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Measurements of atmospheric ethene by solar absorption FTIR spectrometry

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Location	Key	Nobs	Nday	Latitude (deg.)	Longitude (deg.)	Altitude (km)	Terrain	Observation Season & Time
Esrange, Sweden	ESN	160	57	+67.889	+21.085	0.271	Boreal	Winter, Noon
Fairbanks, Alaska	FAI	124	47	+64.830	-147.614	0.182	Boreal	Spring & Summer, Noon
Lynn Lake, Manitoba, Canada	LYL	20	11	+56.858	-101.066	0.354	Boreal	Summer, Noon
Mt. Barcroft, California	MTB	1369	258	+37.584	-118.235	3.801	Mountain	Year-round, Morning
Mountain View, California	ARC	7	4	+37.430	-122.080	0.010	Urban	Various, Noon
Daggett, California	DAG	33	21	+34.856	-116.790	0.626	Desert	Spring, Noon
Ft Sumner, New Mexico	FTS	216	89	+34.480	-104.220	1.260	Steppe	Spring & Fall, Afternoon
TMF, Wrightwood, California	TMF	475	45	+34.382	-117.678	2.257	Mountain	Fall & Winter, Noon
JPL B183, Pasadena, California	JPL	1709	648	+34.199	-118.174	0.345	Urban	Year-round, Noon
JPL Mesa, Pasadena, California	JPL	20	5	+34.205	-118.171	0.460	Urban	Summer, Noon
CSBF, Palestine, Texas	PAL	4	3	+31.780	-95.700	0.100	Rural	Summer, Noon
McMurdo, Antarctica	MCM	37	20	-77.847	+166.728	0.100	Icy	Spring, Noon

Table SI.1. *Summarizing the twelve observation sites from which the JPL MkIV instrument has made ground-based observations as of the end of 2016. For each site, the latitude, longitude, and altitude are listed, together with the type of surrounding terrain, the season, and time of day when observations were typically made. The number of observations (N_{obs}) and observation days (N_{day}) from each site are also provided. JPL has the most observation days with 648+5=653, followed by Mt. Barcroft (258), and Ft. Sumner (89).*

Year	ESN	FAI	LYL	MTB	ARC	DAG	FTS	TMF	JPL	PAL	MCM	Year Total
1985	0	0	0	0	0	0	0	0	5	0	0	5
1986	0	0	0	0	0	0	0	1	3	0	20	24
1987	0	0	0	0	0	0	0	0	4	0	0	4
1988	0	0	0	0	0	0	0	2	5	0	0	7
1989	0	0	0	0	0	0	7	0	10	3	0	20
1990	0	0	0	0	0	0	7	0	13	0	0	20
1991	0	0	0	0	4	0	7	0	40	0	0	51
1992	0	0	0	0	0	0	11	0	32	0	0	43
1993	0	0	0	0	0	21	10	0	33	0	0	64
1994	0	0	0	3	0	0	5	0	47	0	0	55
1995	0	0	0	0	0	0	0	0	72	0	0	72
1996	0	0	11	0	0	0	6	6	30	0	0	53
1997	0	47	0	0	0	0	0	0	18	0	0	65
1998	0	0	0	14	0	0	0	24	8	0	0	46
1999	1	0	0	33	0	0	0	0	16	0	0	50
2000	21	0	0	29	0	0	0	0	26	0	0	76
2001	0	0	0	101	0	0	0	0	0	0	0	101
2002	0	0	0	78	0	0	0	0	6	0	0	84
2003	24	0	0	0	0	0	5	0	6	0	0	35
2004	0	0	0	0	0	0	4	0	9	0	0	13
2005	0	0	0	0	0	0	4	0	2	0	0	6
2006	3	0	0	0	0	0	0	0	13	0	0	16
2007	8	0	0	0	0	0	5	0	1	0	0	14
2008	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	11	1	0	0	12
2010	0	0	0	0	0	0	0	0	4	0	0	4
2011	0	0	0	0	0	0	5	0	20	0	0	25
2012	0	0	0	0	0	0	0	0	18	0	0	18
2013	0	0	0	0	0	0	0	0	74	0	0	74
2014	0	0	0	0	0	0	7	0	50	0	0	57
2015	0	0	0	0	0	0	0	0	51	0	0	51
2016	0	0	0	0	0	0	6	0	36	0	0	42
Site Total	57	47	11	258	4	21	89	45	653	3	20	1208

Table SI.2. *MkIV ground-based observation days at the 12 different sites, broken down by year. 2001 was the year with the most observations days (101) all from Mt. Barcroft. JPL is the site with the most total observation days (653).*

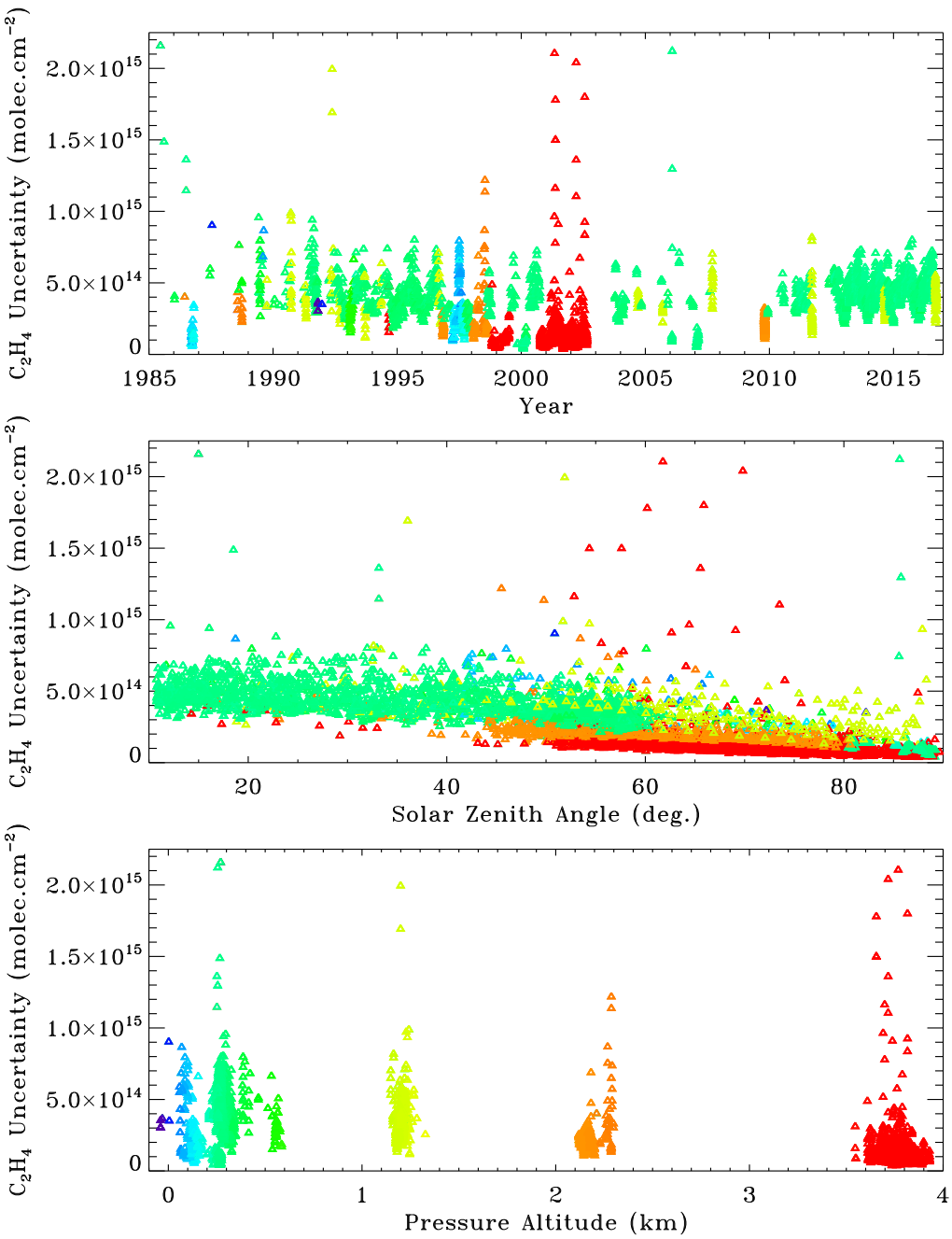

Figure SI.3. *C_2H_4 retrieval uncertainties, color-coded by pressure altitude, plotted versus year (top), solar zenith angle (middle), and pressure altitude (bottom). At any given site, ethene uncertainties decrease with solar zenith angle as the absorption features deepen (middle panel). In absolute terms the uncertainties are smallest at the highest altitude sites (lower panel), where ethene is virtually never detectable. In fractional terms, ethene uncertainties are smallest at the low altitude polluted sites.*