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Evaluation of on-site calibration procedures for SKYNET Prede POM sun–sky photometers

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			POM_CNR	V0_IL*e-04 (A)					%CV						Unc					
	yymm		340	400	500	675	870	1020	340	400	500	675	870	1020	340	400	500	675	870	1020
Davos	1708	IL		1.363	2.828	3.486	2.229	1.164		2.6	1.9	1.2	1.0	1.3		3.5847E-06	5.2884E-06	4.3226E-06	2.3182E-0	1.4899E-06
		XIL		1.3411	2.8384	3.5466	2.2336	1.1984		4.1	2.4	3.1	1.8	4.3		5.4430E-06	6.8334E-06	1.0821E-05	3.8981E-06	5.1719E-06
		PFR			2.844		2.231				0.2		0.3				6.126E-07		5.933E-07	
Rome	1710	IL		1.307	2.782	3.454	2.204	1.151		2.2	1.3	0.7	0.9	1.5		2.8754E-06	3.5888E-06	2.4523E-06	1.8734E-06	1.7035E-06
		XIL		1.3101	2.7803	3.4634	2.2171	1.1417		6.1	2.2	1.3	0.8	1.2		7.9275E-06	6.0121E-06	4.5426E-06	1.7925E-06	1.3215E-06
		PFR			2.858		2.226				0.1		0.2				3.043E-07		4.266E-07	
Davos	1807	IL	0.0886	1.289	2.751	3.268	2.3	1.236	0.8	0.7	0.4	0.2	0.4	1.0	6.8245E-08	9.1519E-07	9.6285E-07	6.2092E-07	8.28E-07	1.2484E-06
		XIL	0.0896	1.3061	2.7756	3.284	2.3203		1.7	1.5	1.3	0.7	0.7		1.4809E-07	2.0023E-06	3.4809E-06	2.3990E-06	1.5773E-06	
		PFR			2.781		2.325				0.3		0.2				6.948E-07		4.221E-07	
Davos	1808	IL	0.0888	1.3	2.762	3.294	2.321	1.228	1.4	1.3	1.0	0.9	1.0	0.5	1.2438E-07	1.6900E-06	2.6791E-06	2.7999E-06	2.2514E-06	6.3856E-07
		XIL	0.0889	1.3045	2.788	3.3126	2.3282	1.2396	3.4	2.8	2.2	1.3	0.9	0.9	2.9799E-07	3.7027E-06	6.2579E-06	4.2749E-06	2.0167E-06	1.0606E-06
		PFR			2.799		2.349				0.5		0.9				1.410E-0		2.204E-06	
Davos	1809	IL	0.0888	1.298	2.771	3.312	2.343	1.24	1.4	0.7	0.4	0.2	0.2	0.6	1.217E-07	9.6052E-07	1.1361E-06	5.9616E-07	4.686E-07	7.44E-07
		XIL	0.0897	1.3065	2.7897	3.3606	2.3744	1.2379	3.4	1.7	1.5	2.2	1.2	0.5	3.0721E-07	2.1913E-06	4.2431E-06	7.2794E-06	2.7935E-06	6.2217E-07
		PFR			2.801		2.368				0.2		0.4				5.387E-07		1.017E-06	
Davos	1810	IL	0.0881	1.286	2.766	3.317	2.346	1.259	0.7	0.5	0.3	0.1	0.4	0.8	6.4298E-08	6.8158E-07	8.5746E-07	3.317E-07	8.4456E-07	1.0576E-06
		XIL	0.0892	1.3025	2.7791	3.3306	2.3561		1.0	1.1	0.5	0.4	0.2		8.9976E-08	1.4159E-06	1.4910E-06	1.3825E-06	5.7300E-07	
		PFR			2.802		2.364				0.1		0.2				3.842E-07		3.991E-07	
Rome	1905	IL	0.0857	1.274	2.717	3.268	2.321	1.235	1.2	1.1	0.6	0.5	1.8	1.2	1.0542E-07	1.4014E-06	1.4944E-06	1.7647E-06	4.201E-06	1.445E-06
		XIL	0.0877	1.3061	2.7466	3.2535	2.2858	1.2063	3.1	4.8	1.3	2.3	3.5	2.2	2.7478E-07	6.2097E-06	3.6318E-06	7.4567E-06	7.9489E-06	2.6940E-06
		PFR			2.804		2.348				0.6		0.6				1.552E-06		1.280E-06	
Rome	1906	IL	0.0852	1.269	2.73	3.272	2.303	1.228	0.5	0.7	0.7	0.7	0.7	0.5	4.3467E-08	8.3754E-07	1.9656E-06	2.2577E-06	1.6121E-06	5.8944E-07
		XIL	0.0865	1.2875	2.7762	3.3197	2.3329	1.2497	4.6	2.2	2.2	2.3	2.0	2.6	3.9447E-07	2.7702E-06	6.0374E-06	7.7213E-06	4.6677E-06	3.3028E-06
		PFR			2.809		2.347				0.7		0.5				1.909E-06		1.144E-06	
Rome	1907	IL	0.0841	1.261	2.737	3.257	2.299	1.231	1.7	1.6	1.1	0.5	0.4	0.3	1.4043E-07	2.0302E-06	2.9286E-06	1.5308E-06	8.5063E-07	3.2006E-07
		XIL	0.0859	1.2938	2.7704	3.3159	2.3329	1.246	3.1	2.8	1.7	1.7	1.3	1.0	2.6246E-07	3.6563E-06	4.6446E-06	5.6785E-06	2.9061E-06	1.2319E-06
		PFR			2.836		2.366				0.2		0.2				5.946E-07		3.893E-07	
Rome	1908	IL	0.0847	1.278	2.765	3.324	2.329	1.25	0.9	0.7	0.4	0.2	0.2	0.3	7.8752E-08	8.6904E-07	1.106E-06	7.3128E-07	4.1922E-07	4.25E-07
		XIL	0.0862	1.298	2.7833	3.3328	2.3305	1.25	3.0	3.3	1.5	1.4	1.0	1.1	2.5662E-07	4.3291E-06	4.2278E-06	4.5499E-06	2.2329E-06	1.3820E-06
		PFR			2.834		2.369				0.6		0.3				1.559E-06		5.794E-07	

Rome	1909	IL	0.0841	1.26	2.747	3.315	2.32	1.246	2.3	1.6	1.0	0.6	0.5	0.4	1.9675E-07	2.0538E-06	2.637E-06	2.055E-06	1.0904E-06	5.3578E-07
		XIL	0.0866	1.309	2.823	3.3463	2.3356	1.2564	4.0	3.6	2.9	1.9	1.1	1.0	3.4160E-07	4.7260E-06	8.0981E-06	6.3714E-06	2.5963E-06	1.1914E-06
		PFR			2.838		2.369				0.1		0.1				3.260E-07		1.754E-07	
Rome	2108	IL		1.251	2.716	3.301	2.259	1.266		2.7	2.5	2.6	0.3	0.3		3.3402E-06	6.709E-06	8.616E-06	6.3252E-07	3.9246E-07
		XIL	0.0854	1.2788	2.7291	3.2931	2.2788	1.2458	2.8	3.3	2.5	1.7	1.5	0.9	2.3456E-07	4.1561E-06	6.7215E-06	5.4234E-06	3.3797E-06	1.1382E-06
Rome	2109	IL	0.0818	1.232	2.686	3.268	2.25	1.25	1.2	1.4	0.6	0.5	0.5	0.4	1.006E-03	1.663E-02	1.638E-02	1.699E-02	1.215E-02	4.875E-03
		XIL	0.083	1.251	2.7016	3.2964	2.2847	1.2526	2.2	2.7	2.3	2.9	3.0	2.5	1.8048E-07	3.4187E-06	6.1926E-06	9.4722E-06	6.8267E-06	3.1340E-06
		PFR			2.754		2.302				0.2		0.4				6.179E-07		1.004E-06	
		Cim_1270	0.085		2.770	3.310	2.280	1.240	1.5		1.1	1.1	1.1	1.5	1.250E-07		3.020E-06	3.600E-06	2.510E-06	1.830E-06
Davos	2110	IL	0.0851	1.255	2.698	3.271	2.293	1.219	1.4	0.5	0.2	0.1	0.2	0.6	1.200E-03	6.401E-03	5.936E-03	3.598E-03	4.586E-03	7.436E-03
		XIL	0.0862	1.2612	2.7043	3.2928	2.302		0.5	0.9	0.6	0.0	0.3		4.5824E-08	1.0882E-06	1.7002E-06		7.2490E-07	
		PFR			2.734		2.311				0.1		0.2				3.628E-07		4.713E-07	
PTB	2206	Lab	0.0903	1.3225	2.9680	3.5506	2.4146	1.2473	4.4	4.3	4.2	4.2	4.1	4.2	4.000E-07	5.700E-06	1.300E-05	1.500E-05	1.000E-05	5.300E-06
Izana	2209	SL	0.0855	1.2551	2.6982	3.2715	2.2965	1.2372	2.5	1.1	0.4	0.2	0.5	0.7	2.160E-07	1.370E-06	1.090E-06	5.070E-07	1.040E-06	8.210E-07

Table S1: Solar calibration constants V_0, percent Coefficients of variation CV, and uncertainties calculated as described from sections 3.1-3.6, for all the methods and periods, for POM_CNR. When CV or Unc is 0, the monthly dataset is composed by only one point. In column three, there is the type of method used: IL (Improved Langley), XIL (Cross Improved Langley), PFR (Transfer from PFR instrument), Cim_1270 (Transfer from Cimel), Lab (laboratory calibration), SL (Standard Langley).

			POM_VAL	V0_IL*e-04 (A)					%CV						Unc					
	yymm		340	400	500	675	870	1020	340	400	500	675	870	1020	340	400	500	675	870	1020
Rome	2109	IL	0.0118	0.7635	2.535	3.803	2.266	1.084	2.9	2.3	0.6	0.5	0.5	0.7	3.3859E-08	1.7683E-06	1.6029E-06	2.0540E-06	1.0129E-06	7.5869E-07
Rome	2109	Cim_1270	0.0124		2.6149	3.8487	2.3072	1.0580	1.2		1.2	1.1	1.1	1.4	1.477E-08		3.082E-06	4.037E-06	2.471E-06	1.516E-06
Rome	2109	PFR			2.6153		2.3130				1.4		1.1				3.6159E-06		2.5904E-06	
PTB	2206	Lab	0.0123	0.7893	2.7770	3.9341	2.3583	1.0889	4.4	4.2	4.2	4.1	4.1	4.2	5.430E-08	3.280E-06	1.180E-05	1.610E-05	9.770E-06	4.520E-06
Vale	2210	IL	0.0116	0.761	2.565	3.841	2.287	1.081	1.0	0.7	1.0	1.4	1.2	1.9	1.2027E-08	5.0584E-07	2.4780E-06	5.2583E-06	2.8130E-06	2.0128E-06
		XIL	0.0117	0.7633	2.6103	3.8144	2.2878	1.0986	3.6	7.4	6.7	2.7	2.1	7.0	4.1569E-08	5.6586E-06	1.7509E-05	1.0429E-05	4.7225E-06	7.6943E-06
Vale	2211	IL	0.0123	0.7804		3.873	2.32	1.081	1.6	2.1		0.5	0.7	1.7	1.9807E-08	1.5959E-06		2.0918E-06	1.5219E-06	1.8031E-06
		XIL	0.0122	0.7841	2.6006	3.8652	2.3123	1.0574	1.2	0.0	0.2	0.4	0.5	0.0	1.4838E-08	0.00	4.4522E-07	1.4502E-06	1.1173E-06	0.00
Vale/ Izana	2211	SL_tranf	0.0124	0.7776	2.5673	3.8002	2.3105	1.0753	2.6	1.1	0.4	0.3	0.5	0.7	3.2100E-08	8.6415E-07	1.1423E-06	9.9221E-07	1.1599E-06	7.8000E-07

Table S2: Solar calibration constants V_0, percent Coefficients of variation CV, and uncertainties calculated as described from sections 3.1-3.6, for all the methods and periods, for POM_UV. When CV or Unc is 0, the monthly dataset is composed by only one point. In column three, there is the type of method used: IL (Improved Langley), XIL (Cross Improved Langley), PFR (Transfer from PFR instrument), Cim_1270 (Transfer from Cimel), Lab (laboratory calibration), SL_trans (Transfer from POM_CNR Standard Langley).

		SVA *e^{-04} (sr)							Unc*e^{-04} (sr)						
		340	400	500	675	870	940	1020	340	400	500	675	870	940	1020
POM_CNR AALTO		2.666	2.464	2.424	2.430	2.418	2.532	2.503	/	/	/	/	/	/	/
POM_VAL PMOD		2.198	2.298	2.302	2.343	2.396	2.433	2.382	0.016	0.011	0.009	0.012	0.012	0.009	0.011
POM_CNR ROME	3m	2.4223 (	2.4633	2.4713	2.4588	2.5018	2.5038	2.5128	0.0144	0.0171	0.0190	0.0070	0.0056	0.0072	0.0090
	3n	2.4363	2.4770	2.4825	2.4713	2.5255	2.5383	2.5425	0.0139	0.0171	0.0182	0.0071	0.0042	0.0063	0.0075
POM_CNR IZANA	3m	2.3750	2.4370	2.4470	2.4382	2.4682	2.4882	2.4973	0.0680	0.0119	0.0084	0.0109	0.0507	0.0193	0.0196
	3n	2.3813	2.4452	2.4538	2.4482	2.4798	2.5183	2.5258	0.0677	0.0122	0.0085	0.0124	0.0565	0.0196	0.0210
POM_VAL VALENCIA	3m	2.2528	2.3110	2.3368	2.3598	2.3923	2.4530	2.3910	0.0107	0.0143	0.0224	0.0222	0.0293	0.0197	0.0199
	3n	2.2645	2.3180	2.3468	2.3708	2.4463	2.5040	2.4220	0.0090	0.0154	0.0222	0.0235	0.0309	0.0170	0.0217
POM_VAL ROME	3m	2.3080	2.3585	2.3625	2.3885	2.4770	2.5460	2.4720	0.0368	0.0092	0.0361	0.0396	0.0120	0.0410	0.0269
	3n	2.2910	2.3475	2.3505	2.3770	2.4215	2.4940	2.4410	0.0438	0.0120	0.0389	0.0417	0.0170	0.0311	0.0240

Table S3. SVA values and their uncertainties, obtained by laboratory calibrations and solar disk scanning methods.

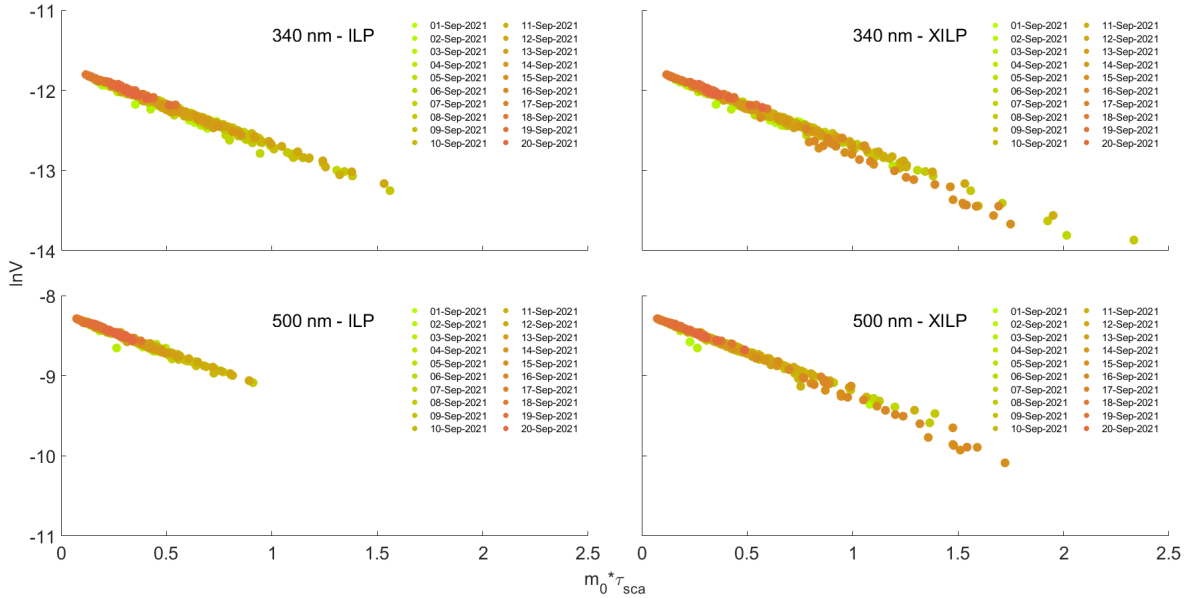

Figure S1: Improved Langley (ILP; left) and Cross Improved Langley plots (XILP; right) in Rome at 340 nm and 500 nm;

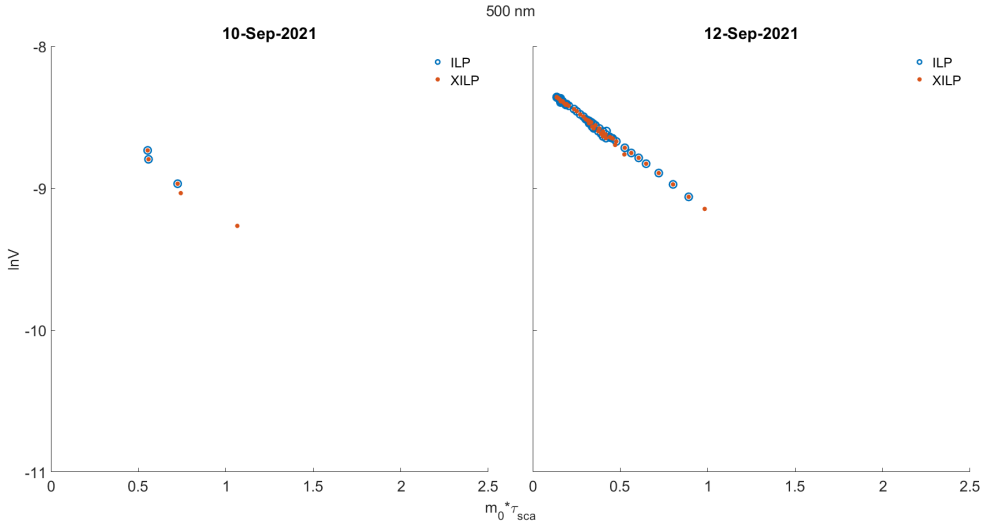

Figure S2: Worst and best cases of ILP and XILP selected from Figure S4.