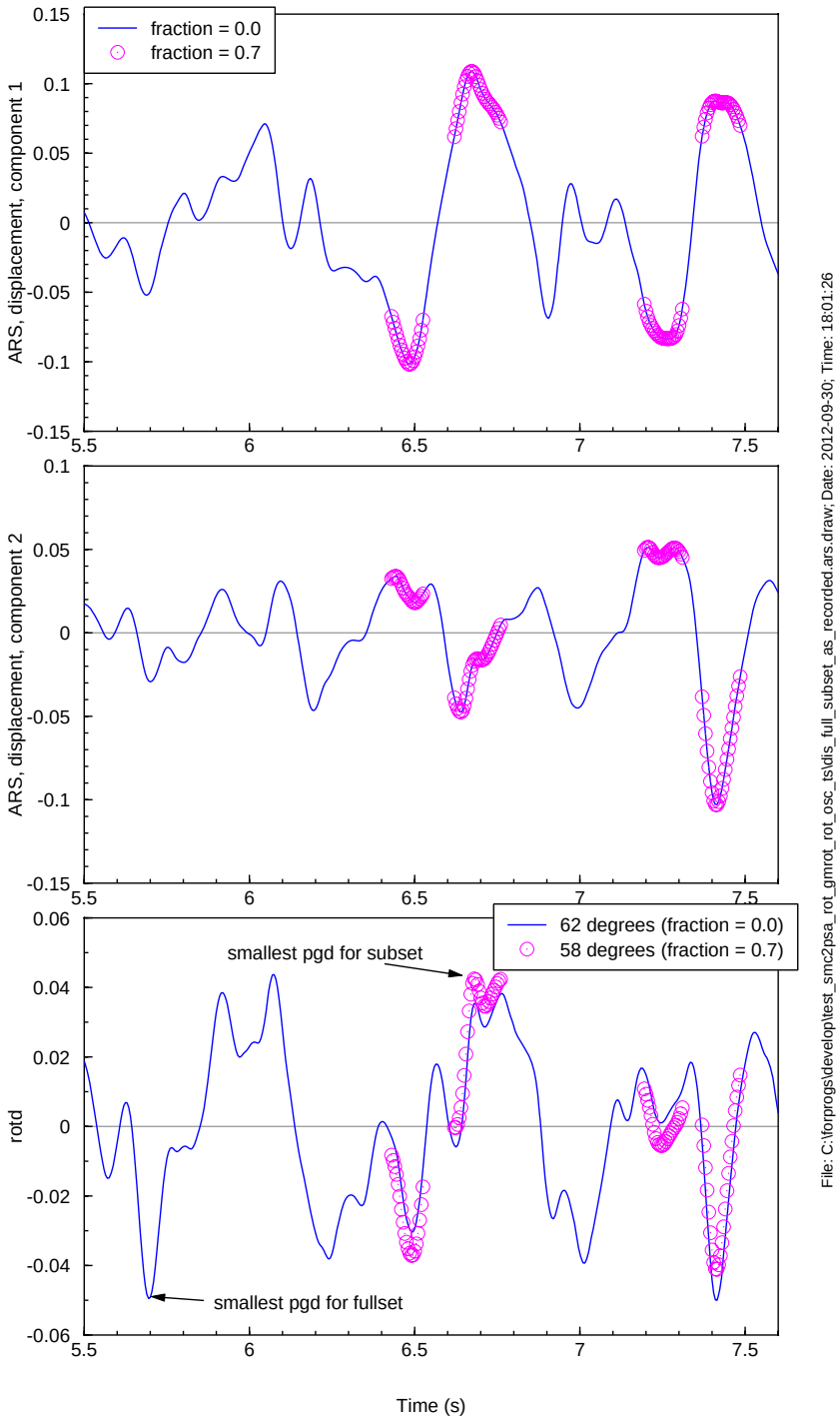

Figure 2. The top two graphs shows the displacements from the as-recorded accelerations, along with the subset of points that satisfy the constraints given in the algorithm given earlier, using fraction = 0.7. The bottom graph shows the full and subset time series rotated to the azimuths corresponding to the minimum pgd given in Figure 1 (58 degrees for the subset, 62 degrees for the full set).

Because of the details of the waveforms, the largest value of the rotated displacement occurs in a portion of the time series that is not in the subset chosen when fraction = 0.7. Although not shown in the figure, fraction = 0.5 leads to equality of the pgd.

Resampling

Regarding the resampling, it should be pointed out that in smc2psa_rot_gmrot the two as-recorded horizontal components were rotated into a given azimuth, and the response spectrum was computed for the new time series. The subroutine used for the response spectral computation resampled the time series when there were fewer than 10 sample points per oscillator period. The resampling, however, simply used linear interpolation between the original sample points, and therefore will be different than the resampling done here (a graph to follow will show this). But in the new program, the resampling is done (using the sampling theorem) of the as-recorded acceleration time series, before any rotations are done and before the oscillator time series are computed. The resampling is specified by an interpolation factor, which is the increase in the samples per second (this must be a power of two), regardless of the oscillator period. I could have computed the interpolation factor based on the minimum oscillator period and the original sample rate, but in most cases this would have been much too conservative. E.g., a 200 sps record and a $T_{\min} = 0.01\,\text{s}$ oscillator would have required a new sample rate of 1600 sps in order for $T_{\min} \times sps >= 10$. This would have been too conservative in most cases because the response of such a short-period oscillator will be controlled at ground motions having frequencies much less than 100 Hz. I leave it to the user to choose the interpolation factor. As will be shown in the examples to follow, it is not clear how this should be chosen, or even if resampling is desirable in most cases.

Here is an example for which pgd_rot00 using interpolate_factor = 4.0 differed the most (by -3%; see Table 9) from that computed when interpolate_facotr = 1.0 (no resampling). I first shown the original and resampled accelerations for a short section of time (0.2 s) containing the peak acceleration for each component.

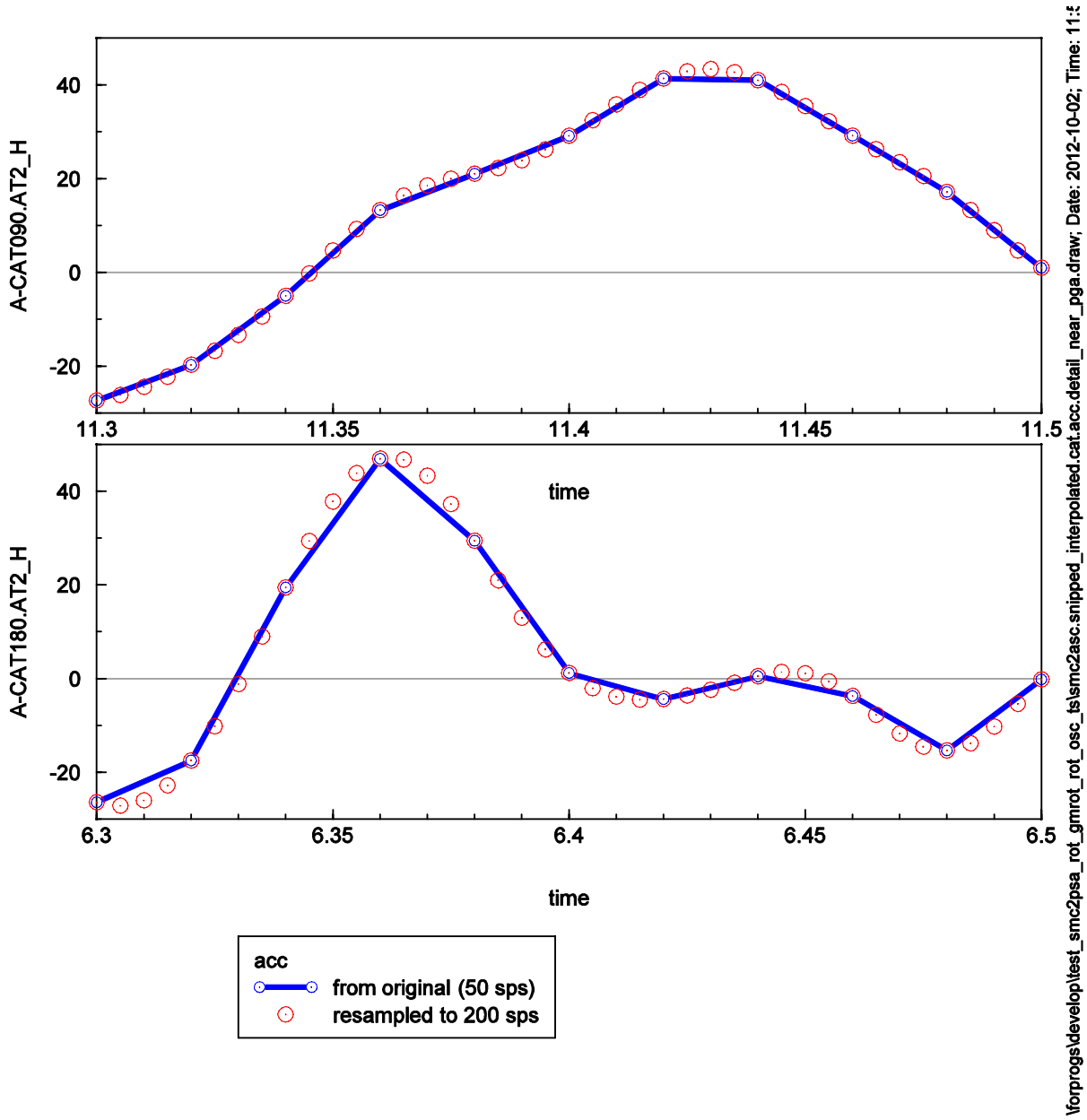

Figure 3. Detail of acceleration waveforms for records A-CAT090.AT2 and A-CAT180.AT2 in region containing the peak acceleration.

It is clear that the resampling leads to a somewhat larger pga, and that the algorithm is correctly reproducing the data at the original sample points. It might be surprising that there is a difference in pgd, which should be controlled by longer periods that those related to the resampling. This is apparently due to differences in the resampled accelerations starting at the

beginning of the record. The next figure is similar to Figure 3, but it shows the accelerations from 0.0 s to 0.2 s. I also show the accelerations resampled to 400 sps.

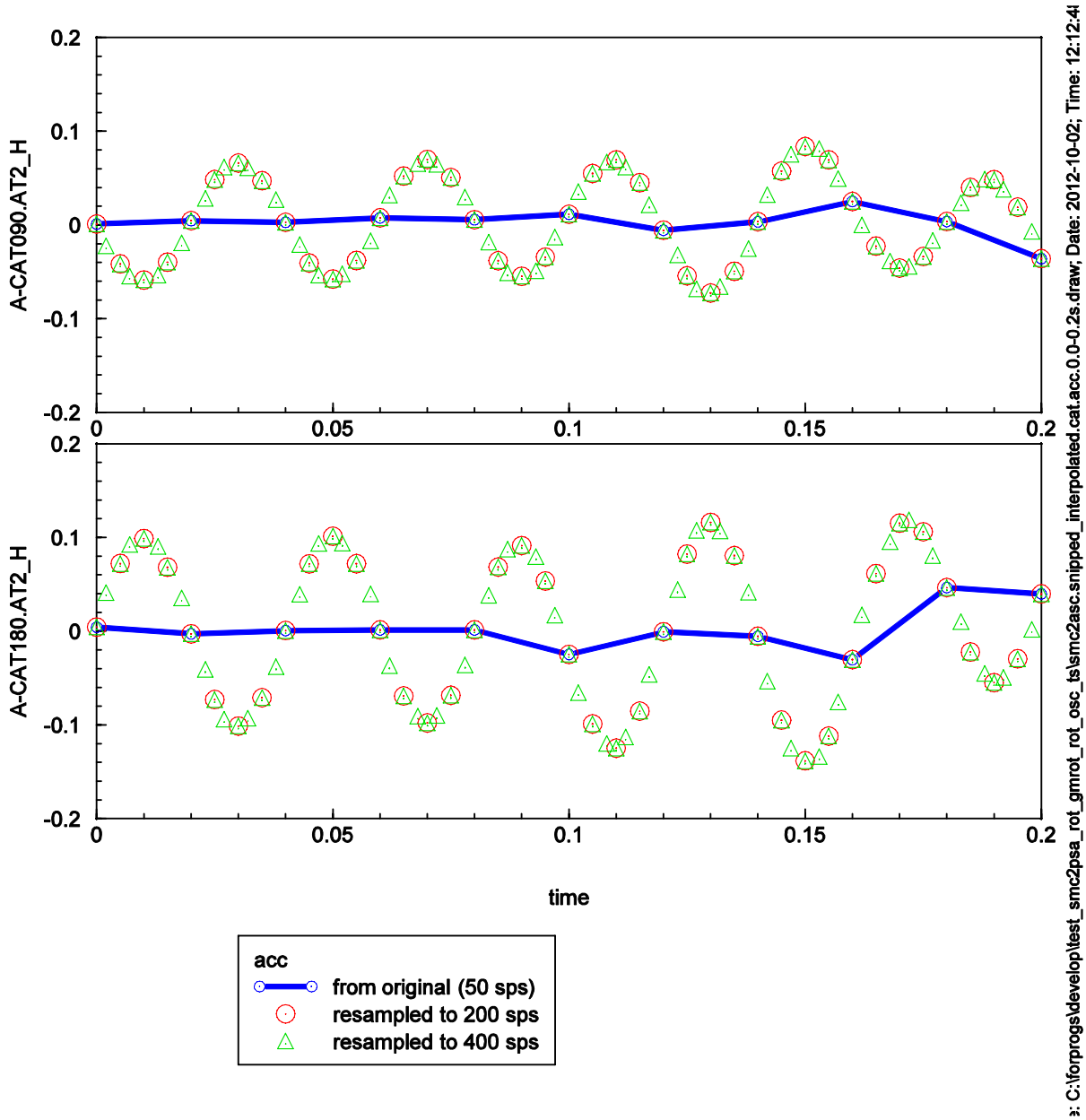

Figure 4. Detail of acceleration waveforms for records A-CAT090.AT2 and A-CAT180.AT2 at the beginning of the records.

Note that there are noticeable oscillations in the resampled accelerations, with a period of 0.04 s (a frequency of 25 Hz). These are undoubtedly a result of the sharp decrease in the Fourier

spectra starting at 25 Hz (presumably an anti-aliasing filter), as shown in the graph of Fourier acceleration spectra given in the next figure.

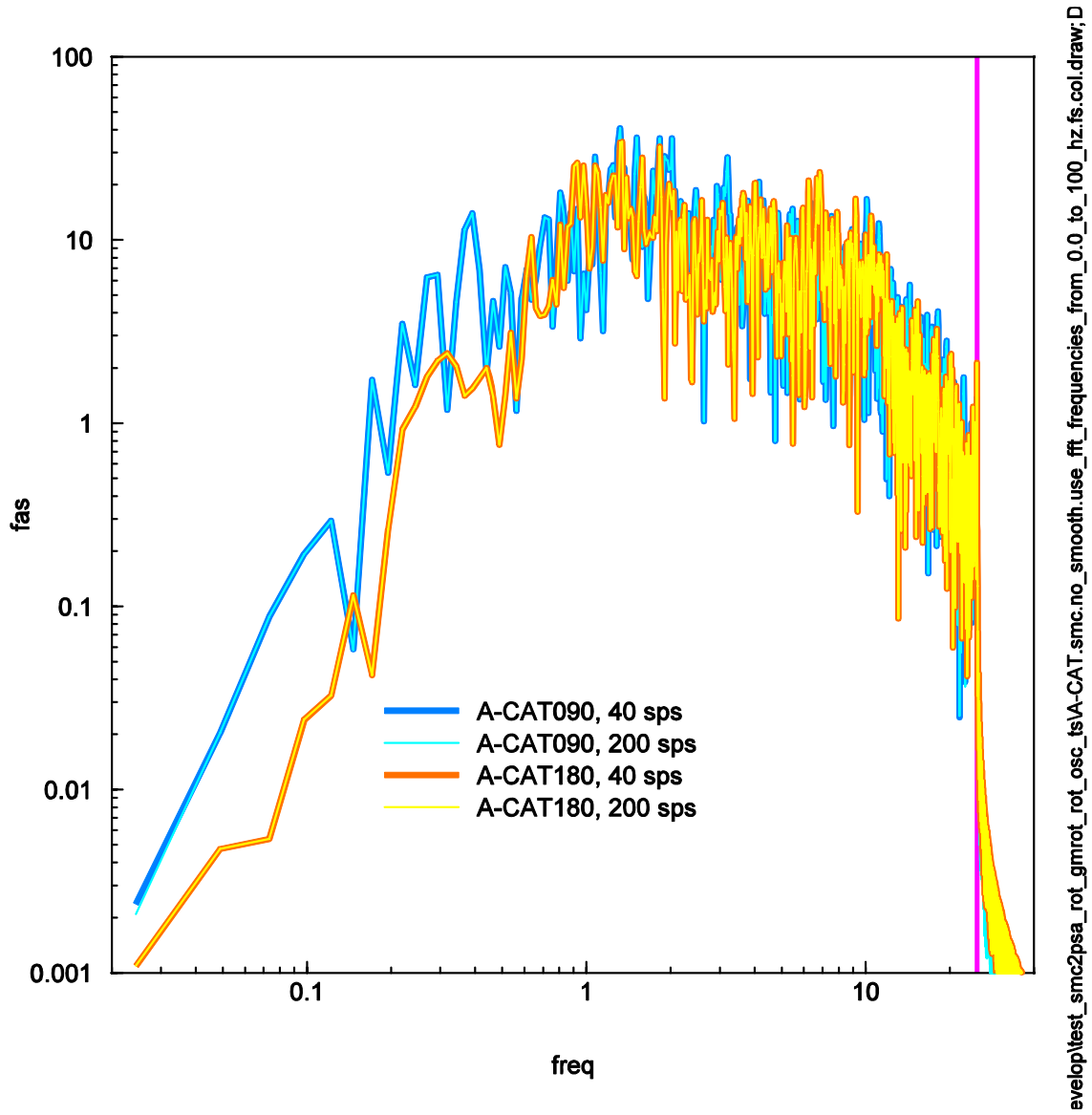

Figure 5. Fourier acceleration spectra for A-CAT090 and A-CAT180. The vertical magenta line is plotted at 25 Hz, and marks the beginning of the abrupt roll off in spectral amplitudes.

The 25 Hz oscillations lead to differences in the displacement waveforms starting from the beginning, as shown in the next figure:

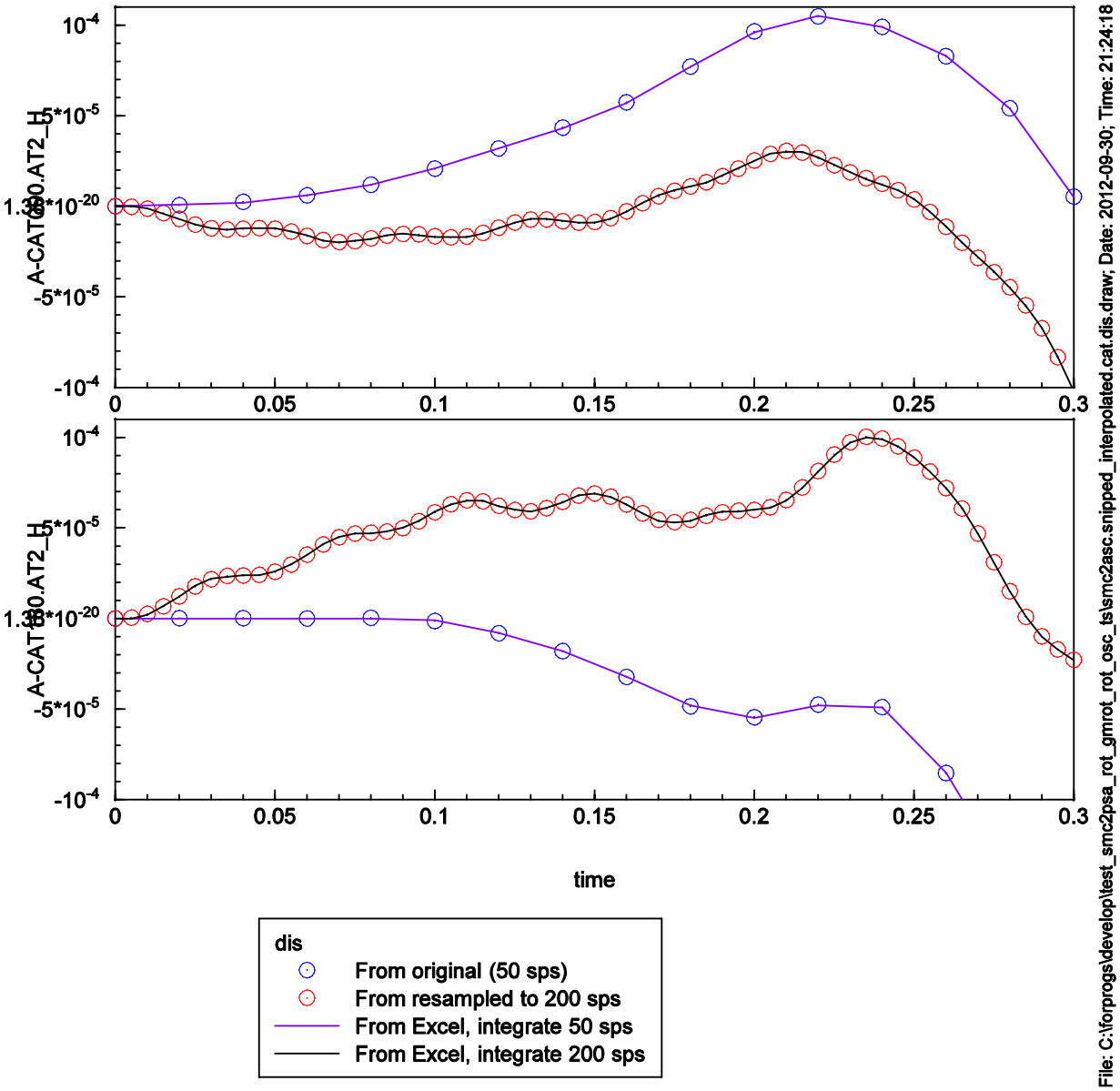

Figure 6. Displacements from the original and resampled time series. The displacements were obtained from double integration using trapezoidal integration, both in my Fortran program and in Excel (to check on my Fortran code).

Results of the Comparisons

Tables comparing the results from the new program with the old program are given at the end of these notes (because there are so many tables, I put them at the end so that readers would not miss the text and discussion based on those tables, which logically would appear after the tables). The entries are $100\left(\frac{IM_{new}}{IM_{old}}-1\right)$. The IM_{new} results are given for interpolate factor = 1 and fraction = 0.9, 0.7, 0.5, and 0.3 (F0.7I1, etc). The last column in each table gives the comparison for interpolate factor = 4 and fraction = 0.5. In addition, the tables for pgd_rot00, pgd_rot50, and pgd_rot100 gives results for interpolate factor = 1.0 and fraction = 0.95. The response spectra in the tables are for 5% damping.

Table 2 is a summary of the decrease of the computational time for the different test runs.

Table 2. speed comparison

Run	Time(m)	Speed Increase
Orig	14.90	-
F0.95,I1.0	0.26	56.8
F0.9,I1.0	0.29	50.8
F0.7,I1.0	0.42	35.9
F0.5,I1.0	0.62	24.2
F0.3,I1.0	0.98	15.3
F0.5,I4.0	2.35	6.3

Times from runs on an older desktop; only the ratios of the times are important. The times are for the full set of NFA-West2 periods and five dampings. The time for F0.95 includes the five dampings and all periods, although the results in the tables at the end are only for pgd.

Perusing the tables leads to a few general conclusions:

1. The intensity measure most sensitive to the choice of fraction is pgd_rot00. fraction = 0.9 works well for all but the rot00 values, and only then the difference between the "true" results and those using a very small subset of points occurs only for a few records (note that even a fraction of 0.95 leads to 0% difference in pgd_rot50 (Table 10)). The conclusion is that a price is being paid for calculating the minimum values, which may never be used (being based on a

median value, rot50 is not sensitive to errors in the smallest values of the intensity measure). If the minimum values are to be used, fraction = 0.5 is my provisional choice at this time. It is twice as slow as fraction = 0.9, but it is still 24 times faster than using the full time series.

2. The resampling generally leads to larger values of the intensity measures, with more increase for the shorter period intensity measures (for convenience, I summarize the results for all intensity measures for the median (rot50) and maximum (rot100) measures in Tables 21 and 22, respectively, sorted by samples per second). The increase is generally greater for records with low sample rates, as expected. The largest difference in the sample set of records is 6.5%; in general, the increase is close to or less than 1%, particularly for records sampled at 100 sps or greater.

Table 3. pga_rot00 (sps=samples per sec; reclen= length of record)

file1	sps	reclen(s)	F0.9, I1.0	F0.7, I1.0	F0.5, I1.0	F0.3, I1.0	F0.5, I4.0
A-CAT090.AT2.smc	50	33	0.00	0.00	0.00	0.00	1.73
A-FAR000.AT2.smc	50	23	-4.26	0.00	0.00	0.00	2.09
A-FEA000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.03
A-G01157.AT2.smc	200	12	0.00	0.00	0.00	0.00	0.88
A-L01000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.07
ARS270.AT2.smc	200	10	-16.09	0.00	0.00	0.00	0.89
A-SOR225.AT2.smc	50	29	0.00	0.00	0.00	0.00	0.43
A-STC090.AT2.smc	50	40	0.00	0.00	0.00	0.00	5.31
CHY036-E.AT2.smc	200	90	0.00	0.00	0.00	0.00	0.01
C-XMG000.AT2.smc	200	22	0.00	0.00	0.00	0.00	0.57
DEV000.AT2.smc	50	61	-13.93	0.00	0.00	0.00	1.33
D-OR6035.AT2.smc	200	13	0.00	0.00	0.00	0.00	2.21
D-SCP070.AT2.smc	200	16	0.00	0.00	0.00	0.00	0.82
FAI095.AT2.smc	50	39	-3.97	0.00	0.00	0.00	0.21
G-CHP000.AT2.smc	200	40	-0.74	0.00	0.00	0.00	0.00
GLB230.AT2.smc	100	8	-17.64	0.00	0.00	0.00	0.55
H-CON180.AT2.smc	200	13	0.00	0.00	0.00	0.00	2.37
H-FIS000.AT2.smc	200	10	-2.12	0.00	0.00	0.00	0.16
HIK000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.64
KAS--L.AT2.smc	200	26	-1.31	0.00	0.00	0.00	0.00
MCG270.AT2.smc	200	7	0.00	0.00	0.00	0.00	1.40
SYC135.AT2.smc	50	46	0.00	0.00	0.00	0.00	0.00
TAF021.AT2.smc	100	54	0.00	0.00	0.00	0.00	0.60
TOT000.AT2.smc	50	78	-1.46	0.00	0.00	0.00	0.28

Table 4. pga_rot50

file1	sps	reclen(s)	F0.9, I1.0	F0.7, I1.0	F0.5, I1.0	F0.3, I1.0	F0.5, I4.0
A-CAT090.AT2.smc	50	33	0.00	0.00	0.00	0.00	3.92
A-FAR000.AT2.smc	50	23	0.00	0.00	0.00	0.00	6.51
A-FEA000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.11
A-G01157.AT2.smc	200	12	0.00	0.00	0.00	0.00	1.79
A-L01000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.08
ARS270.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.87
A-SOR225.AT2.smc	50	29	0.00	0.00	0.00	0.00	0.68
A-STC090.AT2.smc	50	40	0.00	0.00	0.00	0.00	0.20
CHY036-E.AT2.smc	200	90	0.00	0.00	0.00	0.00	0.09
C-XMG000.AT2.smc	200	22	0.00	0.00	0.00	0.00	0.09
DEV000.AT2.smc	50	61	0.00	0.00	0.00	0.00	0.82
D-OR6035.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.48
D-SCP070.AT2.smc	200	16	0.00	0.00	0.00	0.00	0.75
FAI095.AT2.smc	50	39	0.00	0.00	0.00	0.00	1.00
G-CHP000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.45
GLB230.AT2.smc	100	8	0.00	0.00	0.00	0.00	0.24
H-CON180.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.99
H-FIS000.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.44
HIK000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.42
KAS--L.AT2.smc	200	26	0.00	0.00	0.00	0.00	0.05
MCG270.AT2.smc	200	7	0.00	0.00	0.00	0.00	0.10
SYC135.AT2.smc	50	46	0.00	0.00	0.00	0.00	0.55
TAF021.AT2.smc	100	54	0.00	0.00	0.00	0.00	0.45
TOT000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.41

Table 5. pga_rot100

file1	sps	reclen(s)	F0.9, I1.0	F0.7, I1.0	F0.5, I1.0	F0.3, I1.0	F0.5, I4.0
A-CAT090.AT2.smc	50	33	0.00	0.00	0.00	0.00	5.77
A-FAR000.AT2.smc	50	23	0.00	0.00	0.00	0.00	2.10
A-FEA000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.00
A-G01157.AT2.smc	200	12	0.00	0.00	0.00	0.00	1.02
A-L01000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.11
ARS270.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.85
A-SOR225.AT2.smc	50	29	0.00	0.00	0.00	0.00	0.00
A-STC090.AT2.smc	50	40	0.00	0.00	0.00	0.00	1.30
CHY036-E.AT2.smc	200	90	0.00	0.00	0.00	0.00	0.02
C-XMG000.AT2.smc	200	22	0.00	0.00	0.00	0.00	0.35
DEV000.AT2.smc	50	61	0.00	0.00	0.00	0.00	0.00
D-OR6035.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.55
D-SCP070.AT2.smc	200	16	0.00	0.00	0.00	0.00	0.00
FAI095.AT2.smc	50	39	0.00	0.00	0.00	0.00	1.33
G-CHP000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.12
GLB230.AT2.smc	100	8	0.00	0.00	0.00	0.00	0.65
H-CON180.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.33
H-FIS000.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.83
HIK000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.48
KAS--L.AT2.smc	200	26	0.00	0.00	0.00	0.00	0.03
MCG270.AT2.smc	200	7	0.00	0.00	0.00	0.00	1.64
SYC135.AT2.smc	50	46	0.00	0.00	0.00	0.00	0.38
TAF021.AT2.smc	100	54	0.00	0.00	0.00	0.00	0.07
TOT000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.02

Table 6. pgv_rot00

file1	sps	reclen(s)	F0.9, I1.0	F0.7, I1.0	F0.5, I1.0	F0.3, I1.0	F0.5, I4.0
A-CAT090.AT2.smc	50	33	0.00	0.00	0.00	0.00	0.87
A-FAR000.AT2.smc	50	23	0.00	0.00	0.00	0.00	2.90
A-FEA000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.10
A-G01157.AT2.smc	200	12	0.00	0.00	0.00	0.00	0.71
A-L01000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.07
ARS270.AT2.smc	200	10	-16.52	-1.31	0.00	0.00	0.68
A-SOR225.AT2.smc	50	29	0.00	0.00	0.00	0.00	4.42
A-STC090.AT2.smc	50	40	0.00	0.00	0.00	0.00	0.92
CHY036-E.AT2.smc	200	90	0.00	0.00	0.00	0.00	0.01
C-XMG000.AT2.smc	200	22	0.00	0.00	0.00	0.00	0.20
DEV000.AT2.smc	50	61	0.00	0.00	0.00	0.00	0.18
D-OR6035.AT2.smc	200	13	0.00	0.00	0.00	0.00	1.09
D-SCP070.AT2.smc	200	16	0.00	0.00	0.00	0.00	0.63
FAI095.AT2.smc	50	39	0.00	0.00	0.00	0.00	0.09
G-CHP000.AT2.smc	200	40	-0.87	0.00	0.00	0.00	0.31
GLB230.AT2.smc	100	8	-1.27	0.00	0.00	0.00	0.65
H-CON180.AT2.smc	200	13	0.00	0.00	0.00	0.00	1.29
H-FIS000.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.74
HIK000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.49
KAS--L.AT2.smc	200	26	0.00	0.00	0.00	0.00	0.06
MCG270.AT2.smc	200	7	-2.47	0.00	0.00	0.00	0.42
SYC135.AT2.smc	50	46	0.00	0.00	0.00	0.00	0.08
TAF021.AT2.smc	100	54	-46.65	0.00	0.00	0.00	0.13
TOT000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.42

Table 7. pgv_rot50

file1	sps	reclen(s)	F0.9, I1.0	F0.7, I1.0	F0.5, I1.0	F0.3, I1.0	F0.5, I4.0
A-CAT090.AT2.smc	50	33	0.00	0.00	0.00	0.00	0.45
A-FAR000.AT2.smc	50	23	0.00	0.00	0.00	0.00	2.61
A-FEA000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.13
A-G01157.AT2.smc	200	12	0.00	0.00	0.00	0.00	0.55
A-L01000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.06
ARS270.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.40
A-SOR225.AT2.smc	50	29	0.00	0.00	0.00	0.00	1.55
A-STC090.AT2.smc	50	40	0.00	0.00	0.00	0.00	1.56
CHY036-E.AT2.smc	200	90	0.00	0.00	0.00	0.00	0.02
C-XMG000.AT2.smc	200	22	0.00	0.00	0.00	0.00	0.26
DEV000.AT2.smc	50	61	0.00	0.00	0.00	0.00	0.11
D-OR6035.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.64
D-SCP070.AT2.smc	200	16	0.00	0.00	0.00	0.00	0.55
FAI095.AT2.smc	50	39	0.00	0.00	0.00	0.00	0.04
G-CHP000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.06
GLB230.AT2.smc	100	8	0.00	0.00	0.00	0.00	0.58
H-CON180.AT2.smc	200	13	0.00	0.00	0.00	0.00	1.34
H-FIS000.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.55
HIK000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.55
KAS--L.AT2.smc	200	26	0.00	0.00	0.00	0.00	0.07
MCG270.AT2.smc	200	7	0.00	0.00	0.00	0.00	1.08
SYC135.AT2.smc	50	46	0.00	0.00	0.00	0.00	0.07
TAF021.AT2.smc	100	54	0.00	0.00	0.00	0.00	0.11
TOT000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.29

Table 8. pgv_rot100

file1	sps	reclen(s)	F0.9, I1.0	F0.7, I1.0	F0.5, I1.0	F0.3, I1.0	F0.5, I4.0
A-CAT090.AT2.smc	50	33	0.00	0.00	0.00	0.00	0.71
A-FAR000.AT2.smc	50	23	0.00	0.00	0.00	0.00	2.17
A-FEA000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.10
A-G01157.AT2.smc	200	12	0.00	0.00	0.00	0.00	0.24
A-L01000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.12
ARS270.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.49
A-SOR225.AT2.smc	50	29	0.00	0.00	0.00	0.00	2.21
A-STC090.AT2.smc	50	40	0.00	0.00	0.00	0.00	1.45
CHY036-E.AT2.smc	200	90	0.00	0.00	0.00	0.00	0.03
C-XMG000.AT2.smc	200	22	0.00	0.00	0.00	0.00	0.41
DEV000.AT2.smc	50	61	0.00	0.00	0.00	0.00	0.02
D-OR6035.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.62
D-SCP070.AT2.smc	200	16	0.00	0.00	0.00	0.00	0.71
FAI095.AT2.smc	50	39	0.00	0.00	0.00	0.00	0.04
G-CHP000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.03
GLB230.AT2.smc	100	8	0.00	0.00	0.00	0.00	0.48
H-CON180.AT2.smc	200	13	0.00	0.00	0.00	0.00	1.24
H-FIS000.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.71
HIK000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.25
KAS--L.AT2.smc	200	26	0.00	0.00	0.00	0.00	0.03
MCG270.AT2.smc	200	7	0.00	0.00	0.00	0.00	1.04
SYC135.AT2.smc	50	46	0.00	0.00	0.00	0.00	0.05
TAF021.AT2.smc	100	54	0.00	0.00	0.00	0.00	0.07
TOT000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.22

Table 9. pgd_rot00

file1	sps	reclen(s)	F0.95, I1.0	F0.9, I1.0	F0.7, I1.0	F0.5, I1.0	F0.3, I1.0	F0.5, I4.0
A-CAT090.AT2.smc	50	33	0.00	0.00	0.00	0.00	0.00	-3.02
A-FAR000.AT2.smc	50	23	0.00	0.00	0.00	0.00	0.00	0.90
A-FEA000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.00	0.12
A-G01157.AT2.smc	200	12	0.00	0.00	0.00	0.00	0.00	0.13
A-L01000.AT2.smc	200	40	-0.01	0.00	0.00	0.00	0.00	0.03
ARS270.AT2.smc	200	10	-15.20	-15.20	-15.20	0.00	0.00	0.61
A-SOR225.AT2.smc	50	29	-33.48	-33.48	0.00	0.00	0.00	0.07
A-STC090.AT2.smc	50	40	-6.28	-5.73	0.00	0.00	0.00	0.67
CHY036-E.AT2.smc	200	90	-13.83	-0.89	0.00	0.00	0.00	0.00
C-XMG000.AT2.smc	200	22	0.00	0.00	0.00	0.00	0.00	0.06
DEV000.AT2.smc	50	61	-0.01	-0.01	-0.01	-0.01	-0.01	0.15
D-OR6035.AT2.smc	200	13	-16.36	-16.36	0.00	0.00	0.00	0.91
D-SCP070.AT2.smc	200	16	-4.32	-4.32	0.00	0.00	0.00	0.20
FAI095.AT2.smc	50	39	0.00	0.00	0.00	0.00	0.00	0.18
G-CHP000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.00	0.06
GLB230.AT2.smc	100	8	-5.14	-1.22	0.00	0.00	0.00	0.26
H-CON180.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.00	1.34
H-FIS000.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.00	0.06
HIK000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.00	0.23
KAS--L.AT2.smc	200	26	0.00	0.00	0.00	0.00	0.00	0.04
MCG270.AT2.smc	200	7	-22.64	0.00	0.00	0.00	0.00	0.41
SYC135.AT2.smc	50	46	0.00	0.00	0.00	0.00	0.00	0.24
TAF021.AT2.smc	100	54	-37.44	-37.44	0.00	0.00	0.00	0.02
TOT000.AT2.smc	50	78	-63.03	-48.30	0.00	0.00	0.00	0.39

Table 10. pgd_rot50

file1	sps	reclen(s)	F0.95, I1.0	F0.9, I1.0	F0.7, I1.0	F0.5, I1.0	F0.3, I1.0	F0.5, I4.0
A-CAT090.AT2.smc	50	33	0.00	0.00	0.00	0.00	0.00	0.54
A-FAR000.AT2.smc	50	23	0.00	0.00	0.00	0.00	0.00	0.51
A-FEA000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.00	0.09
A-G01157.AT2.smc	200	12	0.00	0.00	0.00	0.00	0.00	0.41
A-L01000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.00	0.09
ARS270.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.00	0.53
A-SOR225.AT2.smc	50	29	0.00	0.00	0.00	0.00	0.00	0.44
A-STC090.AT2.smc	50	40	0.00	0.00	0.00	0.00	0.00	0.20
CHY036-E.AT2.smc	200	90	0.00	0.00	0.00	0.00	0.00	0.00
C-XMG000.AT2.smc	200	22	0.00	0.00	0.00	0.00	0.00	0.26
DEV000.AT2.smc	50	61	0.00	0.00	0.00	0.00	0.00	0.06
D-OR6035.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.00	0.57
D-SCP070.AT2.smc	200	16	0.00	0.00	0.00	0.00	0.00	0.25
FAI095.AT2.smc	50	39	0.00	0.00	0.00	0.00	0.00	0.08
G-CHP000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.00	0.08
GLB230.AT2.smc	100	8	0.00	0.00	0.00	0.00	0.00	0.68
H-CON180.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.00	0.78
H-FIS000.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.00	0.35
HIK000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.00	0.26
KAS--L.AT2.smc	200	26	0.00	0.00	0.00	0.00	0.00	0.04
MCG270.AT2.smc	200	7	0.00	0.00	0.00	0.00	0.00	0.36
SYC135.AT2.smc	50	46	0.00	0.00	0.00	0.00	0.00	-0.01
TAF021.AT2.smc	100	54	0.00	0.00	0.00	0.00	0.00	-0.06
TOT000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.00	0.04

Table 11. pgd_rot100

file1	sps	reclen(s)	F0.95, I1.0	F0.9, I1.0	F0.7, I1.0	F0.5, I1.0	F0.3, I1.0	F0.5, I4.0
A-CAT090.AT2.smc	50	33	0.00	0.00	0.00	0.00	0.00	0.56
A-FAR000.AT2.smc	50	23	0.00	0.00	0.00	0.00	0.00	2.17
A-FEA000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.00	0.12
A-G01157.AT2.smc	200	12	0.00	0.00	0.00	0.00	0.00	0.29
A-L01000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.00	0.08
ARS270.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.00	0.47
A-SOR225.AT2.smc	50	29	0.00	0.00	0.00	0.00	0.00	0.18
A-STC090.AT2.smc	50	40	0.00	0.00	0.00	0.00	0.00	0.57
CHY036-E.AT2.smc	200	90	0.00	0.00	0.00	0.00	0.00	0.00
C-XMG000.AT2.smc	200	22	0.00	0.00	0.00	0.00	0.00	0.21
DEV000.AT2.smc	50	61	0.00	0.00	0.00	0.00	0.00	0.06
D-OR6035.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.00	0.41
D-SCP070.AT2.smc	200	16	0.00	0.00	0.00	0.00	0.00	0.22
FAI095.AT2.smc	50	39	0.00	0.00	0.00	0.00	0.00	0.08
G-CHP000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.00	0.06
GLB230.AT2.smc	100	8	0.00	0.00	0.00	0.00	0.00	0.67
H-CON180.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.00	0.45
H-FIS000.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.00	0.15
HIK000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.00	0.21
KAS--L.AT2.smc	200	26	0.00	0.00	0.00	0.00	0.00	0.03
MCG270.AT2.smc	200	7	0.00	0.00	0.00	0.00	0.00	0.84
SYC135.AT2.smc	50	46	0.00	0.00	0.00	0.00	0.00	0.05
TAF021.AT2.smc	100	54	0.00	0.00	0.00	0.00	0.00	-0.13
TOT000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.00	0.04

Table 12. rotd00(T=0.2s)

file1	sps	reclen(s)	F0.9, I1.0	F0.7, I1.0	F0.5, I1.0	F0.3, I1.0	F0.5, I4.0
A-CAT090.AT2.smc	50	33	0.00	0.00	0.00	0.00	2.50
A-FAR000.AT2.smc	50	23	0.00	0.00	0.00	0.00	3.91
A-FEA000.AT2.smc	200	40	-0.67	0.00	0.00	0.00	0.12
A-G01157.AT2.smc	200	12	0.00	0.00	0.00	0.00	0.19
A-L01000.AT2.smc	200	40	-2.87	0.00	0.00	0.00	0.16
ARS270.AT2.smc	200	10	-8.93	0.00	0.00	0.00	0.54
A-SOR225.AT2.smc	50	29	0.00	0.00	0.00	0.00	3.78
A-STC090.AT2.smc	50	40	0.00	0.00	0.00	0.00	3.65
CHY036-E.AT2.smc	200	90	0.00	0.00	0.00	0.00	0.34
C-XMG000.AT2.smc	200	22	-9.87	0.00	0.00	0.00	0.33
DEV000.AT2.smc	50	61	-26.26	0.00	0.00	0.00	2.83
D-OR6035.AT2.smc	200	13	-0.83	0.00	0.00	0.00	0.28
D-SCP070.AT2.smc	200	16	0.00	0.00	0.00	0.00	0.52
FAI095.AT2.smc	50	39	0.00	0.00	0.00	0.00	2.36
G-CHP000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.17
GLB230.AT2.smc	100	8	-10.95	-6.41	0.00	0.00	1.18
H-CON180.AT2.smc	200	13	-10.92	0.00	0.00	0.00	0.54
H-FIS000.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.29
HIK000.AT2.smc	50	78	0.00	0.00	0.00	0.00	1.28
KAS--L.AT2.smc	200	26	0.00	0.00	0.00	0.00	0.11
MCG270.AT2.smc	200	7	-3.57	0.00	0.00	0.00	0.21
SYC135.AT2.smc	50	46	0.00	0.00	0.00	0.00	1.78
TAF021.AT2.smc	100	54	0.00	0.00	0.00	0.00	0.71
TOT000.AT2.smc	50	78	-0.26	0.00	0.00	0.00	1.78

Table 13. rotd50(T=0.2s)

file1	sps	reclen(s)	F0.9, I1.0	F0.7, I1.0	F0.5, I1.0	F0.3, I1.0	F0.5, I4.0
A-CAT090.AT2.smc	50	33	0.00	0.00	0.00	0.00	3.89
A-FAR000.AT2.smc	50	23	0.00	0.00	0.00	0.00	5.94
A-FEA000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.19
A-G01157.AT2.smc	200	12	0.00	0.00	0.00	0.00	0.30
A-L01000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.16
ARS270.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.36
A-SOR225.AT2.smc	50	29	0.00	0.00	0.00	0.00	4.10
A-STC090.AT2.smc	50	40	0.00	0.00	0.00	0.00	2.85
CHY036-E.AT2.smc	200	90	0.00	0.00	0.00	0.00	0.31
C-XMG000.AT2.smc	200	22	0.00	0.00	0.00	0.00	0.32
DEV000.AT2.smc	50	61	0.00	0.00	0.00	0.00	3.06
D-OR6035.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.63
D-SCP070.AT2.smc	200	16	0.00	0.00	0.00	0.00	0.36
FAI095.AT2.smc	50	39	0.00	0.00	0.00	0.00	1.95
G-CHP000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.26
GLB230.AT2.smc	100	8	0.00	0.00	0.00	0.00	0.93
H-CON180.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.57
H-FIS000.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.40
HIK000.AT2.smc	50	78	0.00	0.00	0.00	0.00	1.79
KAS--L.AT2.smc	200	26	0.00	0.00	0.00	0.00	0.16
MCG270.AT2.smc	200	7	0.00	0.00	0.00	0.00	0.26
SYC135.AT2.smc	50	46	0.00	0.00	0.00	0.00	2.78
TAF021.AT2.smc	100	54	0.00	0.00	0.00	0.00	0.76
TOT000.AT2.smc	50	78	0.00	0.00	0.00	0.00	1.71

Table 14. rotd100(T=0.2s)

file1	sps	reclen(s)	F0.9, I1.0	F0.7, I1.0	F0.5, I1.0	F0.3, I1.0	F0.5, I4.0
A-CAT090.AT2.smc	50	33	0.00	0.00	0.00	0.00	3.87
A-FAR000.AT2.smc	50	23	0.00	0.00	0.00	0.00	6.06
A-FEA000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.15
A-G01157.AT2.smc	200	12	0.00	0.00	0.00	0.00	0.23
A-L01000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.17
ARS270.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.18
A-SOR225.AT2.smc	50	29	0.00	0.00	0.00	0.00	3.36
A-STC090.AT2.smc	50	40	0.00	0.00	0.00	0.00	4.58
CHY036-E.AT2.smc	200	90	0.00	0.00	0.00	0.00	0.14
C-XMG000.AT2.smc	200	22	0.00	0.00	0.00	0.00	0.27
DEV000.AT2.smc	50	61	0.00	0.00	0.00	0.00	1.18
D-OR6035.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.34
D-SCP070.AT2.smc	200	16	0.00	0.00	0.00	0.00	0.22
FAI095.AT2.smc	50	39	0.00	0.00	0.00	0.00	2.19
G-CHP000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.26
GLB230.AT2.smc	100	8	0.00	0.00	0.00	0.00	0.69
H-CON180.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.33
H-FIS000.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.34
HIK000.AT2.smc	50	78	0.00	0.00	0.00	0.00	1.86
KAS--L.AT2.smc	200	26	0.00	0.00	0.00	0.00	0.26
MCG270.AT2.smc	200	7	0.00	0.00	0.00	0.00	0.31
SYC135.AT2.smc	50	46	0.00	0.00	0.00	0.00	5.42
TAF021.AT2.smc	100	54	0.00	0.00	0.00	0.00	0.83
TOT000.AT2.smc	50	78	0.00	0.00	0.00	0.00	2.44

Table 15. rotd00(T=2.0s)

file1	sps	reclen(s)	F0.9, I1.0	F0.7, I1.0	F0.5, I1.0	F0.3, I1.0	F0.5, I4.0
A-CAT090.AT2.smc	50	33	0.00	0.00	0.00	0.00	0.12
A-FAR000.AT2.smc	50	23	0.00	0.00	0.00	0.00	0.41
A-FEA000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.04
A-G01157.AT2.smc	200	12	0.00	0.00	0.00	0.00	0.23
A-L01000.AT2.smc	200	40	-0.31	0.00	0.00	0.00	0.01
ARS270.AT2.smc	200	10	-9.96	-9.96	0.00	0.00	0.25
A-SOR225.AT2.smc	50	29	-4.17	0.00	0.00	0.00	0.07
A-STC090.AT2.smc	50	40	0.00	0.00	0.00	0.00	0.07
CHY036-E.AT2.smc	200	90	0.00	0.00	0.00	0.00	0.01
C-XMG000.AT2.smc	200	22	-6.30	0.00	0.00	0.00	0.05
DEV000.AT2.smc	50	61	-9.02	0.00	0.00	0.00	0.06
D-OR6035.AT2.smc	200	13	-10.86	0.00	0.00	0.00	0.45
D-SCP070.AT2.smc	200	16	-7.36	0.00	0.00	0.00	0.14
FAI095.AT2.smc	50	39	0.00	0.00	0.00	0.00	0.04
G-CHP000.AT2.smc	200	40	-21.94	-2.14	0.00	0.00	0.09
GLB230.AT2.smc	100	8	0.00	0.00	0.00	0.00	0.45
H-CON180.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.69
H-FIS000.AT2.smc	200	10	-1.96	-1.96	0.00	0.00	0.14
HIK000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.05
KAS--L.AT2.smc	200	26	-5.18	0.00	0.00	0.00	0.01
MCG270.AT2.smc	200	7	0.00	0.00	0.00	0.00	0.32
SYC135.AT2.smc	50	46	0.00	0.00	0.00	0.00	0.03
TAF021.AT2.smc	100	54	-17.94	0.00	0.00	0.00	0.02
TOT000.AT2.smc	50	78	-5.47	0.00	0.00	0.00	0.27

Table 16. rotd50(T=2.0s)

file1	sps	reclen(s)	F0.9, I1.0	F0.7, I1.0	F0.5, I1.0	F0.3, I1.0	F0.5, I4.0
A-CAT090.AT2.smc	50	33	0.00	0.00	0.00	0.00	0.06
A-FAR000.AT2.smc	50	23	0.00	0.00	0.00	0.00	0.49
A-FEA000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.05
A-G01157.AT2.smc	200	12	0.00	0.00	0.00	0.00	0.10
A-L01000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.03
ARS270.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.21
A-SOR225.AT2.smc	50	29	0.00	0.00	0.00	0.00	0.24
A-STC090.AT2.smc	50	40	0.00	0.00	0.00	0.00	0.05
CHY036-E.AT2.smc	200	90	0.00	0.00	0.00	0.00	0.00
C-XMG000.AT2.smc	200	22	0.00	0.00	0.00	0.00	0.08
DEV000.AT2.smc	50	61	0.00	0.00	0.00	0.00	0.04
D-OR6035.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.34
D-SCP070.AT2.smc	200	16	0.00	0.00	0.00	0.00	0.16
FAI095.AT2.smc	50	39	0.00	0.00	0.00	0.00	0.03
G-CHP000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.02
GLB230.AT2.smc	100	8	0.00	0.00	0.00	0.00	0.64
H-CON180.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.27
H-FIS000.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.05
HIK000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.09
KAS--L.AT2.smc	200	26	0.00	0.00	0.00	0.00	0.01
MCG270.AT2.smc	200	7	0.00	0.00	0.00	0.00	0.16
SYC135.AT2.smc	50	46	0.00	0.00	0.00	0.00	0.06
TAF021.AT2.smc	100	54	0.00	0.00	0.00	0.00	0.03
TOT000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.15

Table 17. rotd100(T=2.0s)

file1	sps	reclen(s)	F0.9, I1.0	F0.7, I1.0	F0.5, I1.0	F0.3, I1.0	F0.5, I4.0
A-CAT090.AT2.smc	50	33	0.00	0.00	0.00	0.00	0.08
A-FAR000.AT2.smc	50	23	0.00	0.00	0.00	0.00	0.15
A-FEA000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.05
A-G01157.AT2.smc	200	12	0.00	0.00	0.00	0.00	0.13
A-L01000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.03
ARS270.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.21
A-SOR225.AT2.smc	50	29	0.00	0.00	0.00	0.00	0.06
A-STC090.AT2.smc	50	40	0.00	0.00	0.00	0.00	0.05
CHY036-E.AT2.smc	200	90	0.00	0.00	0.00	0.00	0.00
C-XMG000.AT2.smc	200	22	0.00	0.00	0.00	0.00	0.10
DEV000.AT2.smc	50	61	0.00	0.00	0.00	0.00	0.05
D-OR6035.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.21
D-SCP070.AT2.smc	200	16	0.00	0.00	0.00	0.00	0.10
FAI095.AT2.smc	50	39	0.00	0.00	0.00	0.00	0.05
G-CHP000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.03
GLB230.AT2.smc	100	8	0.00	0.00	0.00	0.00	0.40
H-CON180.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.22
H-FIS000.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.01
HIK000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.14
KAS--L.AT2.smc	200	26	0.00	0.00	0.00	0.00	0.01
MCG270.AT2.smc	200	7	0.00	0.00	0.00	0.00	0.54
SYC135.AT2.smc	50	46	0.00	0.00	0.00	0.00	0.04
TAF021.AT2.smc	100	54	0.00	0.00	0.00	0.00	0.02
TOT000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.25

Table 18. rotd00(T=20s)

file1	sps	reclen(s)	F0.9, I1.0	F0.7, I1.0	F0.5, I1.0	F0.3, I1.0	F0.5, I4.0
A-CAT090.AT2.smc	50	33	0.00	0.00	0.00	0.00	-0.06
A-FAR000.AT2.smc	50	23	0.00	0.00	0.00	0.00	0.20
A-FEA000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.08
A-G01157.AT2.smc	200	12	0.00	0.00	0.00	0.00	0.06
A-L01000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.07
ARS270.AT2.smc	200	10	-14.88	-14.88	0.00	0.00	0.32
A-SOR225.AT2.smc	50	29	0.00	0.00	0.00	0.00	0.24
A-STC090.AT2.smc	50	40	0.00	0.00	0.00	0.00	0.52
CHY036-E.AT2.smc	200	90	0.00	0.00	0.00	0.00	0.00
C-XMG000.AT2.smc	200	22	0.00	0.00	0.00	0.00	0.03
DEV000.AT2.smc	50	61	0.00	0.00	0.00	0.00	0.02
D-OR6035.AT2.smc	200	13	-16.31	0.00	0.00	0.00	0.62
D-SCP070.AT2.smc	200	16	-4.37	0.00	0.00	0.00	0.10
FAI095.AT2.smc	50	39	0.00	0.00	0.00	0.00	0.06
G-CHP000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.03
GLB230.AT2.smc	100	8	-1.20	0.00	0.00	0.00	0.12
H-CON180.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.69
H-FIS000.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.04
HIK000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.06
KAS--L.AT2.smc	200	26	0.00	0.00	0.00	0.00	0.03
MCG270.AT2.smc	200	7	0.00	0.00	0.00	0.00	0.27
SYC135.AT2.smc	50	46	0.00	0.00	0.00	0.00	0.11
TAF021.AT2.smc	100	54	-0.23	0.00	0.00	0.00	0.00
TOT000.AT2.smc	50	78	-39.91	-39.91	-39.91	0.00	-39.83

Table 19. rotd50(T=20s)

file1	sps	reclen(s)	F0.9, I1.0	F0.7, I1.0	F0.5, I1.0	F0.3, I1.0	F0.5, I4.0
A-CAT090.AT2.smc	50	33	0.00	0.00	0.00	0.00	0.09
A-FAR000.AT2.smc	50	23	0.00	0.00	0.00	0.00	0.54
A-FEA000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.05
A-G01157.AT2.smc	200	12	0.00	0.00	0.00	0.00	0.28
A-L01000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.05
ARS270.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.31
A-SOR225.AT2.smc	50	29	0.00	0.00	0.00	0.00	0.23
A-STC090.AT2.smc	50	40	0.00	0.00	0.00	0.00	0.16
CHY036-E.AT2.smc	200	90	0.00	0.00	0.00	0.00	0.00
C-XMG000.AT2.smc	200	22	0.00	0.00	0.00	0.00	0.13
DEV000.AT2.smc	50	61	0.00	0.00	0.00	0.00	0.01
D-OR6035.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.35
D-SCP070.AT2.smc	200	16	0.00	0.00	0.00	0.00	0.15
FAI095.AT2.smc	50	39	0.00	0.00	0.00	0.00	0.02
G-CHP000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.05
GLB230.AT2.smc	100	8	0.00	0.00	0.00	0.00	0.44
H-CON180.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.46
H-FIS000.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.22
HIK000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.02
KAS--L.AT2.smc	200	26	0.00	0.00	0.00	0.00	0.03
MCG270.AT2.smc	200	7	0.00	0.00	0.00	0.00	0.19
SYC135.AT2.smc	50	46	0.00	0.00	0.00	0.00	0.06
TAF021.AT2.smc	100	54	0.00	0.00	0.00	0.00	0.00
TOT000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.01

Table 20. rotd100(T=20s)

file1	sps	reclen(s)	F0.9, I1.0	F0.7, I1.0	F0.5, I1.0	F0.3, I1.0	F0.5, I4.0
A-CAT090.AT2.smc	50	33	0.00	0.00	0.00	0.00	0.05
A-FAR000.AT2.smc	50	23	0.00	0.00	0.00	0.00	1.18
A-FEA000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.09
A-G01157.AT2.smc	200	12	0.00	0.00	0.00	0.00	0.18
A-L01000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.05
ARS270.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.25
A-SOR225.AT2.smc	50	29	0.00	0.00	0.00	0.00	0.20
A-STC090.AT2.smc	50	40	0.00	0.00	0.00	0.00	0.03
CHY036-E.AT2.smc	200	90	0.00	0.00	0.00	0.00	0.00
C-XMG000.AT2.smc	200	22	0.00	0.00	0.00	0.00	0.11
DEV000.AT2.smc	50	61	0.00	0.00	0.00	0.00	0.01
D-OR6035.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.20
D-SCP070.AT2.smc	200	16	0.00	0.00	0.00	0.00	0.11
FAI095.AT2.smc	50	39	0.00	0.00	0.00	0.00	0.02
G-CHP000.AT2.smc	200	40	0.00	0.00	0.00	0.00	0.03
GLB230.AT2.smc	100	8	0.00	0.00	0.00	0.00	0.35
H-CON180.AT2.smc	200	13	0.00	0.00	0.00	0.00	0.30
H-FIS000.AT2.smc	200	10	0.00	0.00	0.00	0.00	0.09
HIK000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.03
KAS--L.AT2.smc	200	26	0.00	0.00	0.00	0.00	0.01
MCG270.AT2.smc	200	7	0.00	0.00	0.00	0.00	0.53
SYC135.AT2.smc	50	46	0.00	0.00	0.00	0.00	0.02
TAF021.AT2.smc	100	54	0.00	0.00	0.00	0.00	0.00
TOT000.AT2.smc	50	78	0.00	0.00	0.00	0.00	0.01

Table 21. pga_d50, pgv_d50, pgd_d50, and rotd50 for T= 0.2, 2.0, and 20.0 s, for fraction = 0.5 and interpolate_factor = 4

file1	sps	pga	pgv	pgd	T=0.2s	T=2.0s	T=20s
A-CAT090.AT2.smc	50	3.9	0.4	0.5	3.9	0.1	0.1
A-FAR000.AT2.smc	50	6.5	2.6	0.5	5.9	0.5	0.5
A-SOR225.AT2.smc	50	0.7	1.5	0.4	4.1	0.2	0.2
A-STC090.AT2.smc	50	0.2	1.6	0.2	2.9	0.0	0.2
DEV000.AT2.smc	50	0.8	0.1	0.1	3.1	0.0	0.0
FAI095.AT2.smc	50	1.0	0.0	0.1	1.9	0.0	0.0
HIK000.AT2.smc	50	0.4	0.6	0.3	1.8	0.1	0.0
SYC135.AT2.smc	50	0.6	0.1	0.0	2.8	0.1	0.1
TOT000.AT2.smc	50	0.4	0.3	0.0	1.7	0.2	0.0
GLB230.AT2.smc	100	0.2	0.6	0.7	0.9	0.6	0.4
TAF021.AT2.smc	100	0.4	0.1	-0.1	0.8	0.0	0.0
A-FEA000.AT2.smc	200	0.1	0.1	0.1	0.2	0.0	0.1
A-G01157.AT2.smc	200	1.8	0.5	0.4	0.3	0.1	0.3
A-L01000.AT2.smc	200	0.1	0.1	0.1	0.2	0.0	0.1
ARS270.AT2.smc	200	0.9	0.4	0.5	0.4	0.2	0.3
CHY036-E.AT2.smc	200	0.1	0.0	0.0	0.3	0.0	0.0
C-XMG000.AT2.smc	200	0.1	0.3	0.3	0.3	0.1	0.1
D-OR6035.AT2.smc	200	0.5	0.6	0.6	0.6	0.3	0.4
D-SCP070.AT2.smc	200	0.7	0.6	0.3	0.4	0.2	0.2
G-CHP000.AT2.smc	200	0.5	0.1	0.1	0.3	0.0	0.0
H-CON180.AT2.smc	200	1.0	1.3	0.8	0.6	0.3	0.5
H-FIS000.AT2.smc	200	0.4	0.6	0.4	0.4	0.1	0.2
KAS--L.AT2.smc	200	0.1	0.1	0.0	0.2	0.0	0.0
MCG270.AT2.smc	200	0.1	1.1	0.4	0.3	0.2	0.2

Table 22. pga_d100, pgv_d100, pgd_d100, and rotd100 for T= 0.2, 2.0, and 20.0 s, for fraction = 0.5 and interpolate_factor = 4

file1	sps	pga	pgv	pgd	T=0.2s	T=2.0s	T=20s
A-CAT090.AT2.smc	50	5.8	0.7	0.6	3.9	0.1	0.1
A-FAR000.AT2.smc	50	2.1	2.2	2.2	6.1	0.1	1.2
A-SOR225.AT2.smc	50	0.0	2.2	0.2	3.4	0.1	0.2
A-STC090.AT2.smc	50	1.3	1.4	0.6	4.6	0.1	0.0
DEV000.AT2.smc	50	0.0	0.0	0.1	1.2	0.0	0.0
FAI095.AT2.smc	50	1.3	0.0	0.1	2.2	0.1	0.0
HIK000.AT2.smc	50	0.5	0.2	0.2	1.9	0.1	0.0
SYC135.AT2.smc	50	0.4	0.0	0.0	5.4	0.0	0.0
TOT000.AT2.smc	50	0.0	0.2	0.0	2.4	0.3	0.0
GLB230.AT2.smc	100	0.7	0.5	0.7	0.7	0.4	0.4
TAF021.AT2.smc	100	0.1	0.1	-0.1	0.8	0.0	0.0
A-FEA000.AT2.smc	200	0.0	0.1	0.1	0.2	0.1	0.1
A-G01157.AT2.smc	200	1.0	0.2	0.3	0.2	0.1	0.2
A-L01000.AT2.smc	200	0.1	0.1	0.1	0.2	0.0	0.1
ARS270.AT2.smc	200	0.8	0.5	0.5	0.2	0.2	0.2
CHY036-E.AT2.smc	200	0.0	0.0	0.0	0.1	0.0	0.0
C-XMG000.AT2.smc	200	0.4	0.4	0.2	0.3	0.1	0.1
D-OR6035.AT2.smc	200	0.6	0.6	0.4	0.3	0.2	0.2
D-SCP070.AT2.smc	200	0.0	0.7	0.2	0.2	0.1	0.1
G-CHP000.AT2.smc	200	0.1	0.0	0.1	0.3	0.0	0.0
H-CON180.AT2.smc	200	0.3	1.2	0.5	0.3	0.2	0.3
H-FIS000.AT2.smc	200	0.8	0.7	0.2	0.3	0.0	0.1
KAS--L.AT2.smc	200	0.0	0.0	0.0	0.3	0.0	0.0
MCG270.AT2.smc	200	1.6	1.0	0.8	0.3	0.5	0.5