

Independent global and beam validation on 21 ground data sets

Pierre Ineichen

Pierre.ineichen@unige.ch - www.cuepe.ch

University of Geneva – Energy Group



21 data sets (+ 3 within 15 km from Geneva) : various climates

Station	climate	2000	2005	D _n	DNI	latitude °	longitude °	altitude m	operated by
Cabauw (NL)	temperate maritime		x		x	51.97	4.93	2	BSRN - KNMI
Camborne (UK)	temperate maritime		x		x	50.22	-5.31	88	BSRN - Met Office
Carpentras (F)	mediterranean	x	x		x	44.08	5.06	100	BSRN - Météo France
Davos Dorf	semi-continental alpin	x	x		x	46.81	9.84	1610	WRDC - Met Office
El Saler (Spain)	semi arid	x	x			39.35	-0.32	10	FluxNet
El Saler Sueca (Spain)	semi arid		x			39.28	-0.32	10	FluxNet
Gaillard (CH)	semi-continental		x			46.18	6.21	430	CUEPE - UNIGE
Geneva (CH)	semi-continental	x	x		x	46.20	6.13	420	CIE - UNIGE
Humilly (F)	semi-continental		x			46.13	6.01	430	CUEPE - UNIGE
Jungfraujoch (CH)	high alpine	x	x		x	46.55	7.98	3571	ASRB - Météo Suisse
Jungfraujoch (CH)	high alpine	x	x		x	46.55	7.98	3571	CLIMAP - Météo Suisse
Las Majadas (Spain)	semi arid		x			39.94	-5.77	260	FluxNet
Lerwick (UK)	cold oceanic		x		x	60.13	-1.18	82	BSRN - Met Office
Lindenberg (D)	moderate maritime	x			x	52.22	14.12	125	BSRN - DWD
Nantes (F)	oceanic	x	x	x		47.15	-1.33	30	CIE - CSTB
Naz-dessus (F)	semi-continental		x			46.28	6.05	590	CUEPE - UNIGE
Payerne (CH)	moderate maritime/continental	x	x		x	46.82	6.95	490	BSRN - Météo Suisse
Sede Boqer (Israël)	dry desert		x			30.87	34.77	457	BSRN - Met Office
Sonnblick (A)	temperate alpine	x	x		x	47.05	12.95	3105	WRDC - ZAMG
Tamanrasset (AL)	dry desert		x			22.78	5.52	1400	BSRN - Met Office
Thessaloniki (GR)	mediterranean temperate	x	x			40.63	22.97	60	WRDC - Met Office
Toravere (Estonia)	cold humid	x	x		x	58.27	26.47	70	BSRN - EMHI
Val d'Alinya (Spain)	semi arid		x			42.15	1.45	1770	FluxNet
Vaulx-en-Velin (F)	semi-continental	x	x	x		45.78	4.93	170	CIE - ENTPE
Wien / Hohe Warte (A)	continental	x	x		x	48.25	16.35	203	WRDC - ZAMG

ASRB Alpine Surface Radiation Budget Network
 BSRN Baseline Surface Radiation Network
 CIE Commission Internationale pour l'Eclairage
 CLIMAP MeteoSwiss Climate Mapping application
 CUEPE Energy Group, UniGe

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21 data sets (+ 3 within 15 km from Geneva) : various latitudes

Ground stations

Station	climate	2000	2005	D _n	DNI	latitude °	longitude °	altitude m	operated by
Tamanrasset (AL)	dry desert		x			22.78	5.52	1400	BSRN - Met Office
Sede Boqer (Israël)	dry desert		x			30.87	34.77	457	BSRN - Met Office
El Saler Sueca (Spain)	semi arid		x			39.28	-0.32	10	FluxNet
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Val d'Alinya (Spain)	semi arid		x			42.15	1.45	1770	FluxNet
Carpentras (F)	mediterranean	x	x		x	44.08	5.06	100	BSRN - Météo France
Vaulx-en-Velin (F)	semi-continental	x	x	x		45.78	4.93	170	CIE - ENTPE
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Payerne (CH)	moderate maritime/continental	x	x		x	46.82	6.95	490	BSRN - Météo Suisse
Sonnblick (A)	temperate alpine	x	x		x	47.05	12.95	3105	WRDC - ZAMG
Nantes (F)	oceanic	x	x	x		47.15	-1.33	30	CIE - CSTB
Wien / Hohe Warte (A)	continental	x	x		x	48.25	16.35	203	WRDC - ZAMG
Camborne (UK)	temperate maritime		x		x	50.22	-5.31	88	BSRN - Met Office
Cabauw (NL)	temperate maritime		x		x	51.97	4.93	2	BSRN - KNMI
Lindenberg (D)	moderate maritime	x			x	52.22	14.12	125	BSRN - DWD
Toravere (Estonia)	cold humid	x	x		x	58.27	26.47	70	BSRN - EMHI
Lerwick (UK)	cold oceanic		x		x	60.13	-1.18	82	BSRN - Met Office

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Ground stations

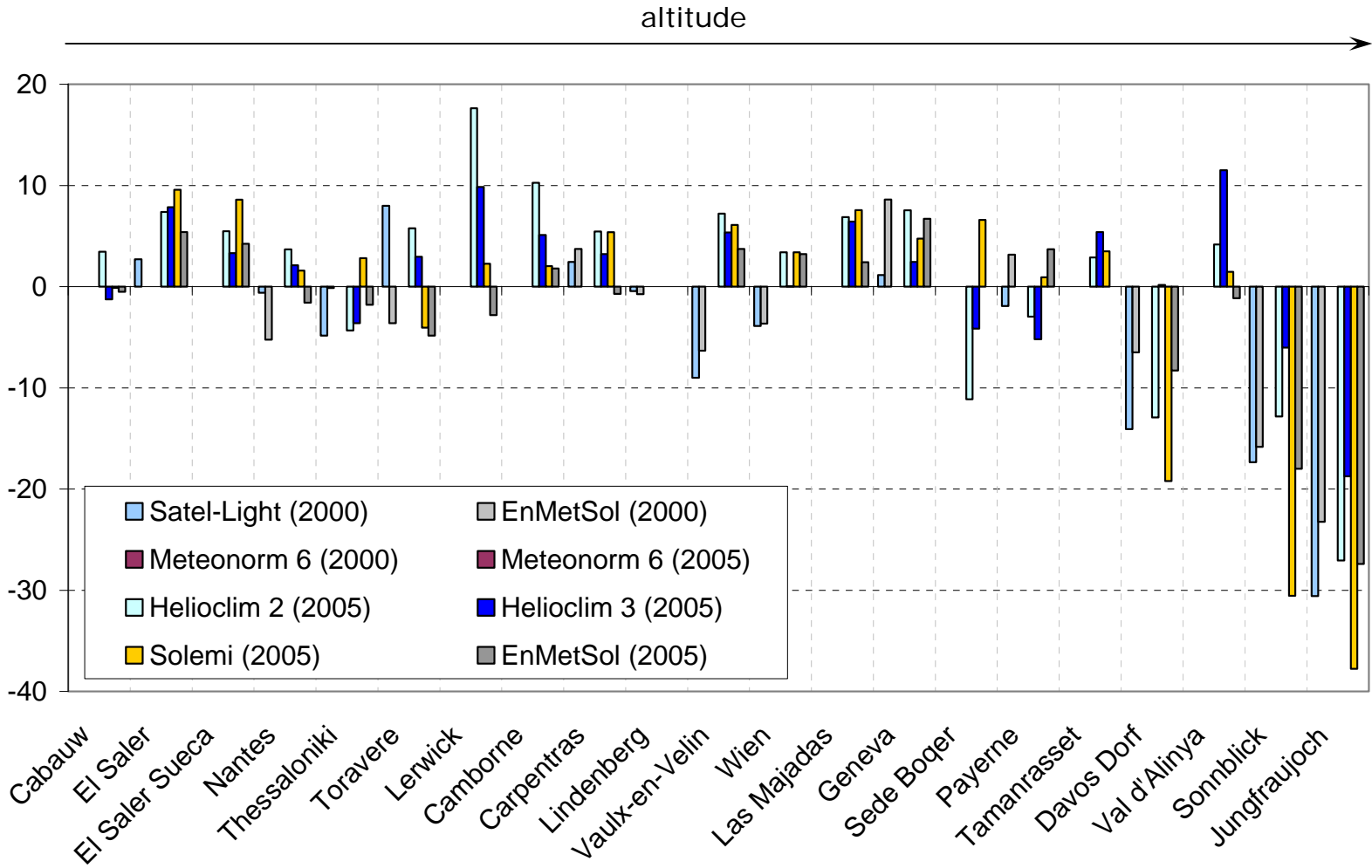
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Vaulx-en-Velin (F)	semi-continental	x	x	x		45.78	4.93	170	CIE - ENTPE
Wien / Hohe Warte (A)	continental	x	x		x	48.25	16.35	203	WRDC - ZAMG
Las Majadas (Spain)	semi arid		x			39.94	-5.77	260	FluxNet
Geneva (CH)	semi-continental	x	x		x	46.20	6.13	420	CIE - UNIGE
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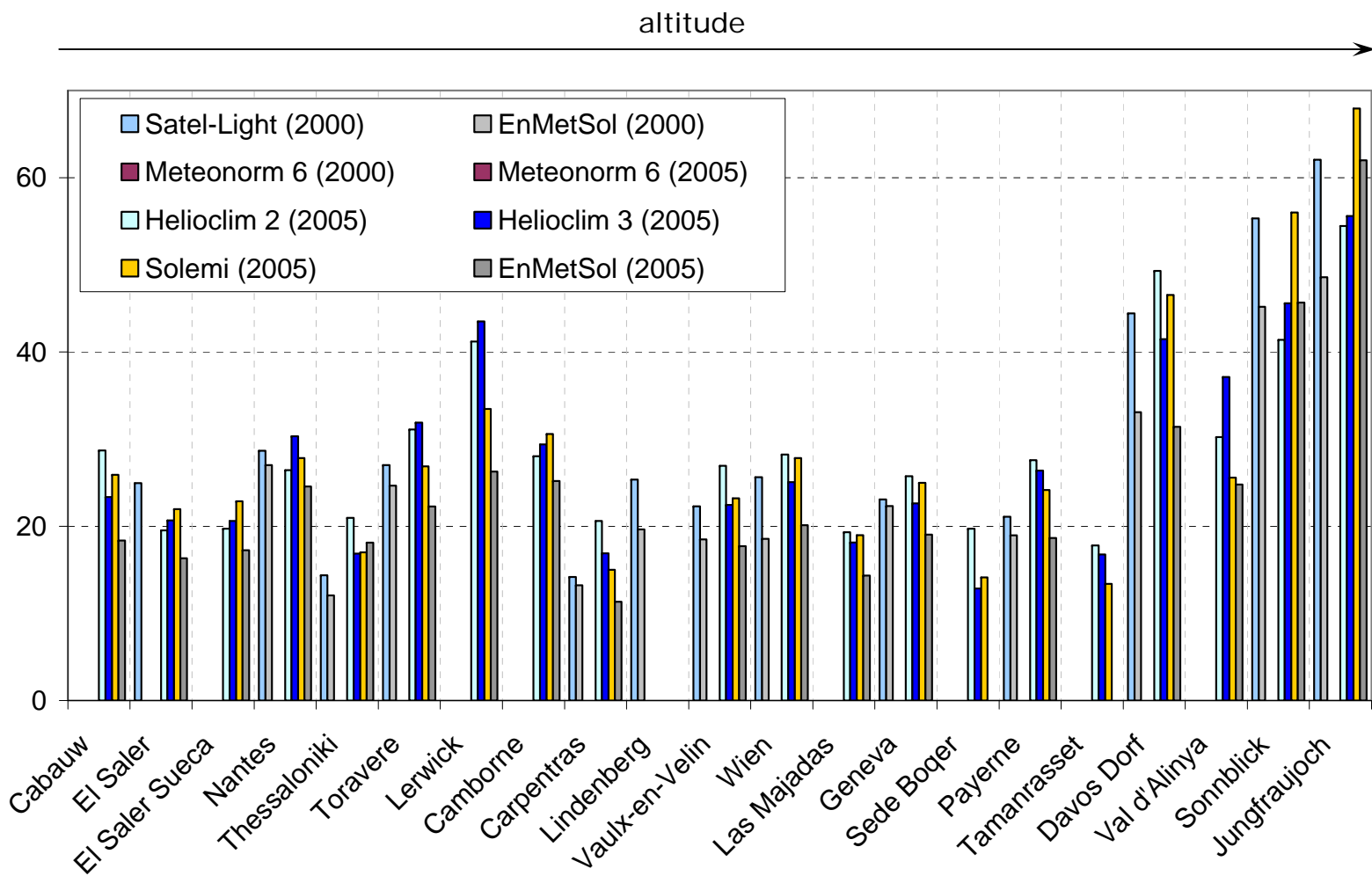
Mean bias difference [%]

Global irradiance (G_h)



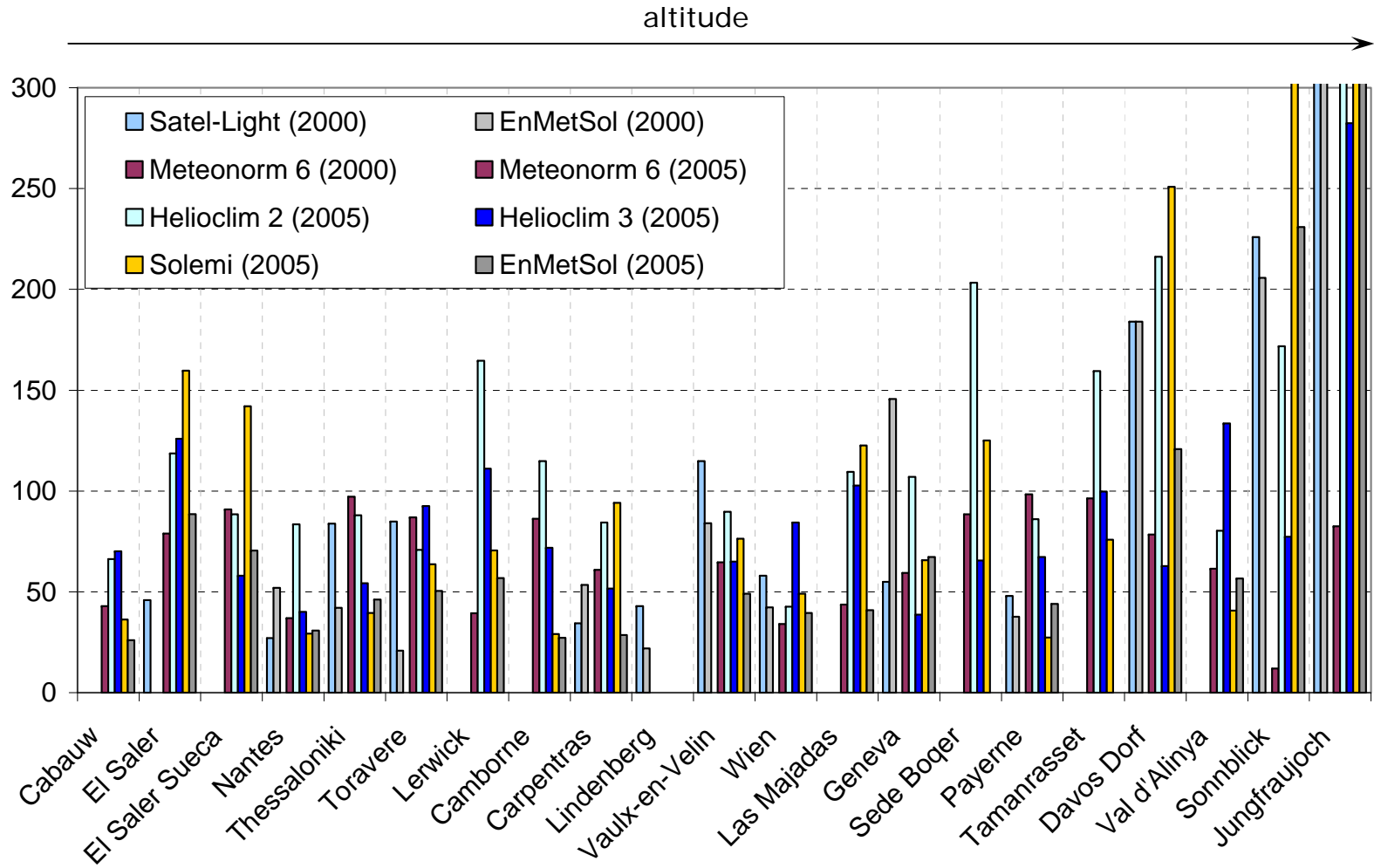
Root mean square difference [%]

Global irradiance (G_h)



Second order statistic KSI%

Global irradiance (G_h)



Snow effect for Davos, Sonnblick and Jungfrauoch



Sea and latitude
effects for
Lerwick



Over 60'000 hourly values:

- mbd - 2% to + 5%
- rmsd 19% to 27%

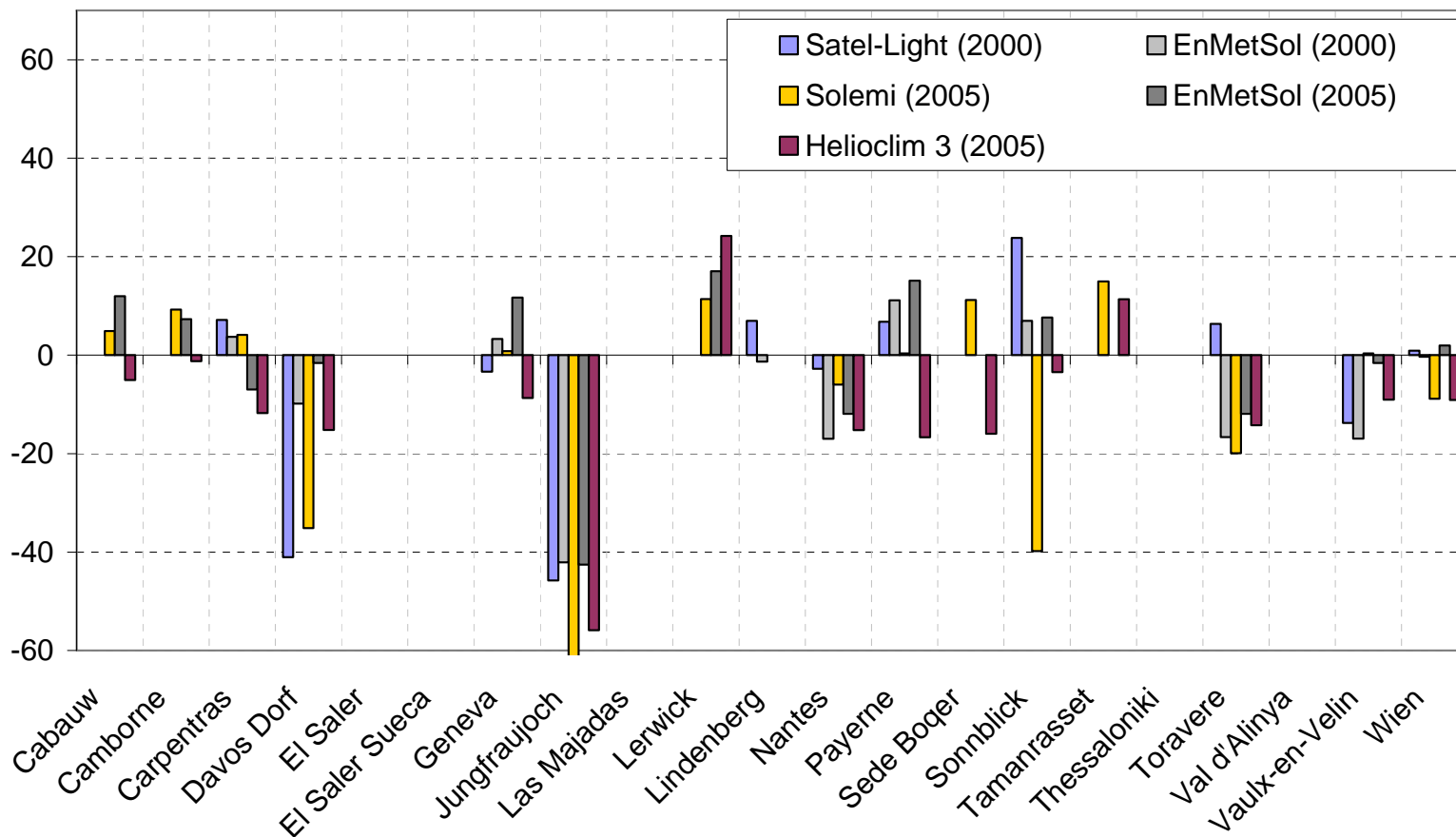
Global irradiance (G_h)

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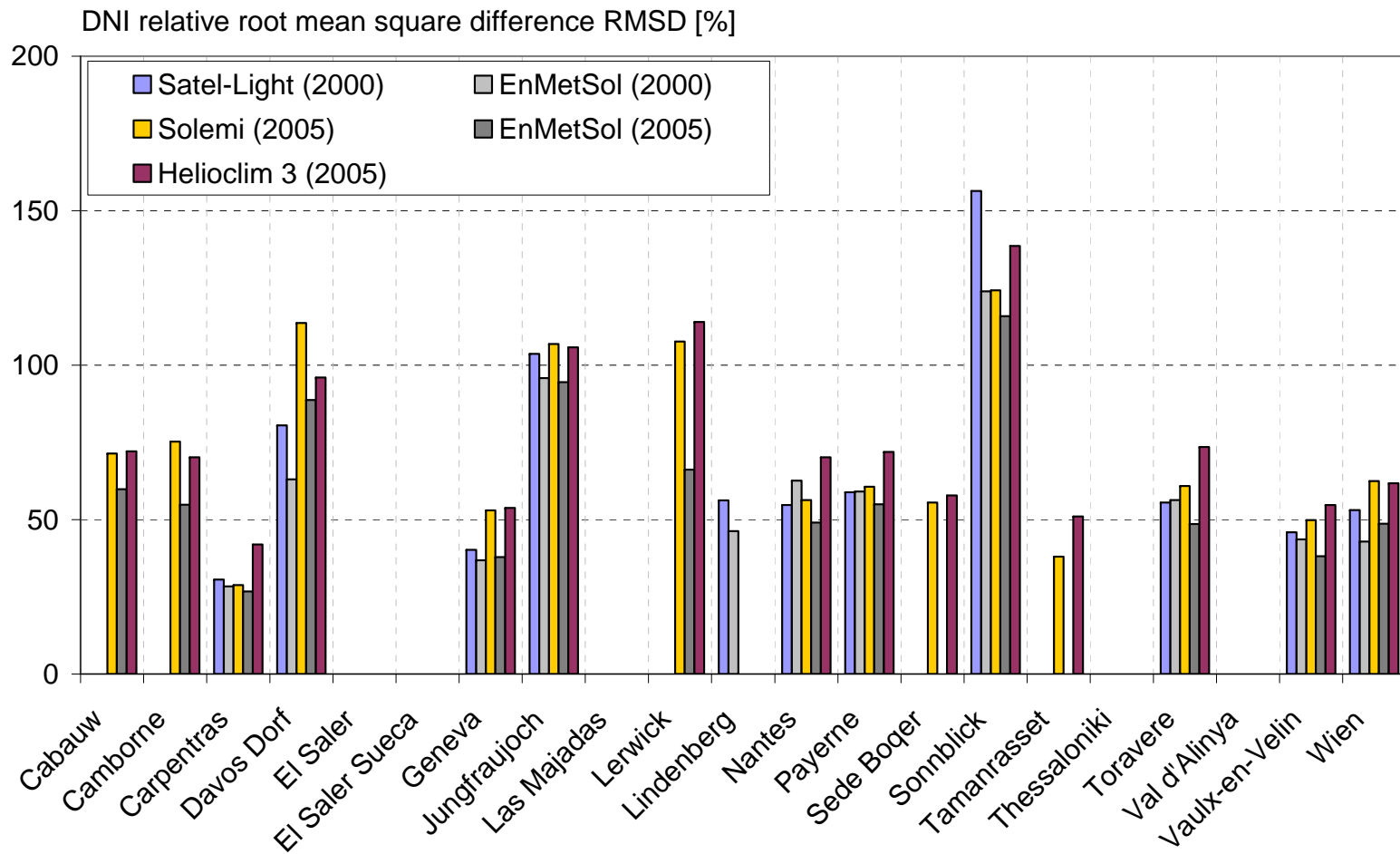
DNI relative mean bias model-measurements difference MBD [%]



Normal beam irradiance (DNI)



Normal beam irradiance (DNI)



Over 35'000 hourly values:

- mbd - 9% to +1%
- rmsd 45% to 64%

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