PV ALPS

SATELLITENBASIERTE PV POTENTIAL KLIMATOLOGIE FÜR ALPINE REGIONEN

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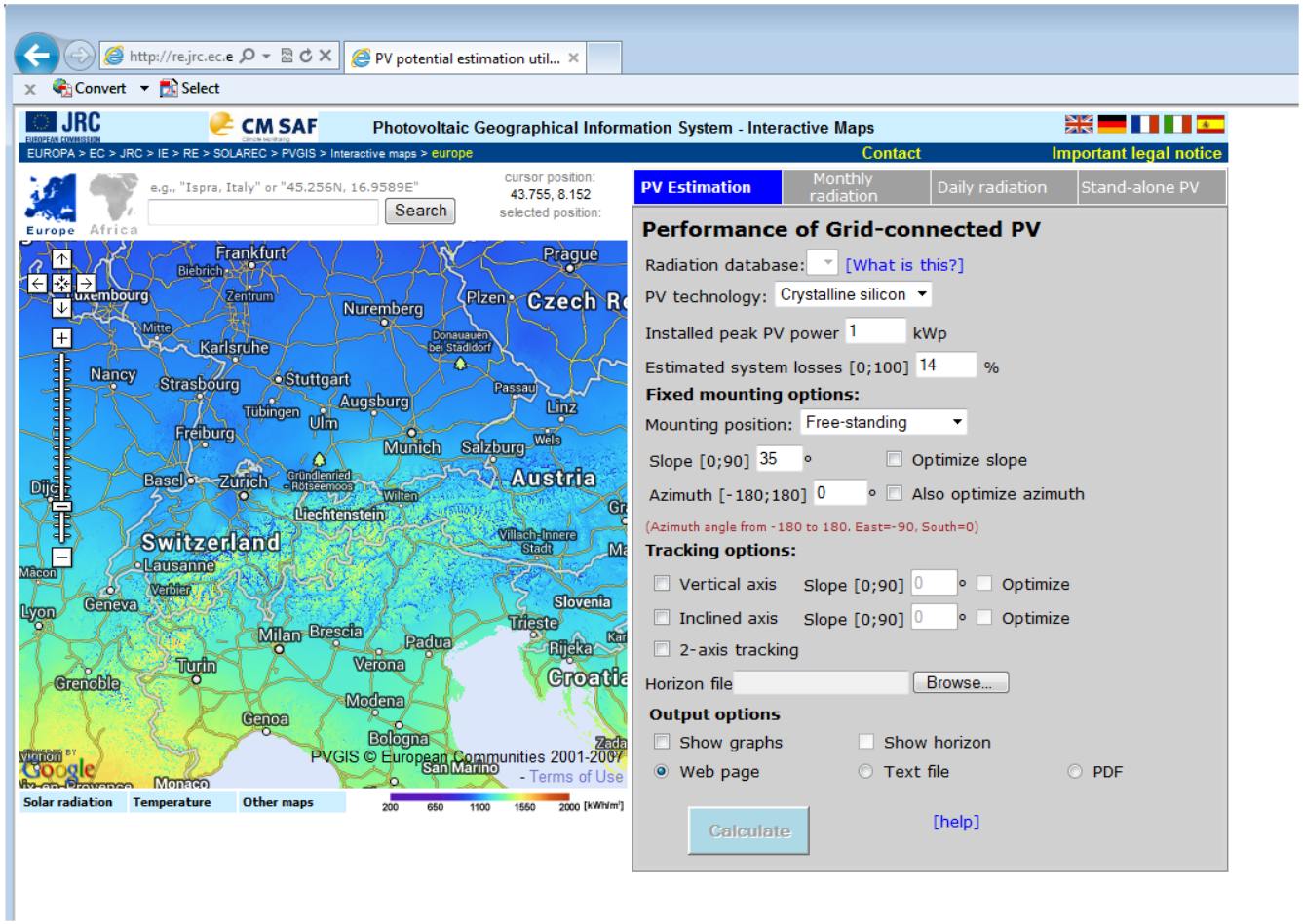
INTERREG
ITALIA-SVIZZERA ITALIE-SUISSE ITALIEN-SCHWEIZ
Unione Europea
Fondo Europeo di Sviluppo Regionale
Le opportunità non hanno confini

Überblick

- Motivation
- Methodik, Erläuterung des neuen Algorithmus.
- Ergebnisse
- Validierung

WELCHE PRODUKTE GIBT ES FÜR DEN ALPENRAUM? – PVGIS !



Le opportunità non hanno confini

WARUM SATELLITENDATEN ?

International Journal of Remote Sensing
Vol. 30, No. 22, 20 November 2009, 5821–5841

Deriving surface global irradiance over the Alpine region from METEOSAT Second Generation data by supplementing the HELIOSAT method

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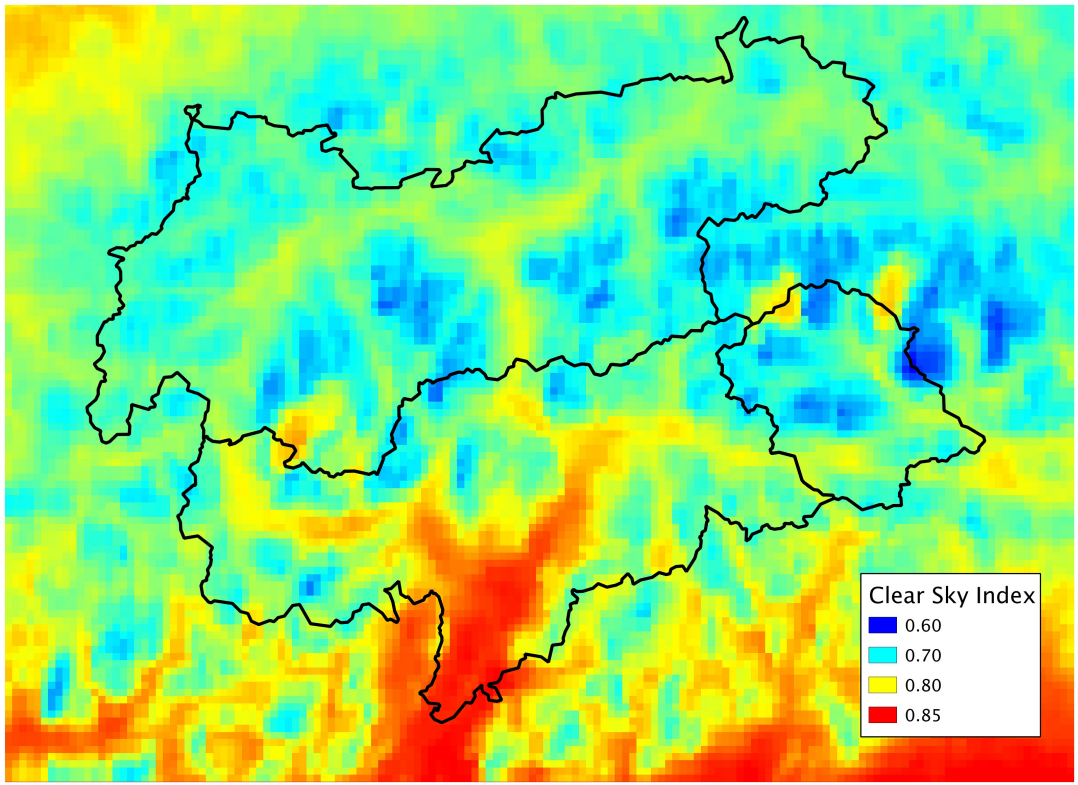
In the framework of the Satellite Application Facility for Climate Monitoring (CM-SAF) an upgraded formulation of the HELIOSAT surface global irradiance retrieval scheme is proposed, which is suitable for real-time application to METEOSAT Second Generation (MSG) satellite data. The new scheme includes image georeferencing, pixel-wise snow-cover detection, special treatment of clouds above snow and correction of terrain effects over the Alpine region. Results show that the mean bias difference between the revised irradiance estimates from satellite and from ground measurements can be substantially reduced by correctly distinguishing between clouds and snow, and by applying the new cloud-index scheme for clouds blue above snow. The increase of the root mean square difference with increasing altitude can be mainly attributed to the increase of the variability of the natural irradiance field. We strongly recommend the use of MSG-based irradiance estimates for locations at more than 4 km distance to the next measurement site.

VARIBILITÄT DES WOLKENINDEX (DATEN VON METEOSCHWEIZ)

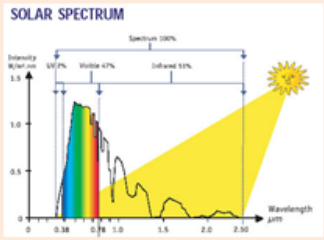


Durchschnittlicher „ clear sky index“ im August 2011

BERECHNUNG IN DREI TEILSCHRITTEN

I_dir(λ), I_glo(λ)

SPECMAGIC ALGORITMUS



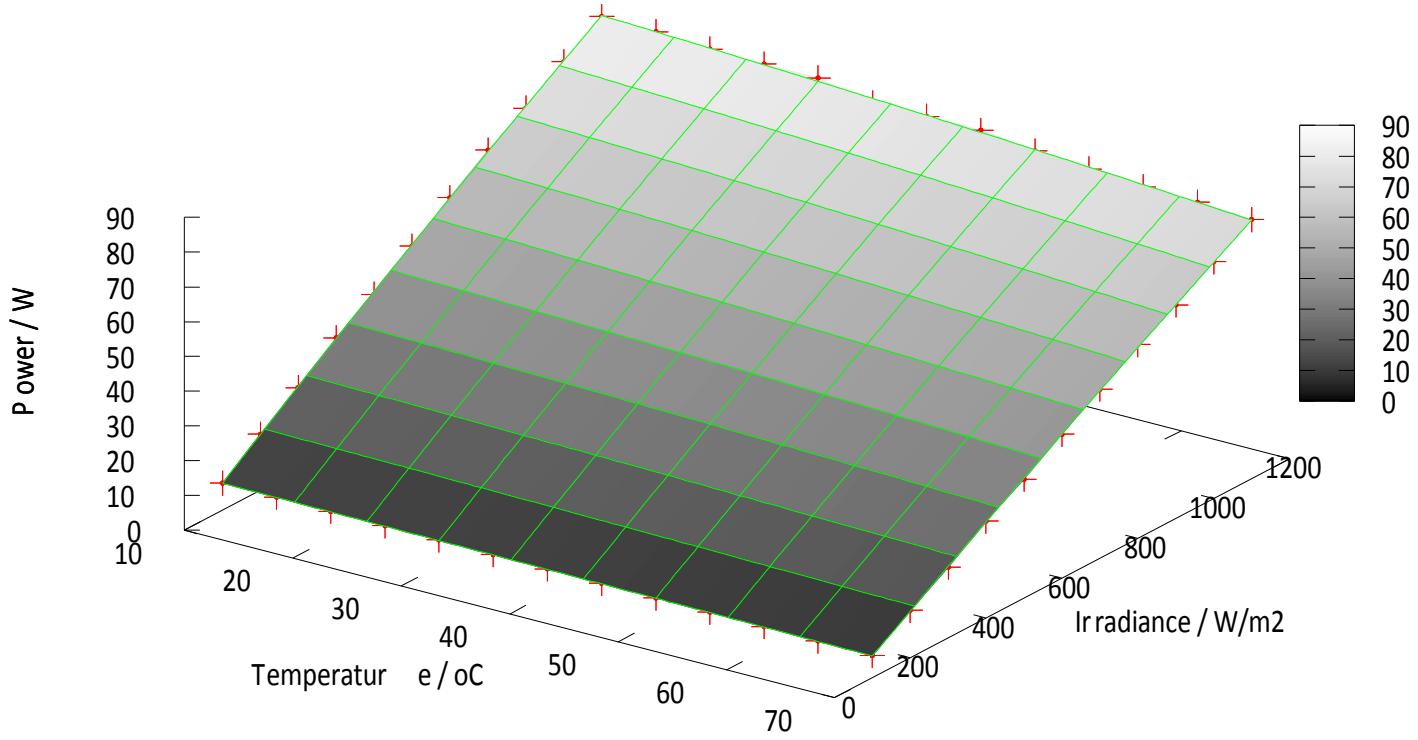
I_dir(λ,CI), I_glo(λ,CI)

CI (cloud index) von
MeteoSwiss
Algorihmus

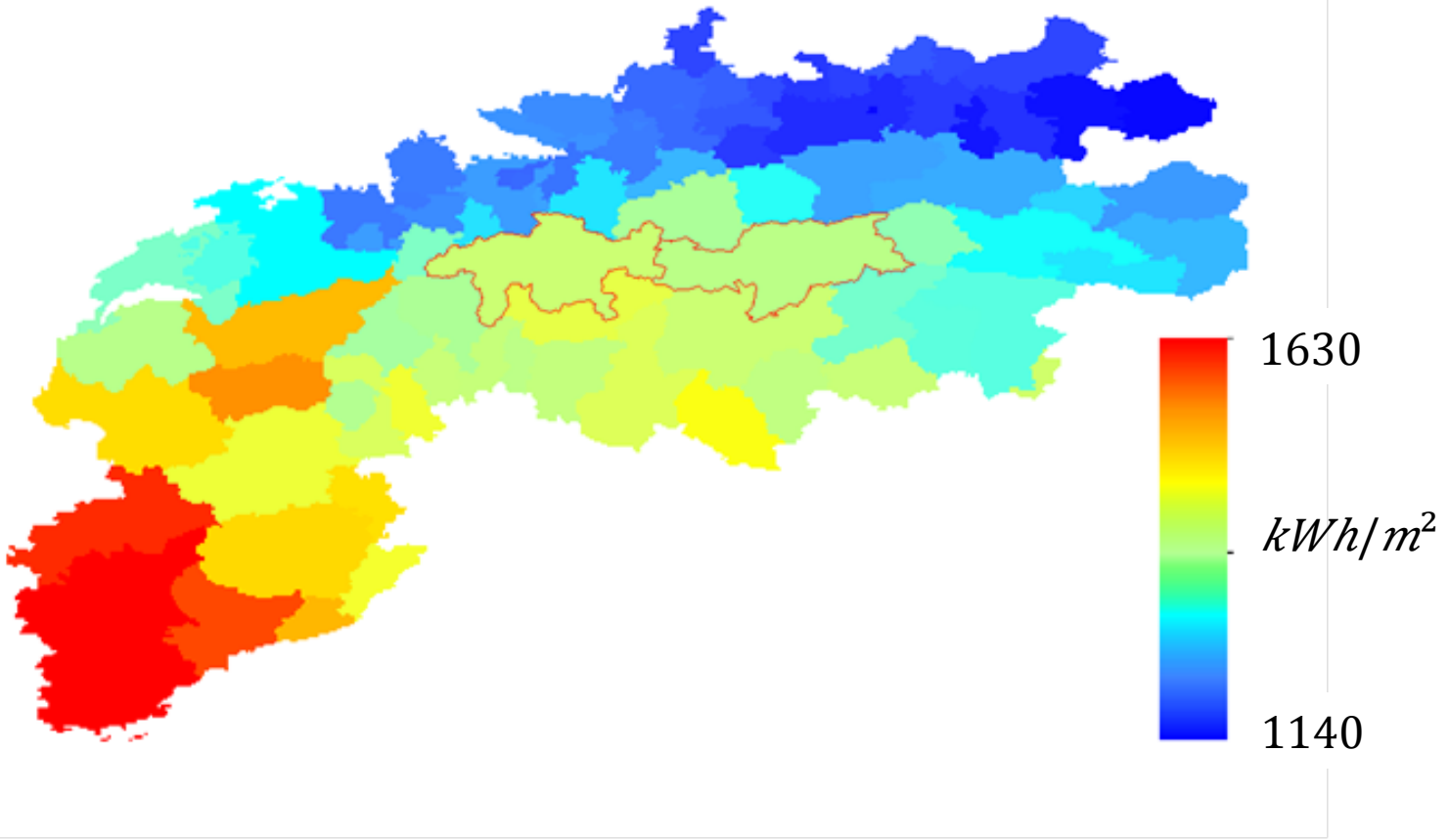
I_dir(λ,CI,fsky,σ),
I_glo(λ,CI,fsky,σ)

Topographie Korrektur
(sky view und Verschattung)

PERFORMANCE MATRIX METHODE ZUR UMRECHNUNG VON SOLARSTRAHLUNG IN PV ERTRAG



SOLAR STRAHLUNG IM ALPENRAUM



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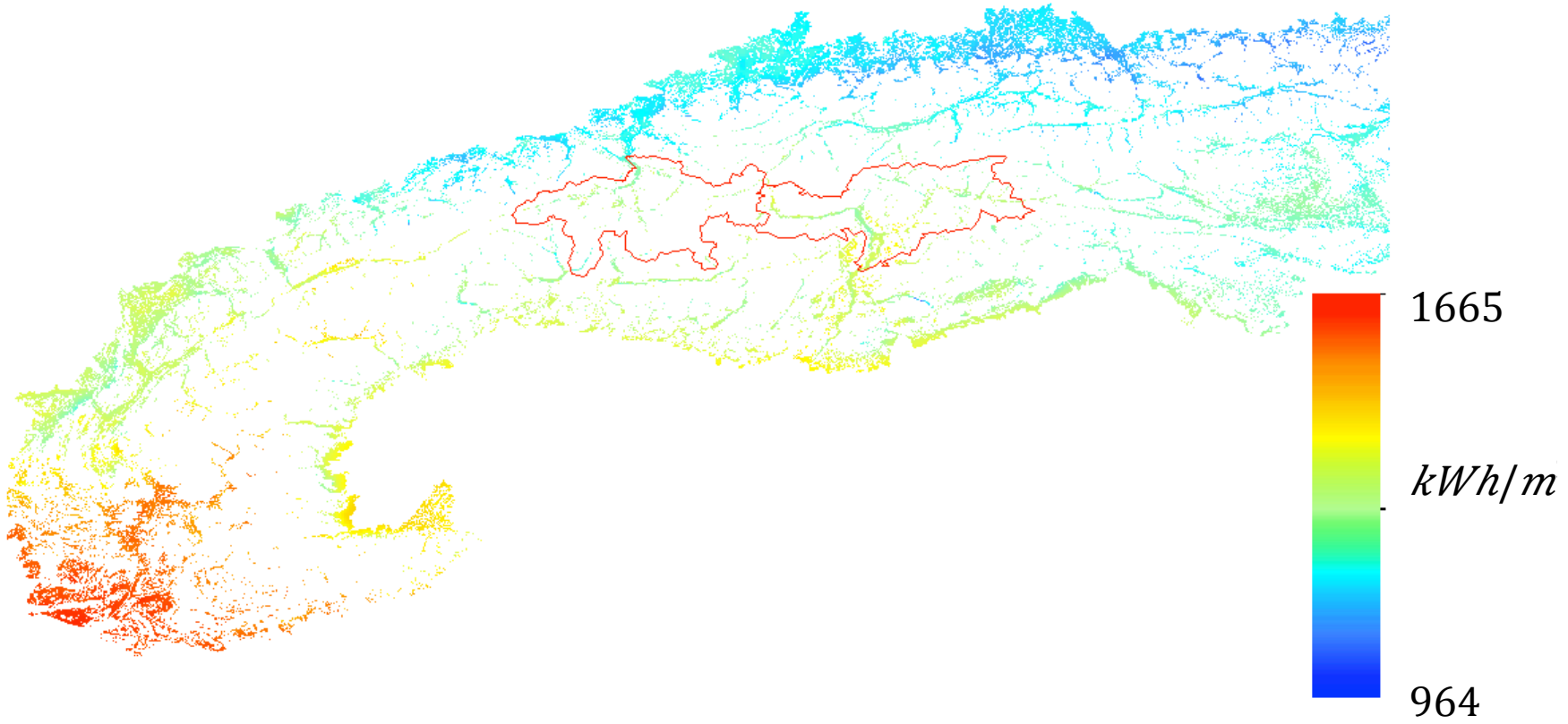
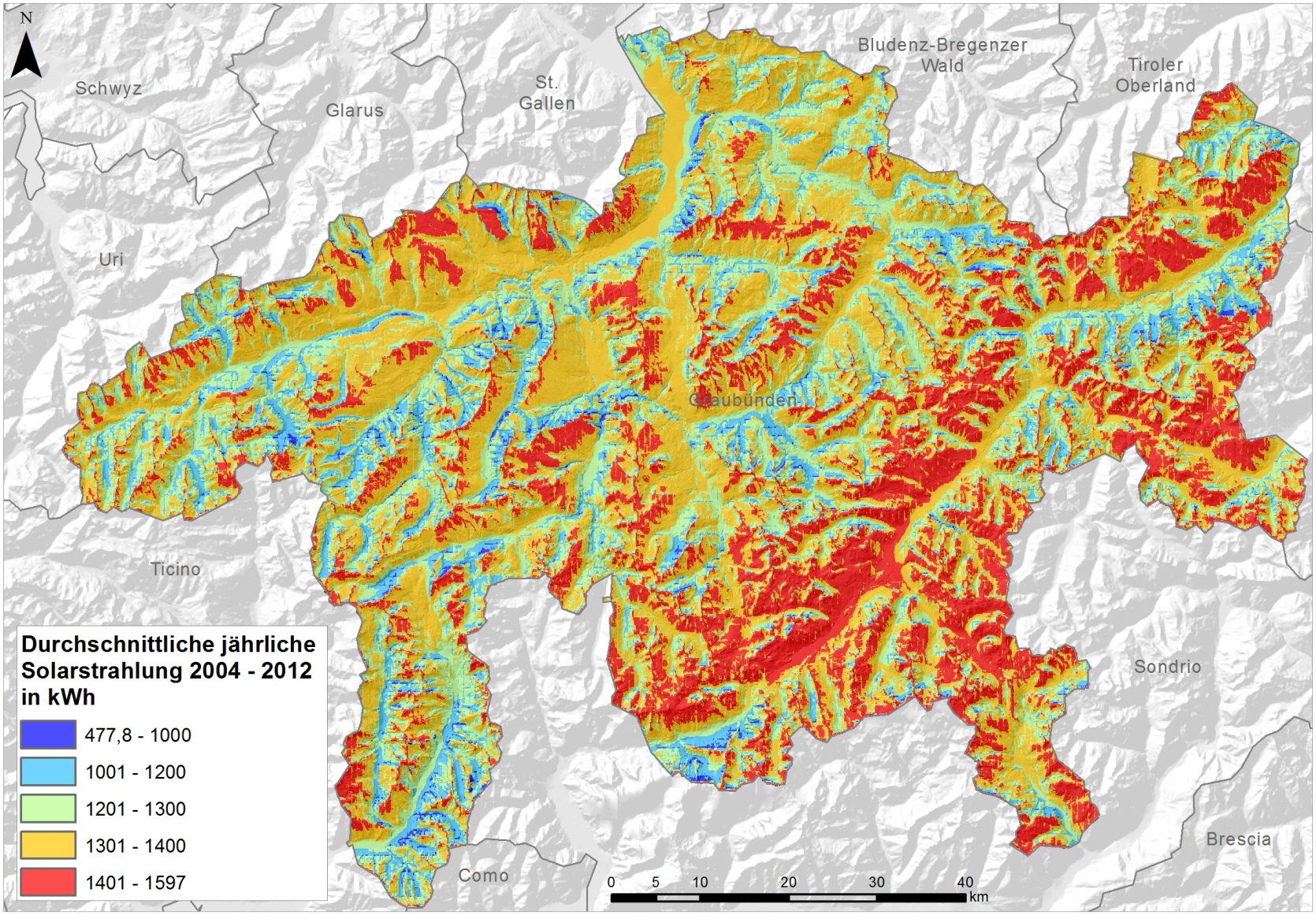
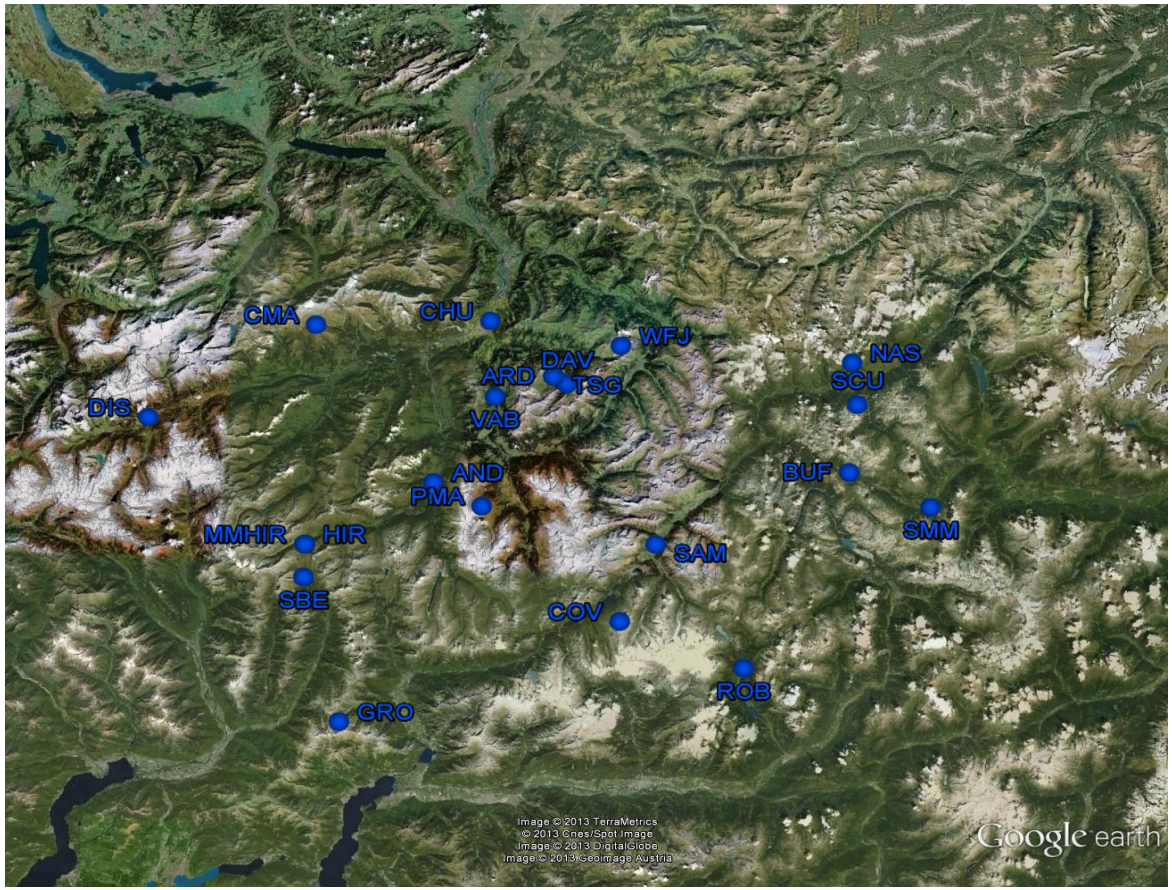
SOLAR STRAHLUNG IM ALPENRAUM (BESIEDELTE GEBIETE)



SOLARE BESTRAHLUNGSSTÄRKE IN GRAUBÜNDEN



VALIDIERUNG SIS CMSAF / METEOSWISS / EURAC



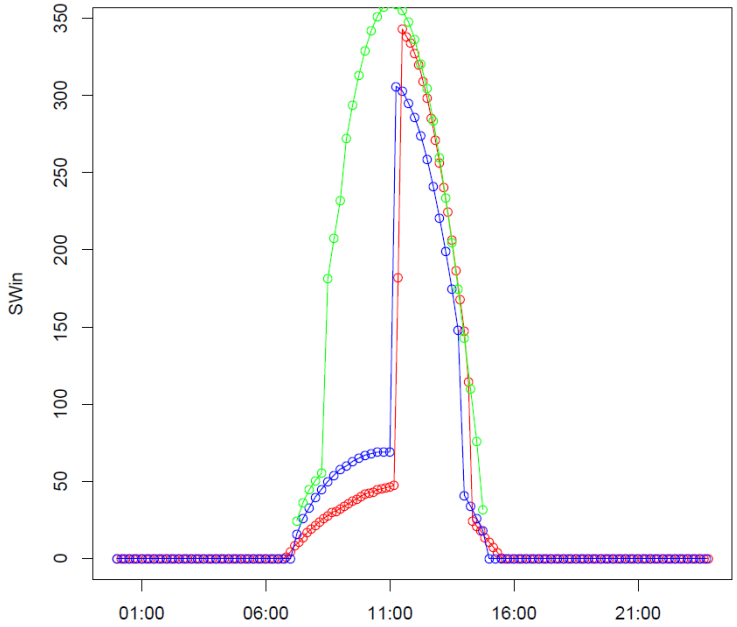
Bodenstationen für Globalstrahlung in Graubünden.

VALIDIERUNG

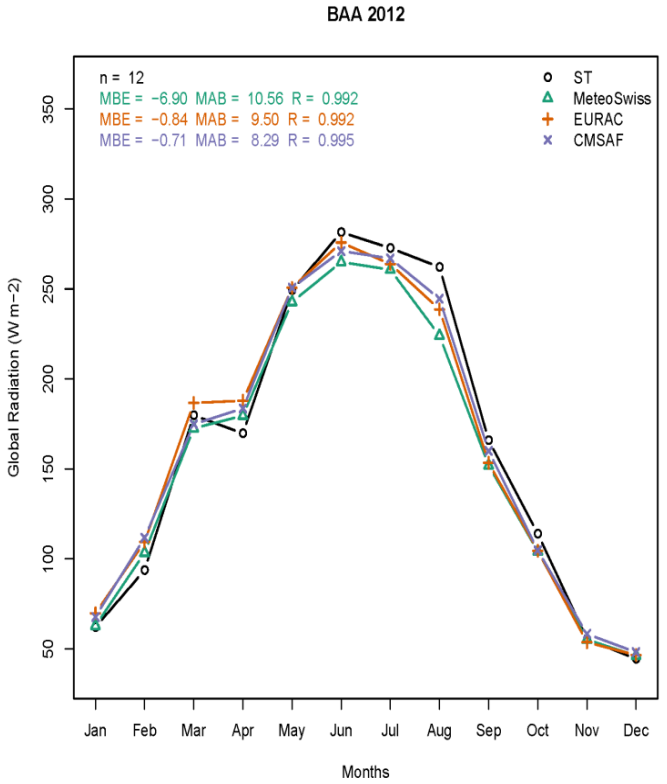
Monthly SIS	AND	ARD	BUF	CHU	CMA	COV	DAV	DIS	NAS	PMA	ROB	SAM	SBE	SCU	SMM	TSG	VAB	GRO	AV.
Height asl [m]	987	1840	1968	556	2480	3305	1594	1197	2400	2670	1078	1708	1638	1303	1383	2040	1569	323	
CMSAF MAB [W/m2]	6,74	11,48	24,48	6,36	25,35	31,12	23,27	27,09	27,37	23,88	12,54	23,18	8,48	21,56	11,24	24,91	15,16	18,33	**19,03**
EURAC MAB [W/m2]	6,62	7,07	10,06	3,56	11,86	12,94	6,31	8,21	11,85	7,18	2,94	9,02	3,86	14,2	12,72	9,05	5,05	17,87	**8,91**
METEO SWISS MAB [W/m2]	7,32	9,06	8,24	2,31	14,77	36,2	7	6,44	10,92	17,95	7,94	7,77	6,04	8,12	15,94	8,15	4,7	7,54	**10,36**
	n=12	n=12	n=12	n=12	n=12	n=12	n=12	n=12	n=12	n=12	n=12	n=12	n=12	n=12	n=12	n=12	n=12	n=2	

Validierung der Globalstrahlung im Kanton Graubünden 2012.

VALIDIERUNG SIS CMSAF / METEOSWISS / EURAC



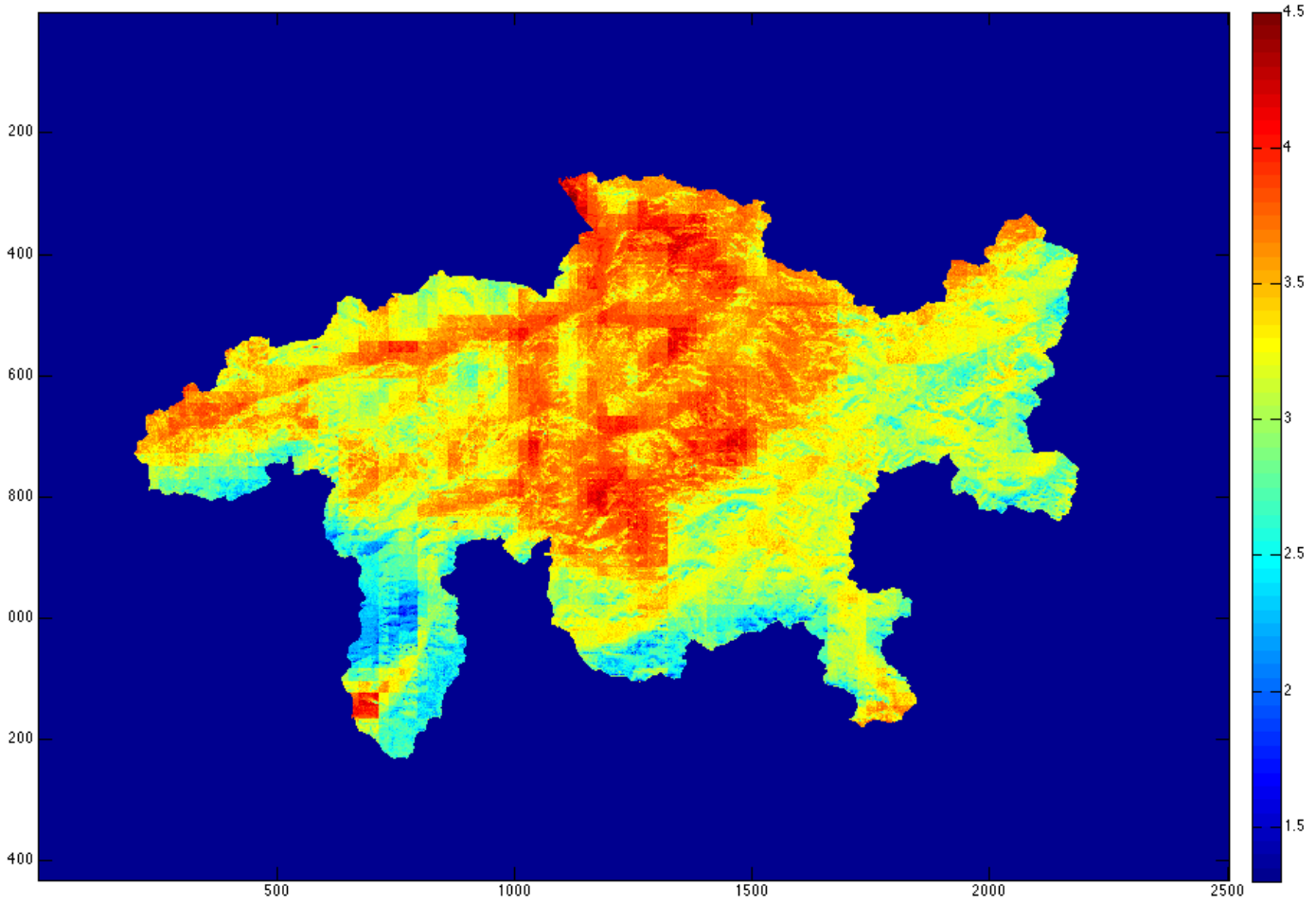
Wolkenlos am 28 Dez. 2011
Station Antholz



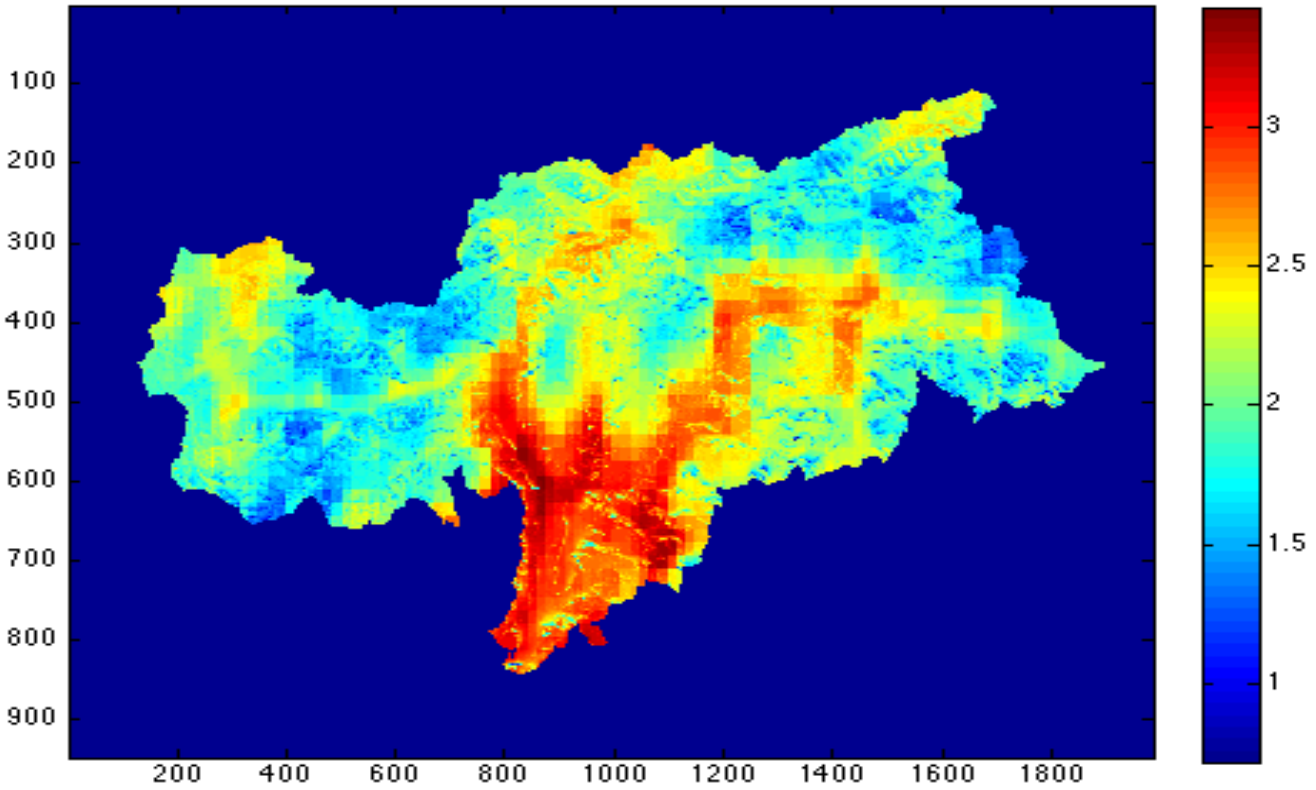
Vergleich der Monatsmittelwerte 2012
Station Bozen Flughafen

GROUND DATA
EURAC
METEOSWISS

Jährlicher „COV“ in Graubünden



Jährlicher „COV“ in Südtirol



ANALYSE DER GLOBALSTRAHLUNG

HEIGHT LEVEL	AREA %	MEAN	STD
<500	2,78	1244,799	3,08
501-1000	5,56	1290,906	3,22
1001-1500	8,33	1315,593	3,59
1501-2000	11,11	1354,249	4,39
2001-2500	13,89	1397,229	4,42
2501-3000	16,67	1427,498	4,56
3001-3500	19,44	1463,491	6,64
>3500	22,22	1564,639	4,76

Durchschnittliche Jahressumme der Globalstrahlung (2004 to 2012 (kWh/m^2)) für unterschiedliche Höhenstufen in Graubünden.

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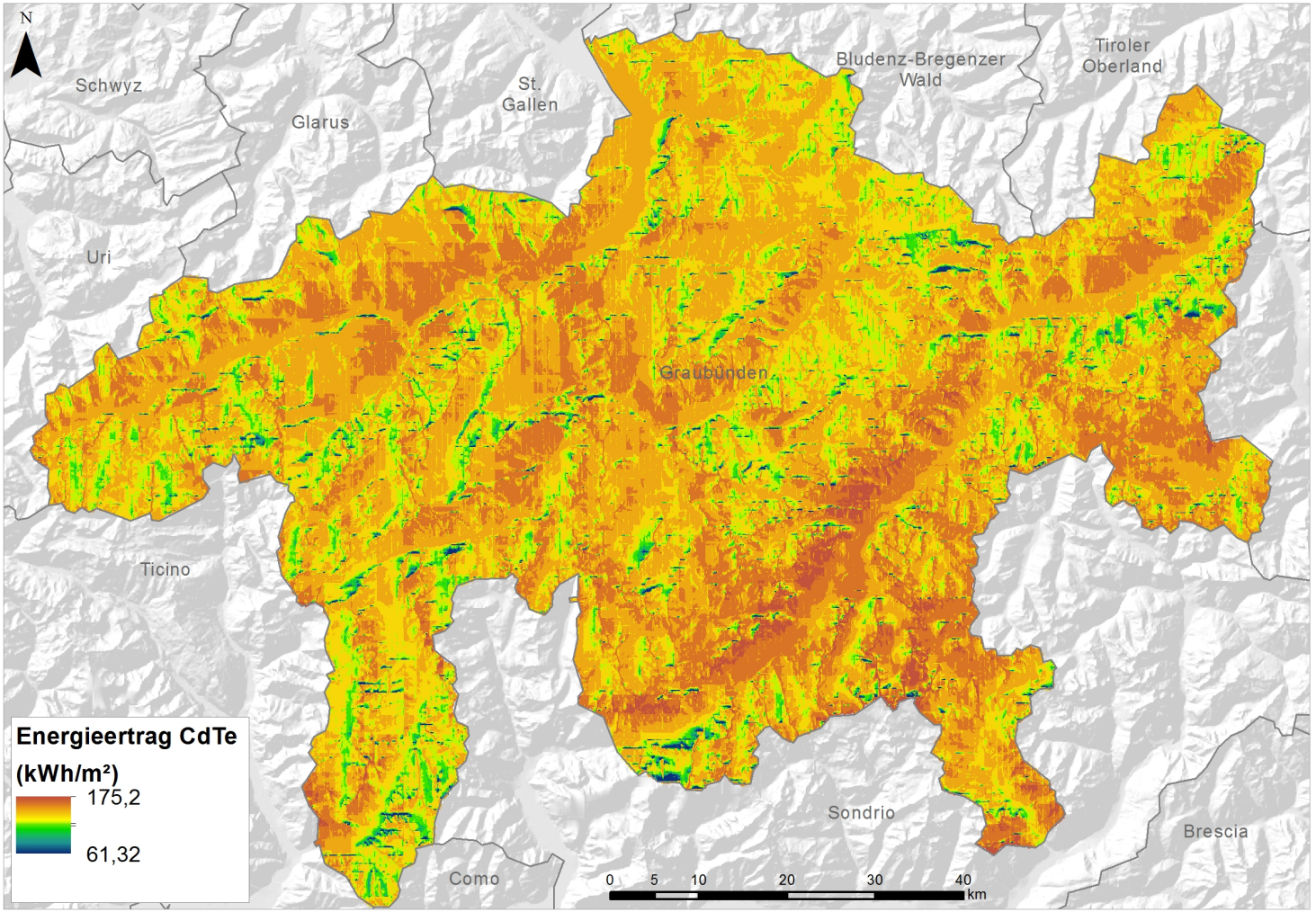
PV ERTRAG IN GRAUBUNDEN FÜR CADMIUM TELLURID MODULE



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Vielen Dank für ihre Aufmerksamkeit!

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EURAC research