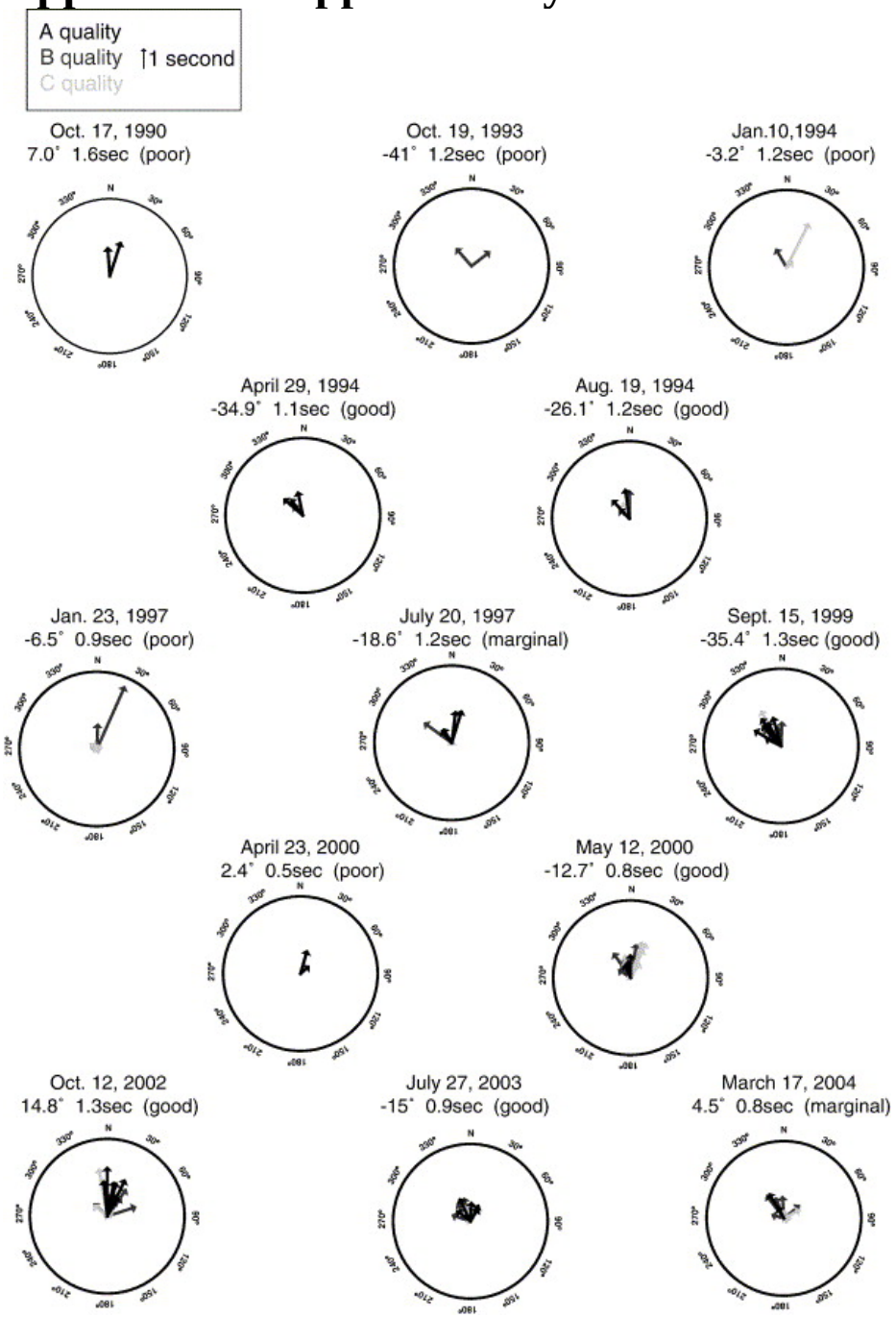
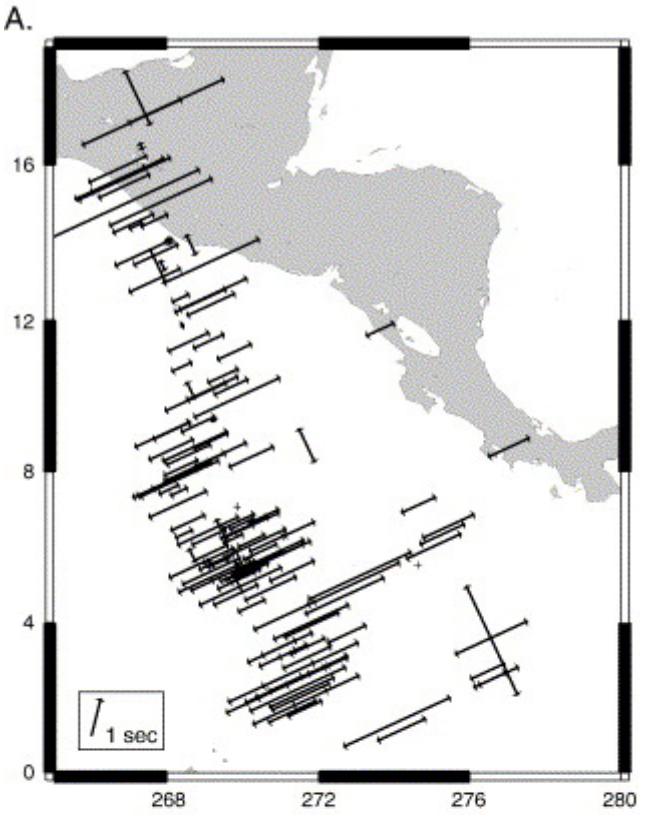
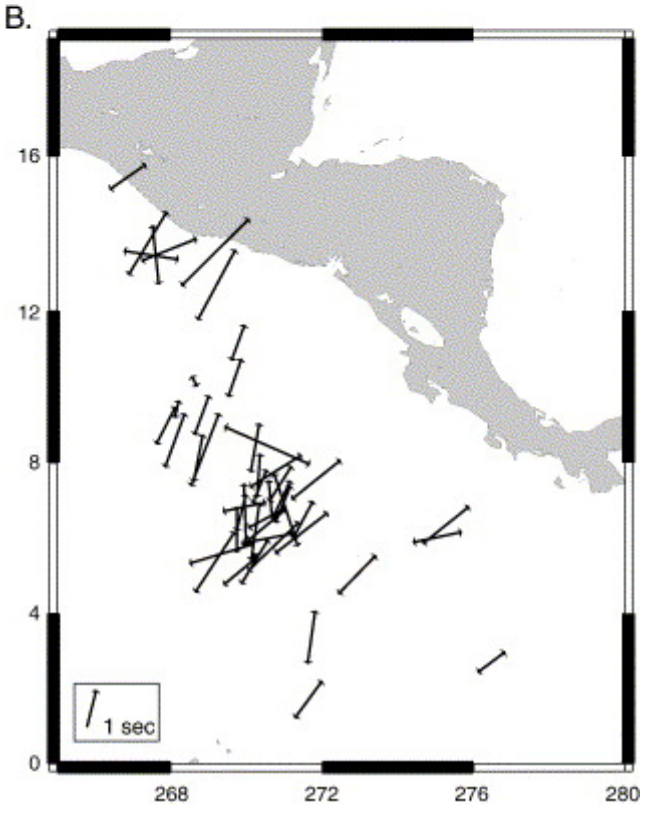
Appendix A. Supplementary data

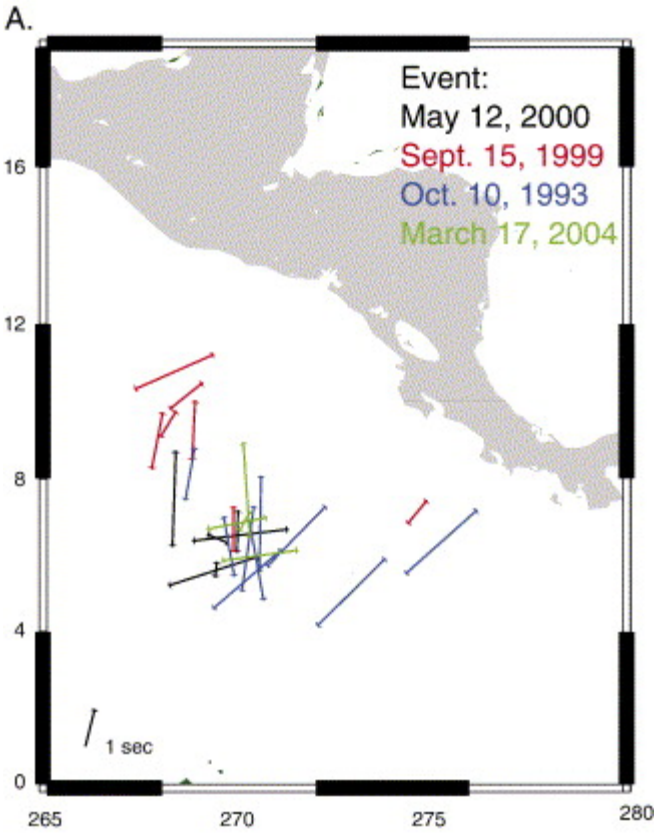


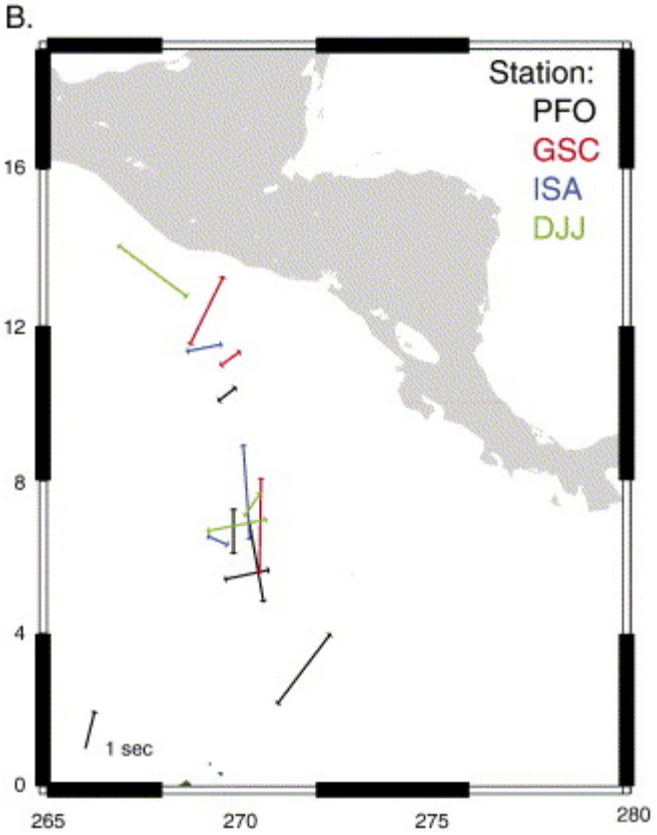
Supplemental Fig. 1. These 13 azimuthal plots show the residual S splitting parameters averaged to form source terms for each event. Vectors are scaled to delay time, oriented in the fast polarization direction, and colored according to the quality of the splitting measurement (see text). A weighted averaging scheme is used, where A quality measures are given in full weight, B quality in three-quarters weight, and C quality in one-quarter weight. The final source terms are noted for each event, as well as their overall quality.


A.
16
12
8
4
0
1 sec
268
272
276
280

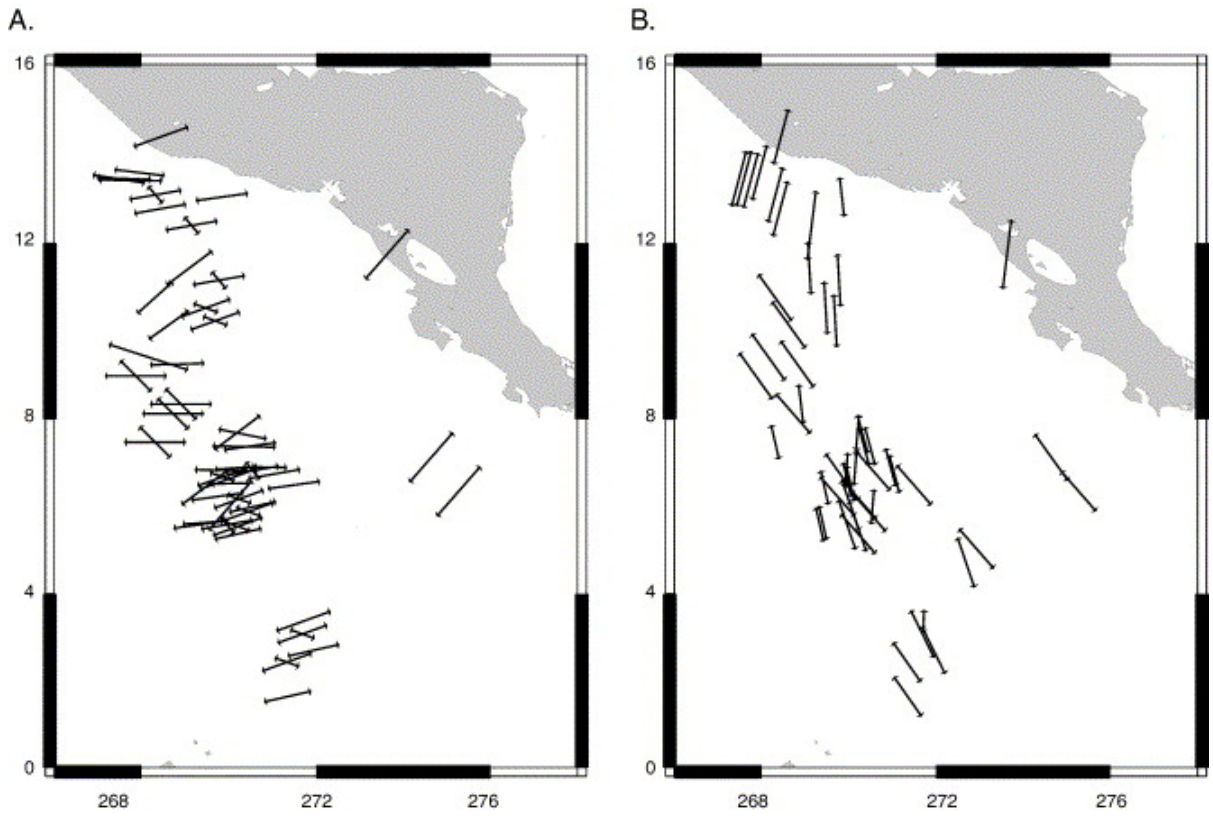

B.
16
12
8
4
0
1 sec
268
272
276
280

Supplemental Fig. 2. The top map (A) shows the results of previous work in the region under the assumption of VTI. Vectors are oriented either parallel (V_{SV} fast) or orthogonal (V_{SH} fast) to the ray path. Linear traces are denoted with X's. The balance point of each vector corresponds to the CMB bounce point for each arrival. Bottom map (B) shows the results from this study without source term corrections. Vectors are scaled to the delay time and oriented in the fast polarization direction. The population of records for which splitting parameters can be robustly measured is different than when source terms are utilized, which results in slightly different sets of usable (and thus, plotted) data.

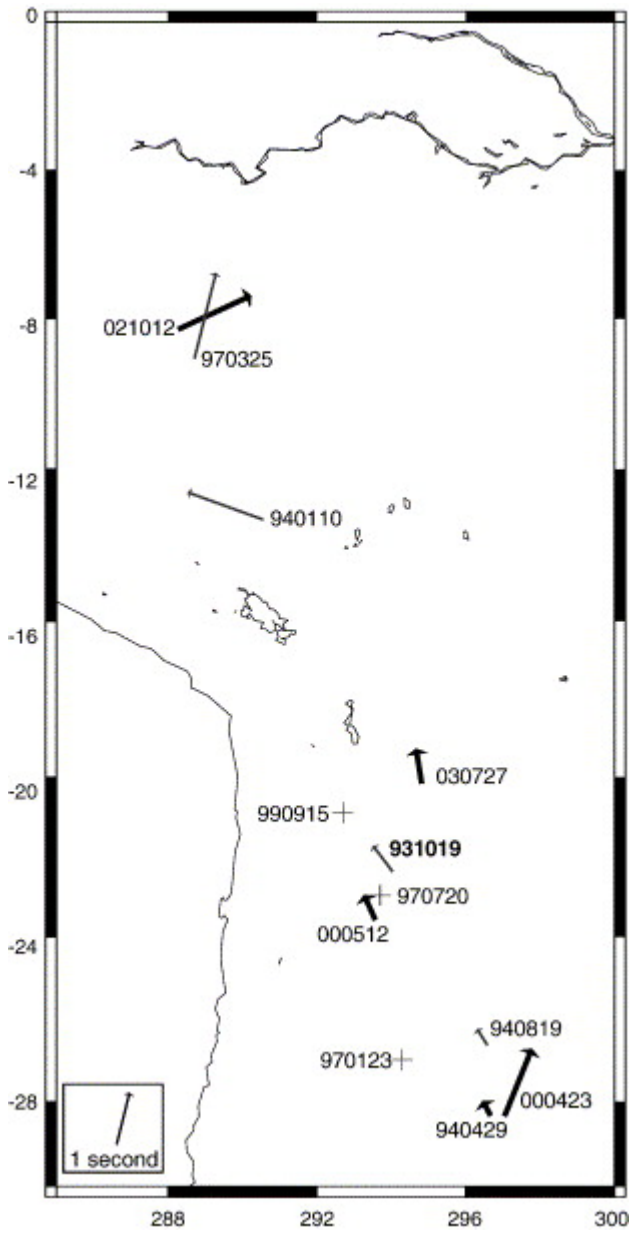

A.
Event:
May 12, 2000
Sept. 15, 1999
Oct. 10, 1993
March 17, 2004
1 sec
16
12
8
4
0
265
270
275
280


B.
Station:
PFO
GSC
ISA
DJJ
1 sec
16
12
8
4
0
265
270
275
280

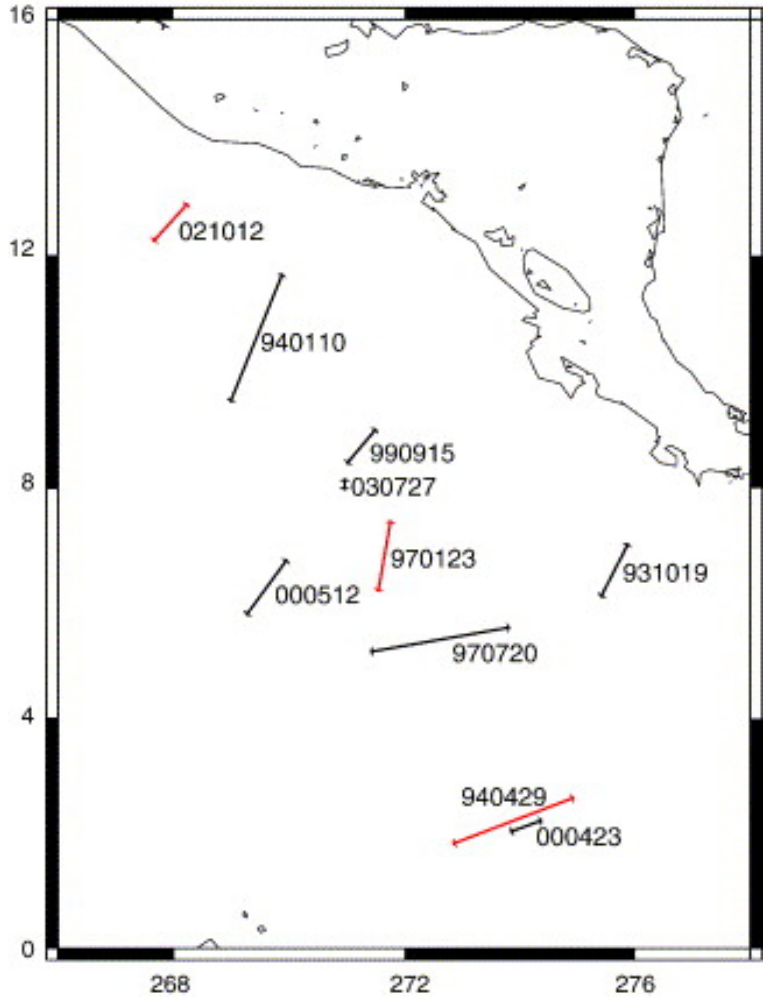
Supplemental Fig. 3. The top map (A) shows the splitting results for four events to demonstrate that individual events show a diversity of fast directions, which are consistent with the geographical pattern inferred from the complete data set. The bottom map (B) shows the splitting results for four different stations to demonstrate that records from a given station show a diversity of fast directions. The plotting scheme for each is identical to Supplemental Fig. 2.



Supplemental Fig. 4. The left map (A) shows the receiver correction used for each record plotted at the CMB bounce point. Some stations require correction for two layers below the receiver and consequently these bounce points have two intersecting vectors. The second map (B) shows the source correction used for each record with resolvable ScS splitting, plotted at the CMB bounce point. These maps are very different from each other or from our final ScS results, which indicates that our results are not simply injected by the source or receiver corrections.



Supplemental Fig. 5. Source terms determined using stacks of all S arrivals from a single event. These sources are used in splitting analyses on stacked ScS arrivals, presented in Fig. 5S. Note that not all resolved source terms have a complementary ScS result because some events result in poor ScS stacks. Null or < 0.1 s values for source-side splitting are denoted by X's. Thicker lines denote more reliable source terms.



Supplemental Fig. 6. Results from the splitting analyses using stacks of all ScS arrivals from a single event. Result is plotted at average CMB bounce point of utilized traces. Red traces denote less reliable results.

Supplemental Table 1: S splitting results organized by event

Event	Event Lat	Long	Station	Fast azm	dt	Quality
10/17/90	-10.97	-70.78	CMB	18	1.8	A
10/17/90	-10.97	-70.78	MHC	-4	1.45	A
10/19/93	-22.38	-65.97	NEE	-41	1.15	B
10/19/93	-22.38	-65.97	TUC	70	0.75	B
1/10/94	-13.34	69.45	WDC	-30	1.05	B
4/29/94	-28.3	-63.35	ANMO	-37	1	A-
4/29/94	-28.3	-63.35	BAR	-44	0.65	B
4/29/94	-28.3	-63.35	SVD	-12	1.2	A
4/29/94	-28.3	-63.35	TUC	76	1.2	A
4/29/94	-28.3	-63.35	WDC	-49	1.25	A
5/10/94	-28.5	-63.1	PFO	6	2.15	A
5/10/94	-28.5	-63.1	TUC	84	1.4	A
8/19/94	-26.64	-63.42	ANMO	-43	1.25	A
8/19/94	-26.64	-63.42	GSC	-48	0.65	A-
8/19/94	-26.64	-63.42	SMTC	-8	1.5	A
8/19/94	-26.64	-63.42	TUC	77	0.95	A-
1/23/97	-27	-65.72	ANMO	80	0.2	C
1/23/97	-27	-65.72	BKS	-22	0.25	B-
1/23/97	-27	-65.72	DGR	72	0.2	C
1/23/97	-27	-65.72	MLAC	24	3.5	B-
1/23/97	-27	-65.72	PKD	2	1.25	B-
1/23/97	-27	-65.72	TUC	-86	1.3	A
1/23/97	-27	-65.72	VTV	-24	0.2	C
3/25/97	-9.06	-70	CMB	23	2.1	A
7/20/97	-22.88	-66.3	CCM	-26	0.05	C
7/20/97	-22.88	-66.3	PFO	-39	0.8	A-
7/20/97	-22.88	-66.3	TUC	66	0.05	C
9/15/99	-20.93	-67.28	CCM	86	1.25	A-
9/15/99	-20.93	-67.28	CMB	-30	1.35	A
9/15/99	-20.93	-67.28	JRSC	-30	0.5	B-
9/15/99	-20.93	-67.28	ORV	-36	1.7	A
9/15/99	-20.93	-67.28	SAO	-45	1.2	B-
9/15/99	-20.93	-67.28	WDC	-42	1.4	A
4/23/00	-28.31	-62.94	JCS	16	1.2	A
5/12/00	-23.55	-66.45	BAK	-19	0.9	C
5/12/00	-23.55	-66.45	BDM	-32	0.15	C
5/12/00	-23.55	-66.45	BRIB	-9	0.85	A-
5/12/00	-23.55	-66.45	BRK	-56	0.7	B-
5/12/00	-23.55	-66.45	CMB	-6	0.9	C
5/12/00	-23.55	-66.45	DJJ	18	1.9	C
5/12/00	-23.55	-66.45	GLA	32	0.85	C
5/12/00	-23.55	-66.45	ISA	24	1.55	C
5/12/00	-23.55	-66.45	JCS	-14	1.15	C
5/12/00	-23.55	-66.45	LGU	24	1.9	C
5/12/00	-23.55	-66.45	MHC	-16	0.35	B-
5/12/00	-23.55	-66.45	MWC	0	1.15	A
5/12/00	-23.55	-66.45	PAS	10	1.7	B-
5/12/00	-23.55	-66.45	PFO	-24	0.7	A
5/12/00	-23.55	-66.45	SAO	-22	0.95	B
5/12/00	-23.55	-66.45	SDD	-22	0	B
5/12/00	-23.55	-66.45	SLA	66	0	C
5/12/00	-23.55	-66.45	SVD	-35	1.5	B
5/12/00	-23.55	-66.45	TOV	-38	0	B
10/12/02	-8.27	-71.69	BDM	8	1.1	B

10/12/02	-8.27	-71.69	BRK	36	1.15	B-
10/12/02	-8.27	-71.69	CHF	11	0.7	C
10/12/02	-8.27	-71.69	CIA	21	1.05	A
10/12/02	-8.27	-71.69	CMB	11	1.75	A
10/12/02	-8.27	-71.69	CVS	14	0.95	B
10/12/02	-8.27	-71.69	DGR	-68	0.15	C
10/12/02	-8.27	-71.69	GLA	14	0.3	C
10/12/02	-8.27	-71.69	JCC	35	1.65	B-
10/12/02	-8.27	-71.69	JCS	72	1.5	B
10/12/02	-8.27	-71.69	JRSC	20	0.5	C
10/12/02	-8.27	-71.69	KCC	26	2.05	A-
10/12/02	-8.27	-71.69	LGU	30	0.3	C
10/12/02	-8.27	-71.69	MOD	-10	2.45	C
10/12/02	-8.27	-71.69	MPM	-50	0.85	C
10/12/02	-8.27	-71.69	SAO	0	2.5	A-
10/12/02	-8.27	-71.69	SBC	14	0.65	B
10/12/02	-8.27	-71.69	SLA	-47	0.9	B-
10/12/02	-8.27	-71.69	SVD	-6	1.8	A-
10/12/02	-8.27	-71.69	VTV	26	0.15	C
10/12/02	-8.27	-71.69	WENL	14	0.35	C
7/27/03	-20.13	-65.19	BAR	-18	0.6	C n
7/27/03	-20.13	-65.19	CMB	-26	1.25	A
7/27/03	-20.13	-65.19	GSC	-24	0.85	C n
7/27/03	-20.13	-65.19	JCS	3	0.95	A-
7/27/03	-20.13	-65.19	MWC	27	0.9	A-
7/27/03	-20.13	-65.19	PLM	30	0.7	A
7/27/03	-20.13	-65.19	SBC	-23	0.85	C n
7/27/03	-20.13	-65.19	SDD	-24	0.65	C n
7/27/03	-20.13	-65.19	TIN	29	0.75	B+
7/27/03	-20.13	-65.19	TOV	-15	0.7	B-
3/17/04	-21.1336	-65.25	DGR	88	0.3	C
3/17/04	-21.1336	-65.25	DJJ	76	0	C
3/17/04	-21.1336	-65.25	GLA	50	1	B
3/17/04	-21.1336	-65.25	GSC	-10	0.45	C
3/17/04	-21.1336	-65.25	ISA	58	0	C
3/17/04	-21.1336	-65.25	NEE	-37	1.45	B
3/17/04	-21.1336	-65.25	PLM	78	0.05	C
3/17/04	-21.1336	-65.25	TIN	-4	1.1	B-
3/17/04	-21.1336	-65.25	USC	64	0.15	B-

Supplemental Table 2: ScS results without source term corrections

Event	Station	Fast Azi	Split	Quality
10/17/90	MHC	31	1.95	A
10/17/90	PAS	44	0	B
10/19/93	ANMO	51	1.55	B
10/19/93	BAR	31	1.35	B
10/19/93	CCM	-57	0.4	A
10/19/93	MHC	11	1.25	B
10/19/93	NEE	28	1.1	A
10/19/93	PAS	0	1.2	B
10/19/93	SVD	8	1.5	B
10/19/93	TUC	44	1.4	B
1/10/94	GSC	20	1	B
1/10/94	PFO	19	1.05	A
4/29/94	ANMO	53	0.9	B
1/23/97	MHC	21	2.05	A
1/23/97	MLAC	10	1.3	B
7/20/97	ANMO	78	1.3	B
7/20/97	PFO	-22	0.1	C
9/15/99	CMB	20	1.1	A
9/15/99	JRSC	27	1.1	A
9/15/99	ORV	-26	0.3	B-
9/15/99	PFO	14	0.98	A-
9/15/99	POTR	14	0.45	B-
9/15/99	SAO	20	1.5	C
4/23/00	JCS	36	1.2	A
4/23/00	MPM	8	1.4	A
5/12/00	DAN	46	1.85	A
5/12/00	MPM	-2	1.65	B-
5/12/00	PAS	73	1.75	B
5/12/00	PLM	50	1.1	B-
5/12/00	RPV	33	1.9	C
10/12/02	DAN	45	2.5	B
10/12/02	GLA	28	2.1	A
10/12/02	LGU	-81	1.45	B-
10/12/02	TOV	-6	1.55	A-
10/12/02	VCS	68	1.55	A
10/12/02	WENL	55	1.15	A-
7/27/03	DAN	51	1.65	A
7/27/03	DGR	25	1	B
7/27/03	DJJ	22	0.95	A
7/27/03	JCS	-18	2	B
7/27/03	OSI	4	1.15	A
7/27/03	PLM	22	1.05	A-
7/27/03	SDD	-5	1	A
3/17/04	BAR	79	1.35	B
3/17/04	DGR	62	1.1	C
3/17/04	DJJ	78	1.15	B-
3/17/04	GLA	52	1.75	A-
3/17/04	GSC	32	1.1	A-
3/17/04	PLM	50	1.3	B
3/17/04	SLA	58	1.6	B
3/17/04	TIN	-66	2.45	C

Supplemental Table 3: ScS results with source correction applied.

Event	Station	Ang	dt	Quality
10/17/90	GSC	26	2	A
10/17/90	ANMO	76	1.15	A-
10/19/93	PFO	-10	2.15	A-
10/19/93	PAS	-10	1.6	B
10/19/93	GSC	1	2.5	B
10/19/93	SVD	8	2.25	B+
10/19/93	MHC	10	1.4	C
10/19/93	NEE	44	2.2	B
10/19/93	TUC	45	2.5	B-
10/19/93	ANMO	48	2.5	B-
10/19/93	BAR	49	2.35	C
10/19/93	CCM	52	0.65	A-
1/10/94	SVD	-76	0.45	A
1/10/94	PFO	52	0.6	A-
1/10/94	GSC	54	0.65	A-
1/10/94	ISA	79	0.95	A
4/29/94	SVD	29	2.1	B
4/29/94	BAR	29	1.85	B-
8/19/94	SMTC	20	1.5	B-
8/19/94	PFO	37	2.3	B
1/23/97	NEE	15	1.35	B
1/23/97	MHC	24	1.1	C
7/20/97	ANMO	-86	2.45	B
7/20/97	CCM	-72	1.85	B-
7/20/97	PFO	78	1.2	A-
7/20/97	DGR	89	1.35	B-
7/20/97	TUC	89	1.4	B-
9/15/99	PFO	0	1.2	B
9/15/99	CMB	3	1.55	B+
9/15/99	JRSC	11	1.5	B
9/15/99	POTR	31	0.8	B-
9/15/99	ANMO	39	0.8	B
9/15/99	ORV	51	1.1	B
9/15/99	WDC	66	2.26	B
4/23/00	MPM	8	1.3	A-
5/12/00	ISA	-67	0.6	C
5/12/00	MPM	1	1.1	B
5/12/00	MHC	2	2.5	B
5/12/00	MWC	6	0.4	B
5/12/00	PAS	72	2.45	A
5/12/00	SLA	83	2.5	B
10/12/02	LGU	-85	2.5	A-
10/12/02	DJJ	-53	2.25	C
10/12/02	TOV	-35	1.15	B
10/12/02	DGR	-15	2.5	C
10/12/02	MPM	13	1.7	B-
10/12/02	VCS	77	1.4	A
10/12/02	JCS	84	2.5	B-
7/27/03	PAS	-58	0.85	A-
7/27/03	JCS	-19	1.05	B+
7/27/03	OSI	18	0.65	A
7/27/03	DJJ	34	0.75	B
7/27/03	PLM	36	0.75	B+
3/17/04	ISA	-4	2.5	C
3/17/04	MWC	29	0.6	C
3/17/04	DJJ	79	1.6	C
3/17/04	BAR	82	2	C