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UNIVERSITY OF TRENTO - Italy
Department of Civil, Environmental
and Mechanical Engineering

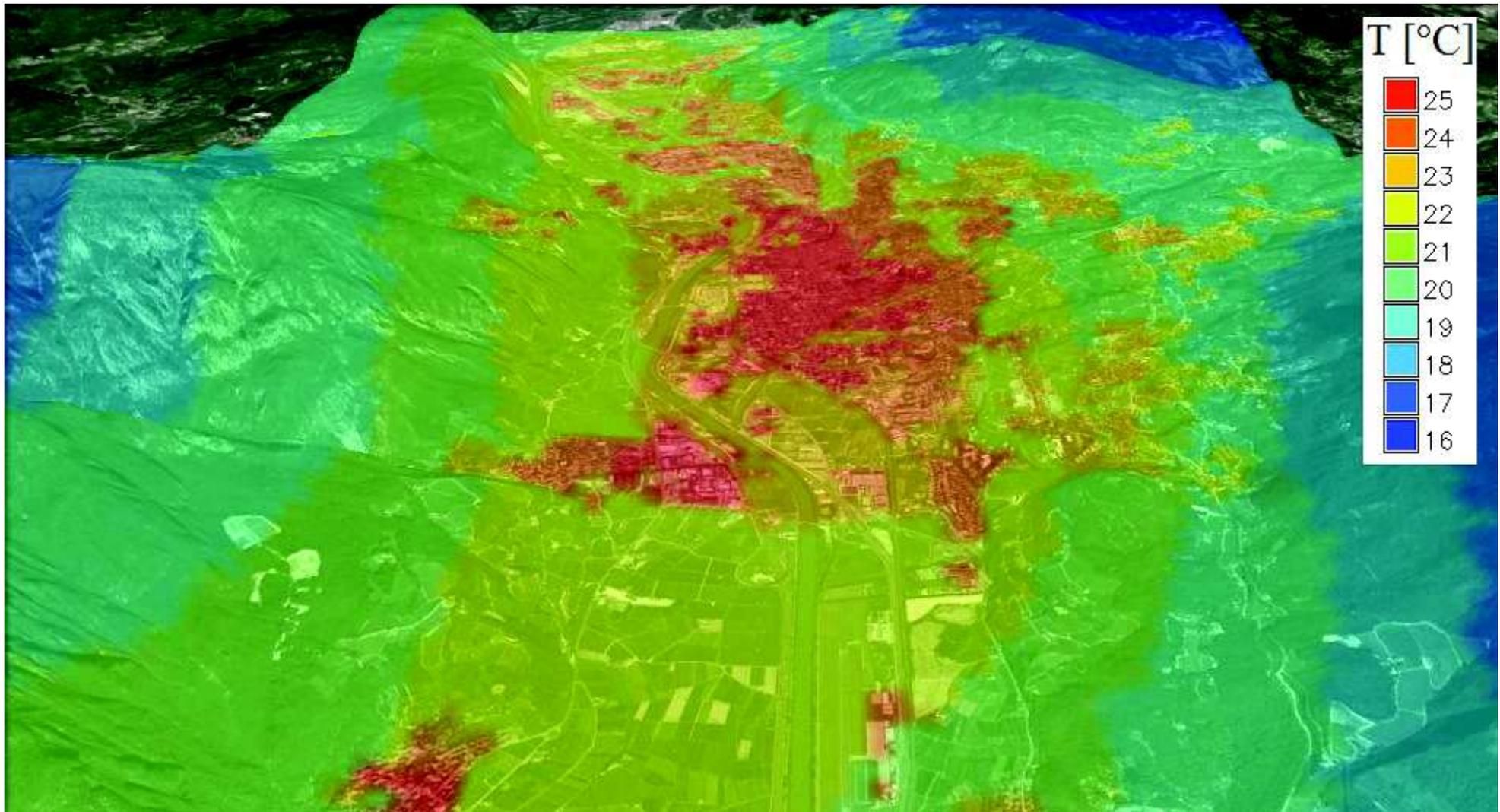
LA VALUTAZIONE DEI CONSUMI ENERGETICI DEGLI EDIFICI ATTRAVERSO IL MODELLO ATMOSFERICO WRF

Lorenzo Giovannini, Gianluca Pappaccogli

Trento, 4 Dicembre 2018

IMEAS Mid-Term Conference

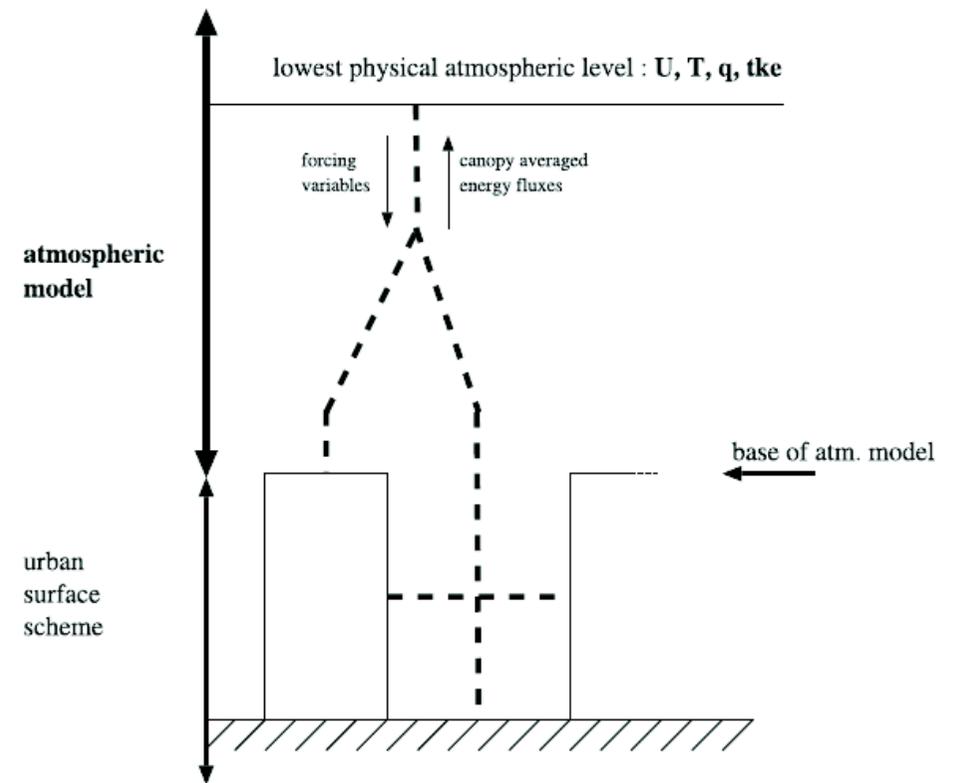
L'ISOLA DI CALORE URBANA



AREE URBANE NEI MODELLI METEOROLOGICI

Nei primi anni 2000 sono state sviluppate alcune parametrizzazioni con lo scopo di tenere in considerazione gli effetti delle aree urbane nei modelli meteorologici.

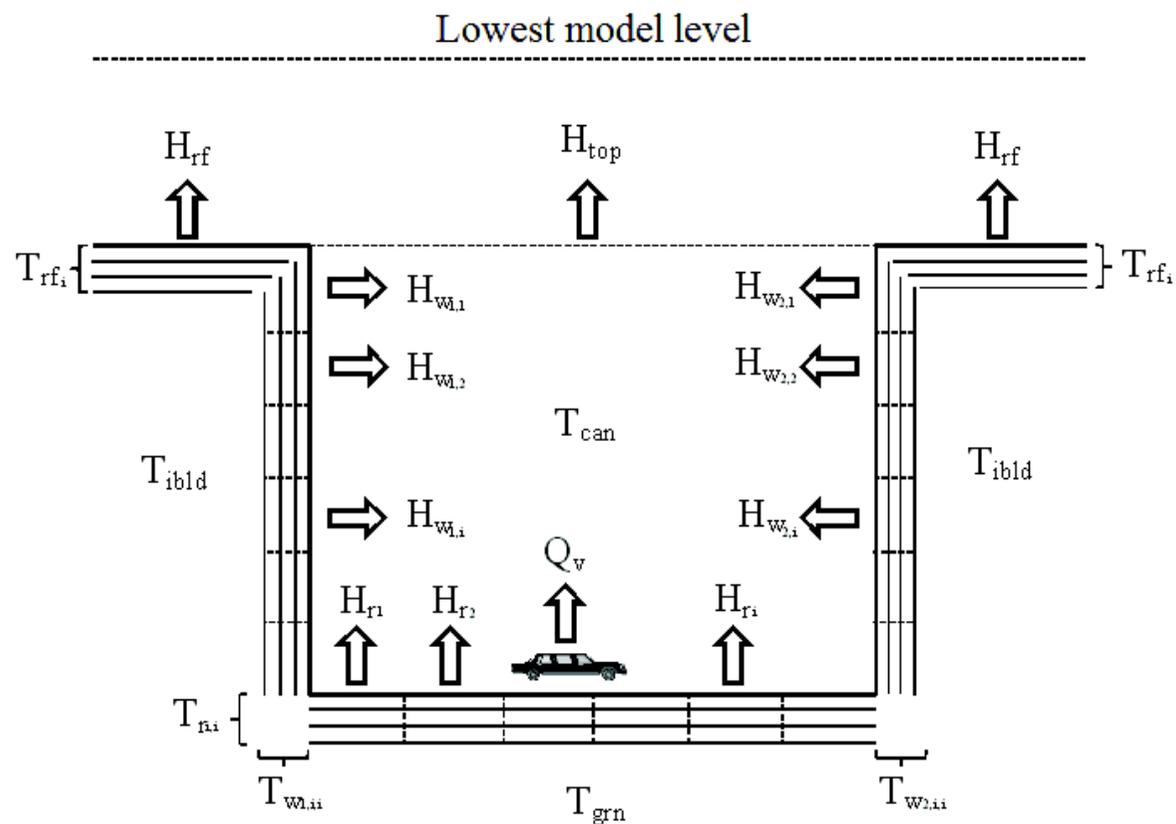
Nella griglia dei modelli meteorologici i flussi superficiali sono calcolati come se provenissero da un canyon urbano con le caratteristiche medie della morfologia urbana.



Masson (2006)

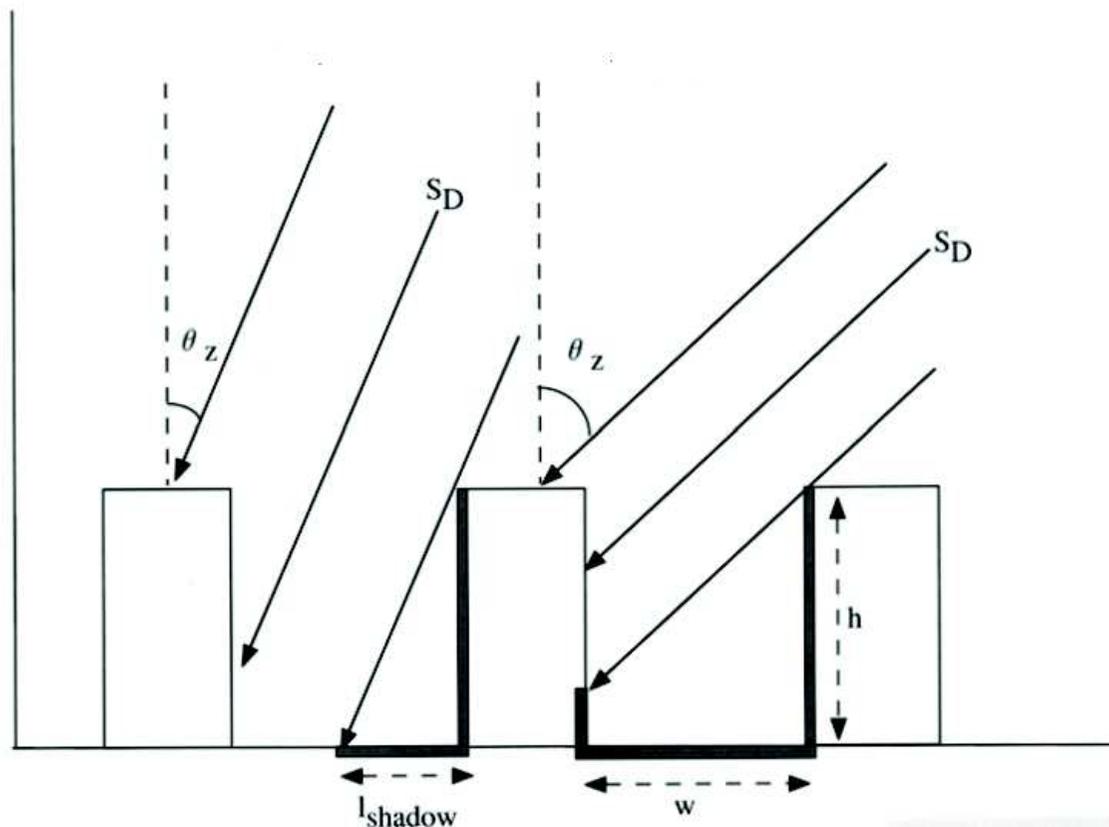
AREE URBANE NEI MODELLI METEOROLOGICI

- calcolo del bilancio energetico superficiale all'interno della strada
-
-
-



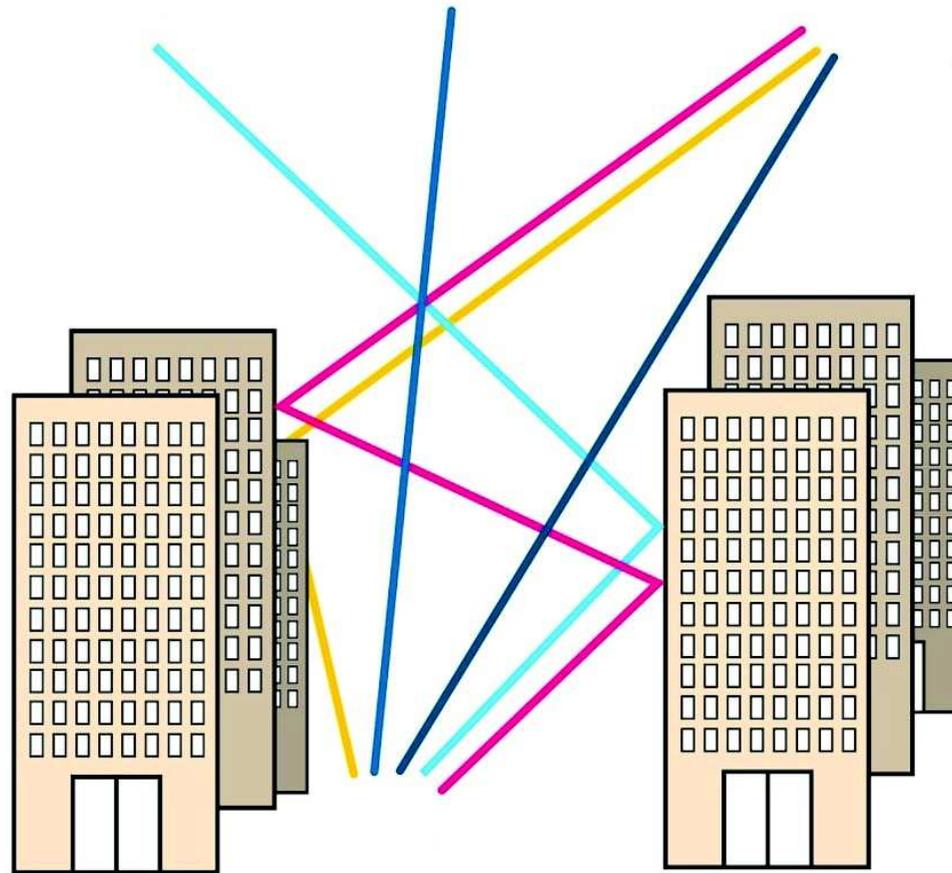
AREE URBANE NEI MODELLI METEOROLOGICI

- calcolo del bilancio energetico superficiale all'interno della strada
- ombreggiamento all'interno della strada
-
-



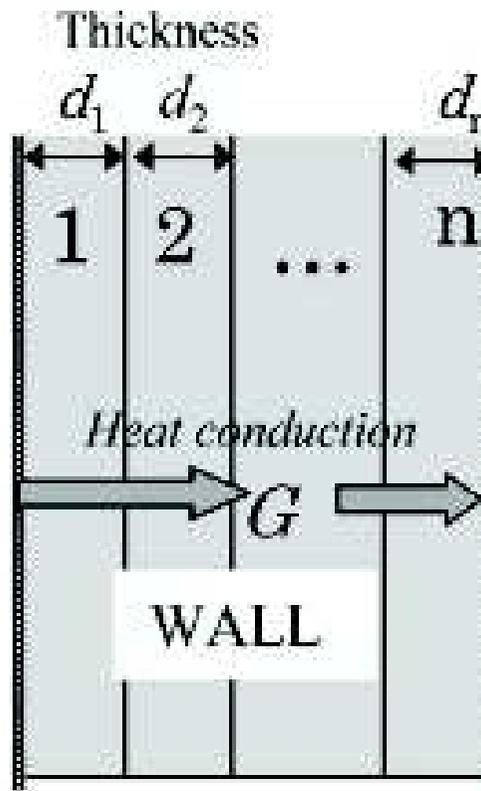
AREE URBANE NEI MODELLI METEOROLOGICI

- calcolo del bilancio energetico superficiale all'interno della strada
- ombreggiamento all'interno della strada
- riflessioni multiple di radiazione
-



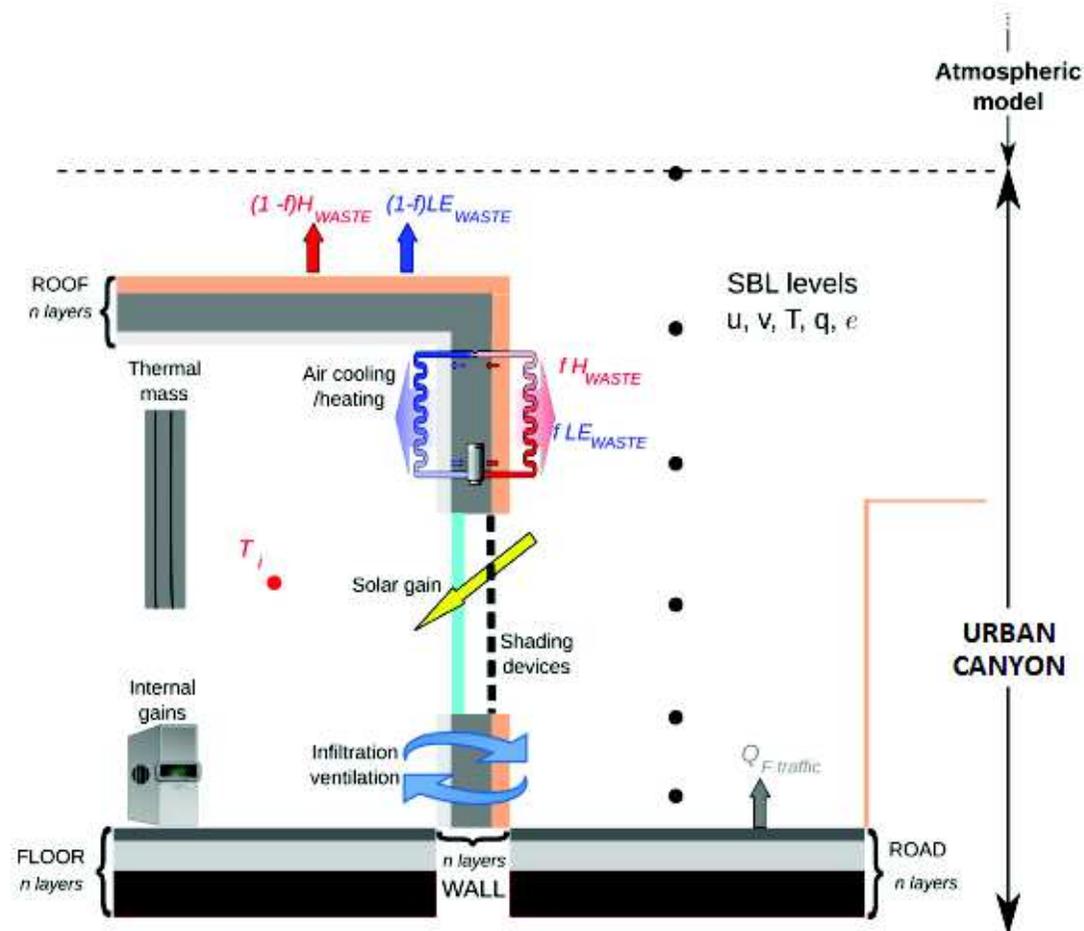
AREE URBANE NEI MODELLI METEOROLOGICI

- calcolo del bilancio energetico superficiale all'interno della strada
- ombreggiamento all'interno della strada
- riflessioni multiple di radiazione
- conduzione di calore nelle superfici



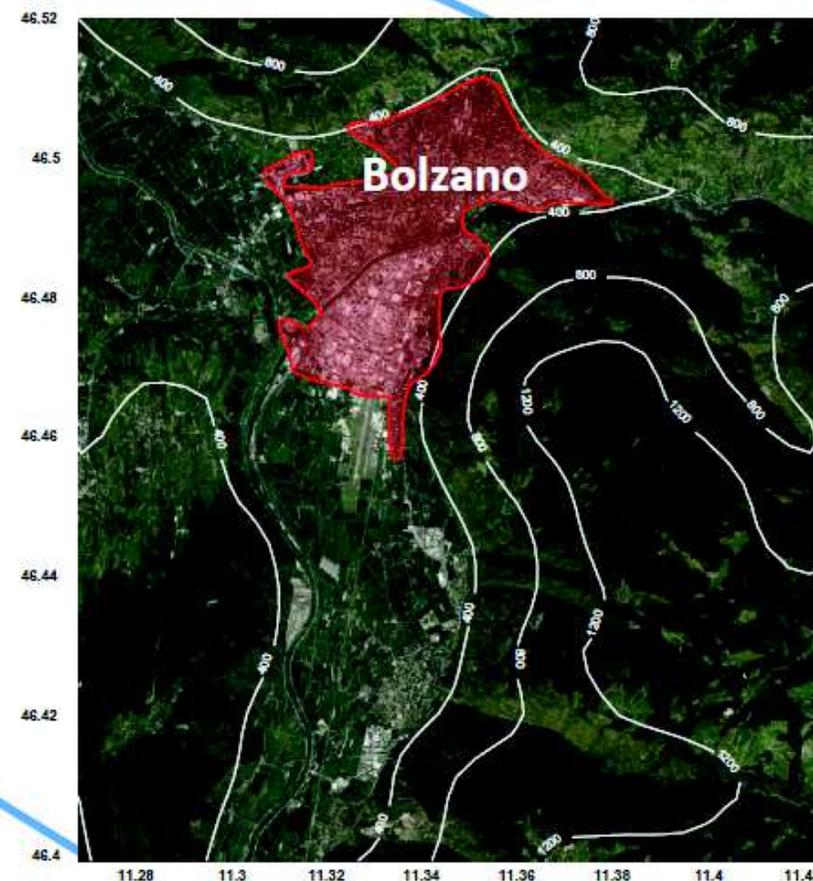
AREE URBANE NEI MODELLI METEOROLOGICI

A partire dal 2010 modelli energetici degli edifici sono stati accoppiati alle parametrizzazioni urbane per stimare i consumi nelle città.

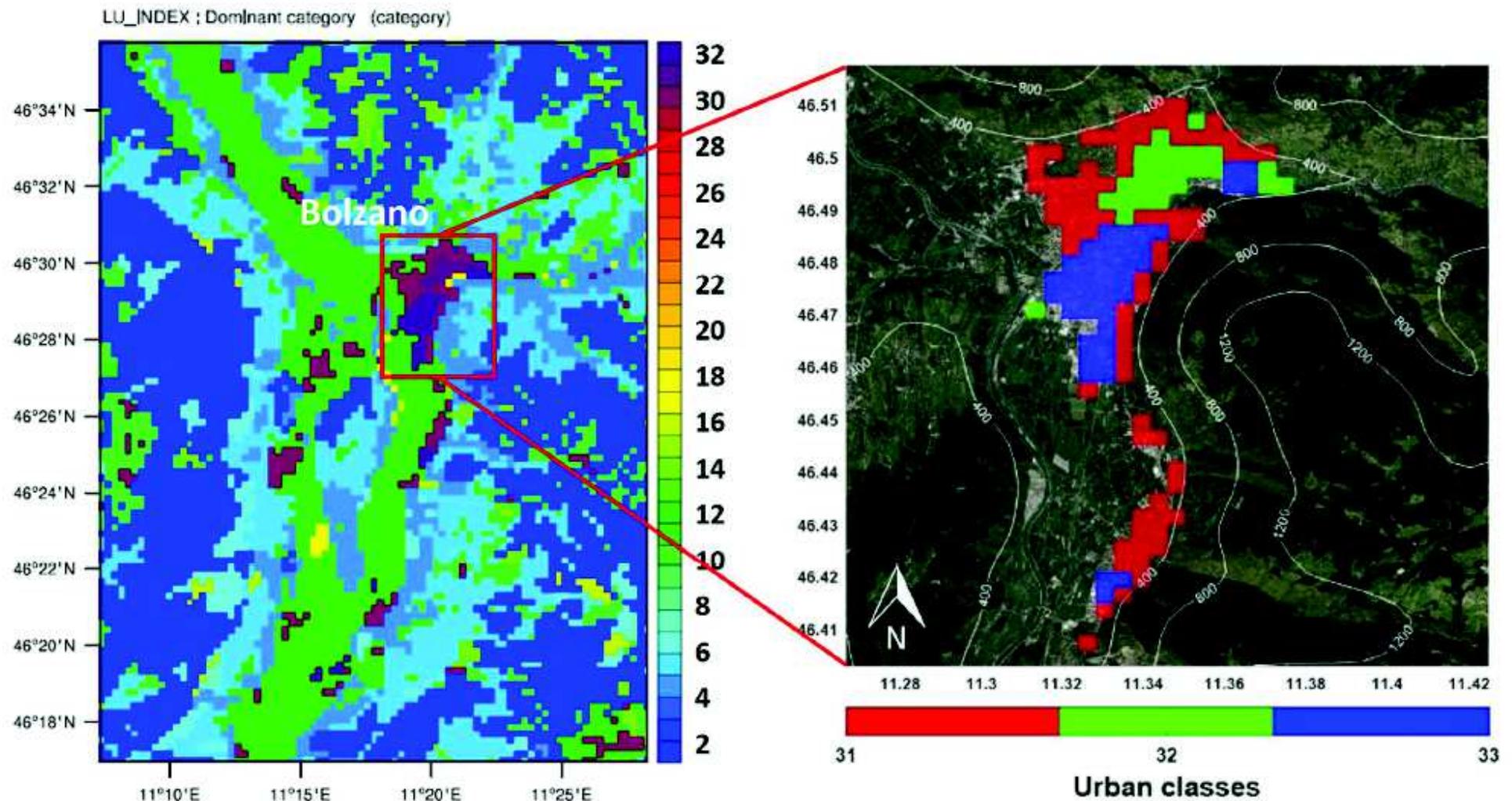


Bueno (2012)

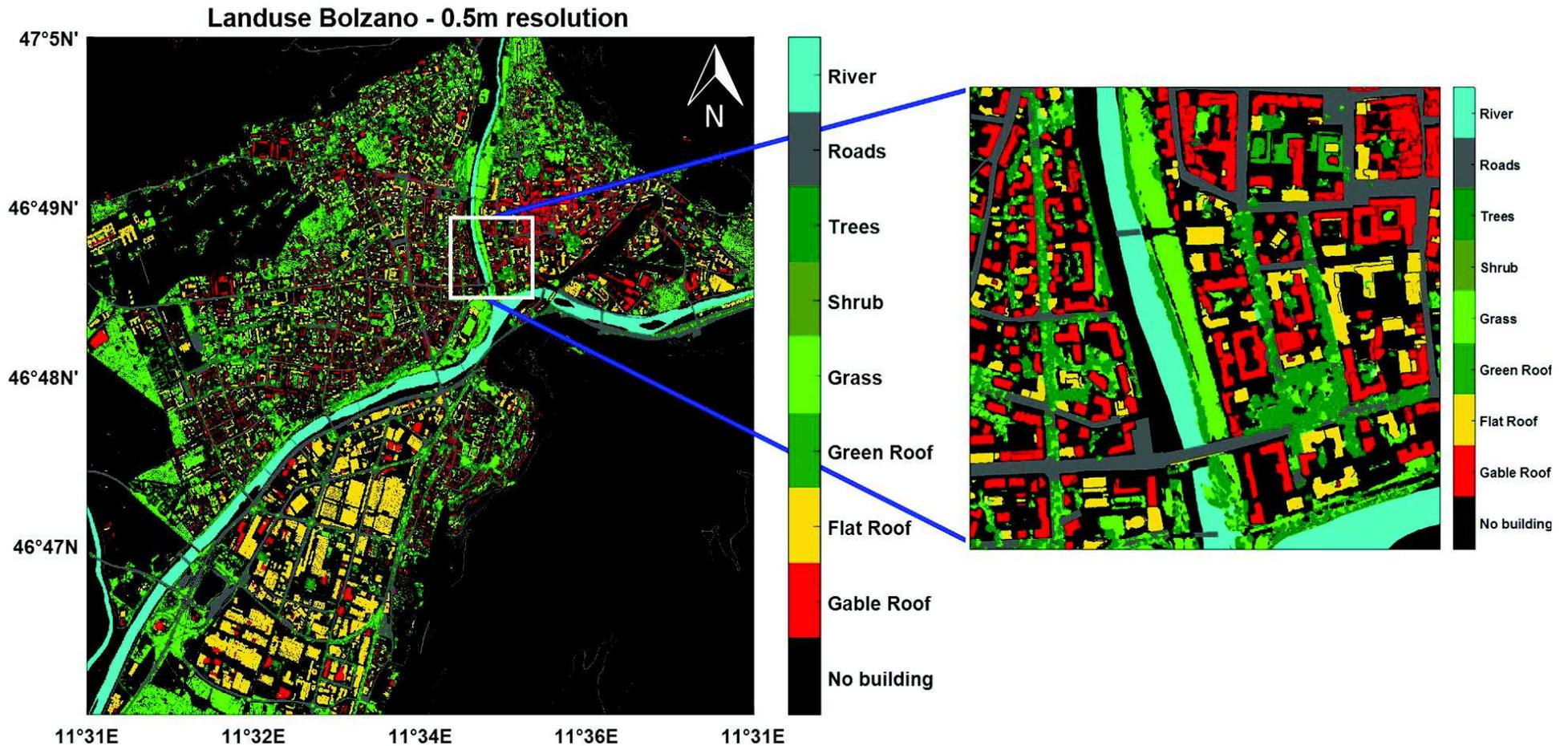
AREA DI STUDIO



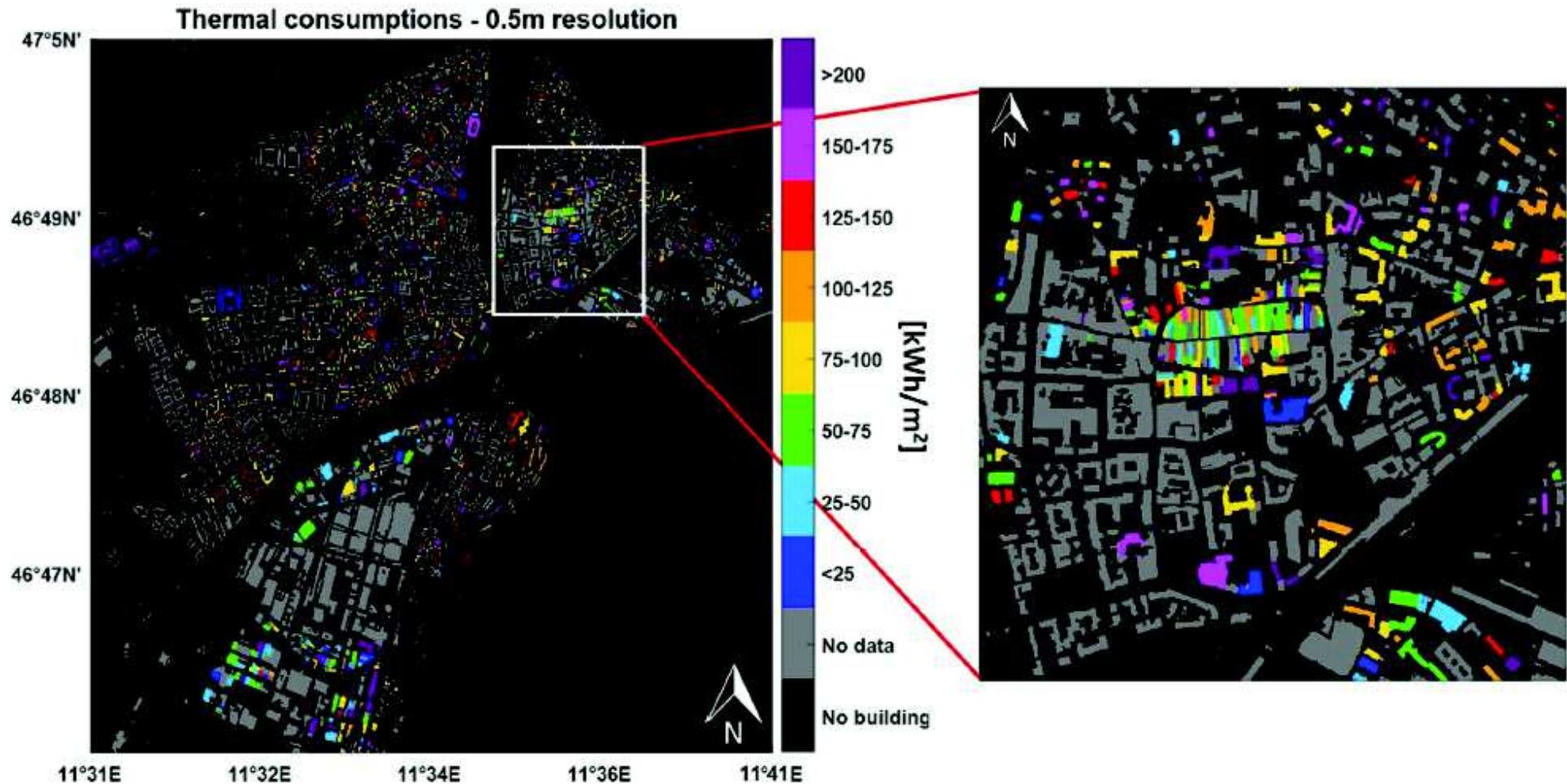
CLASSI URBANE IN WRF



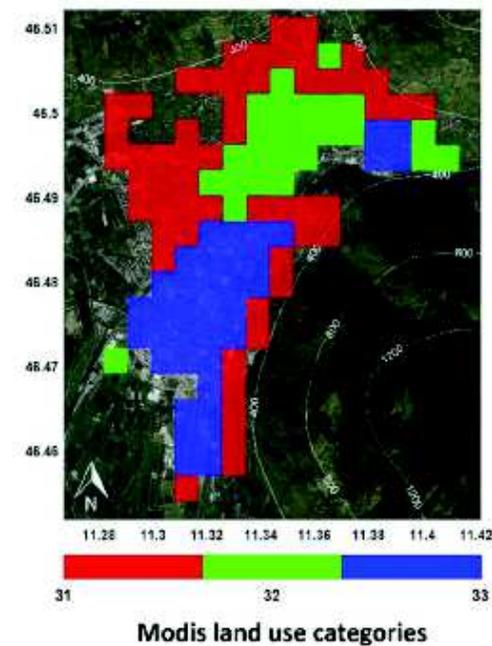
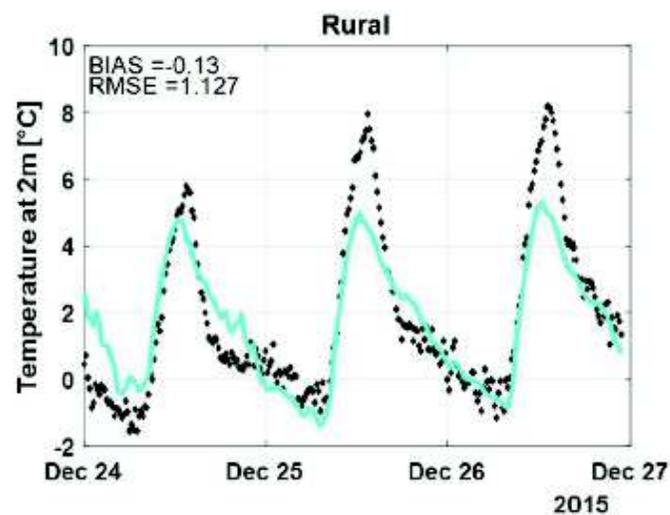
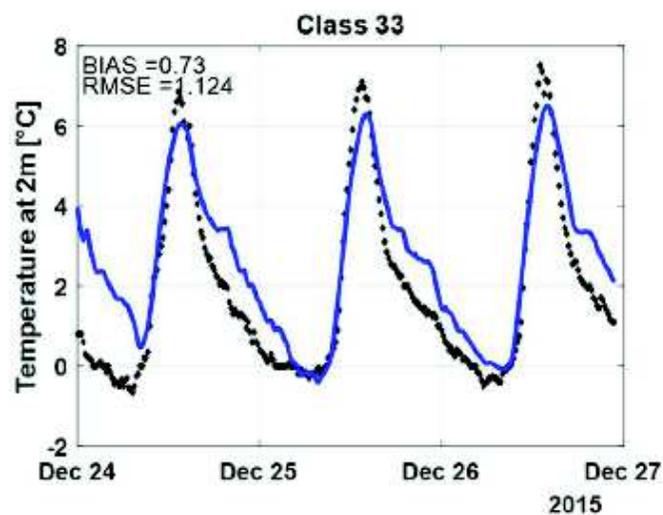
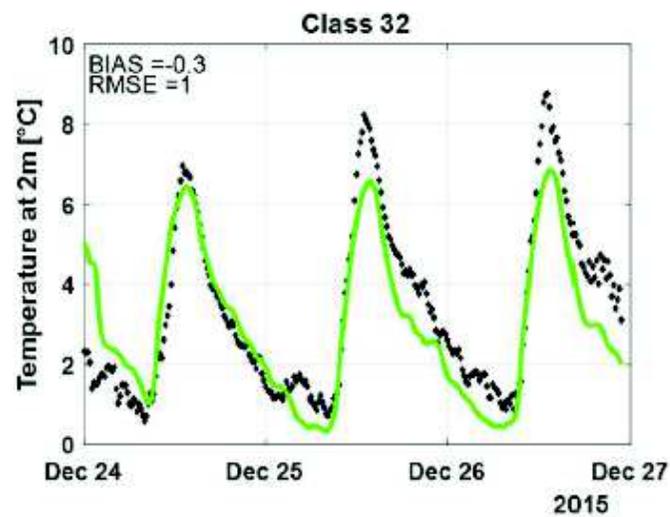
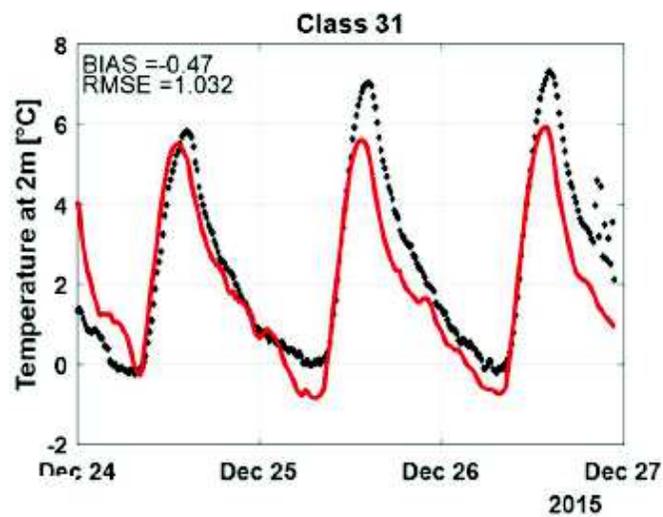
MORFOLOGIA URBANA



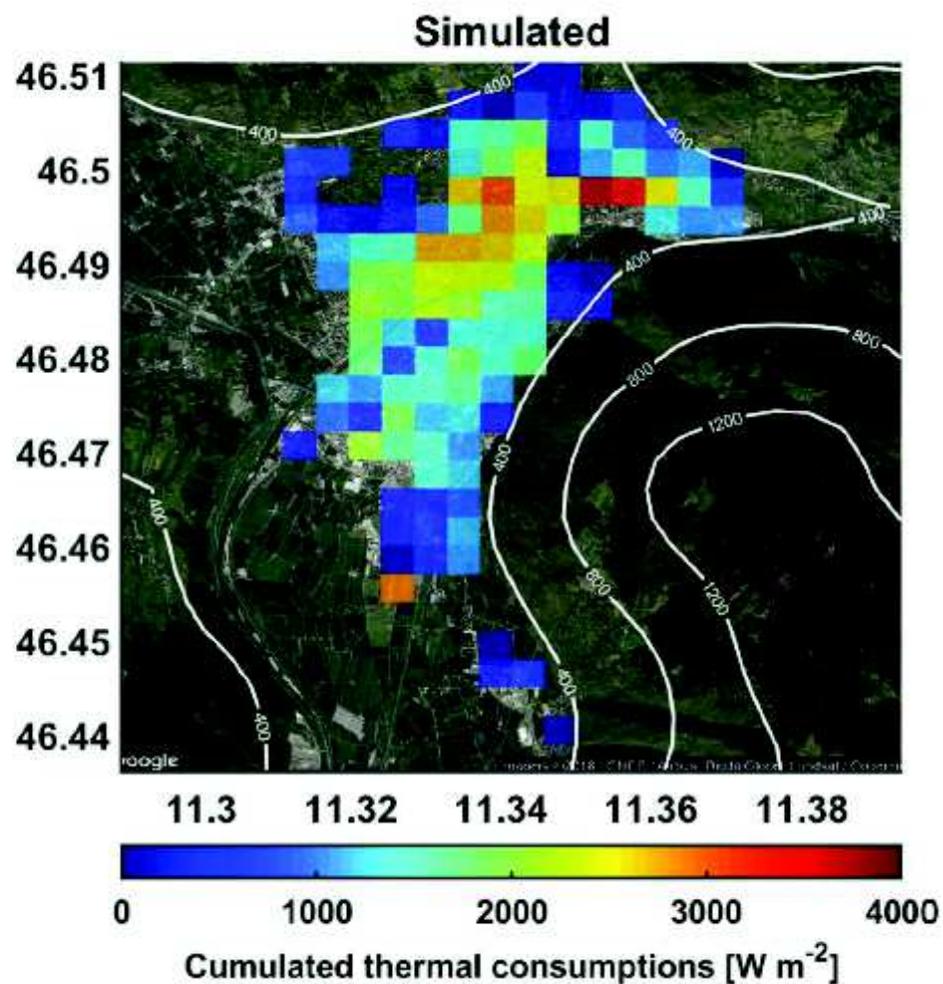
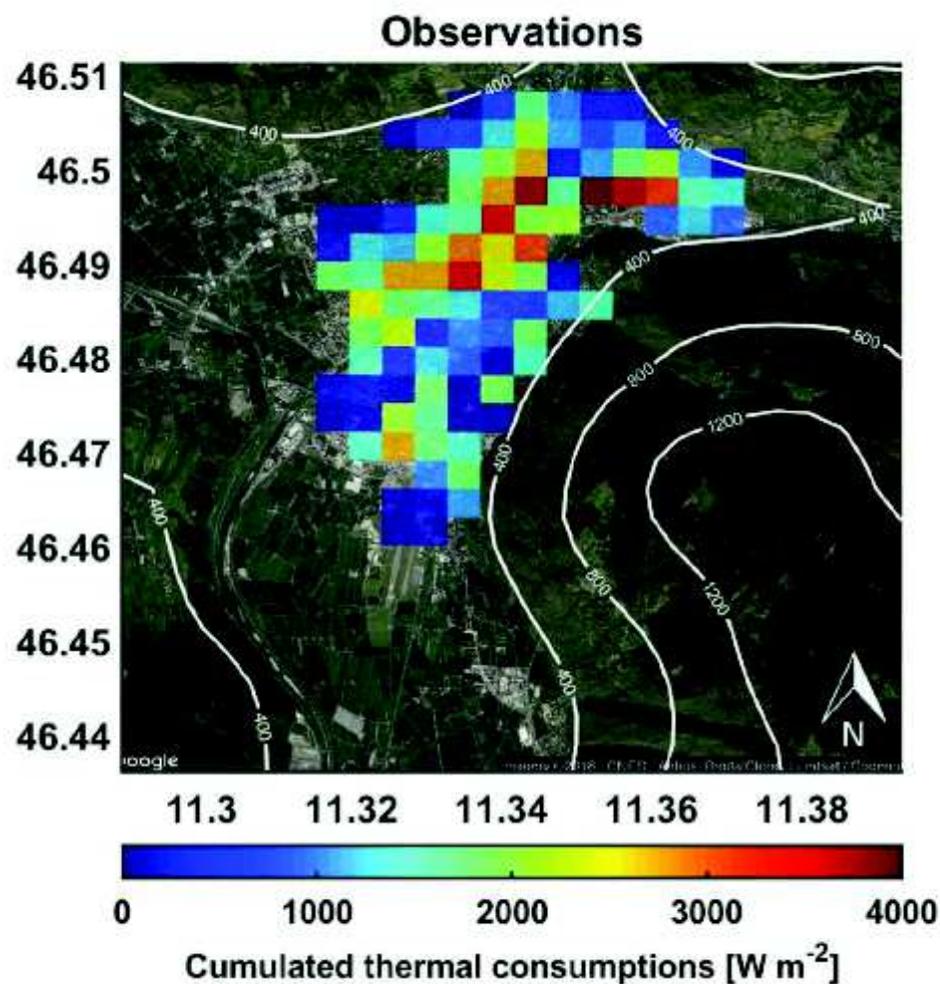
CONSUMI ENERGETICI ANNUI PER RISCALDAMENTO



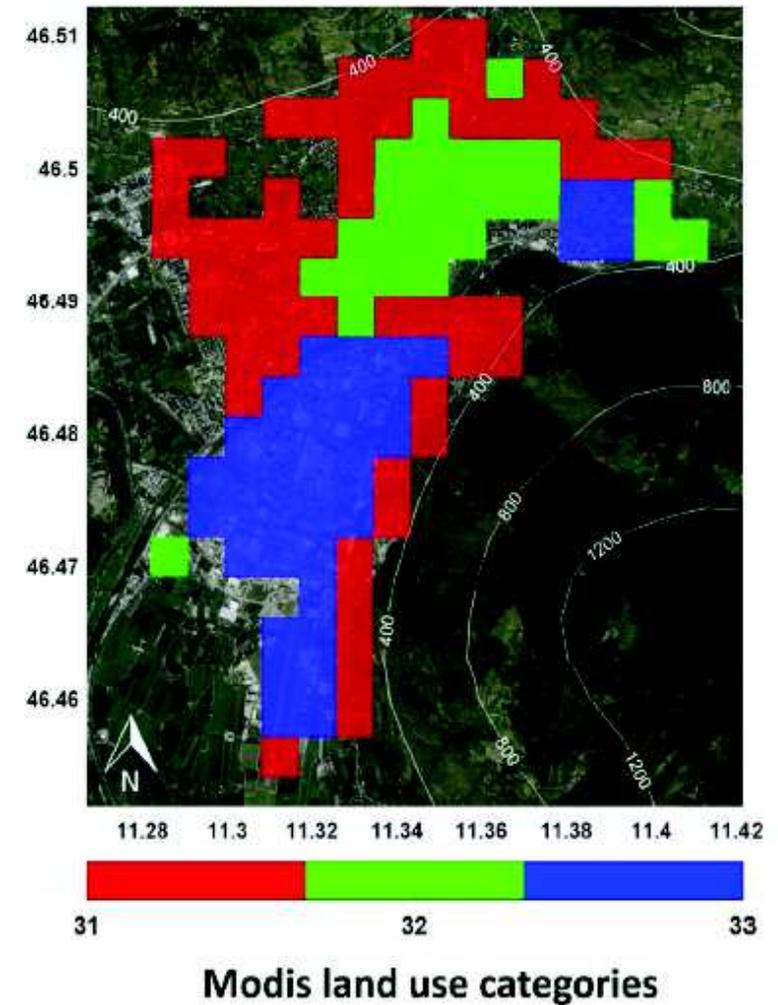
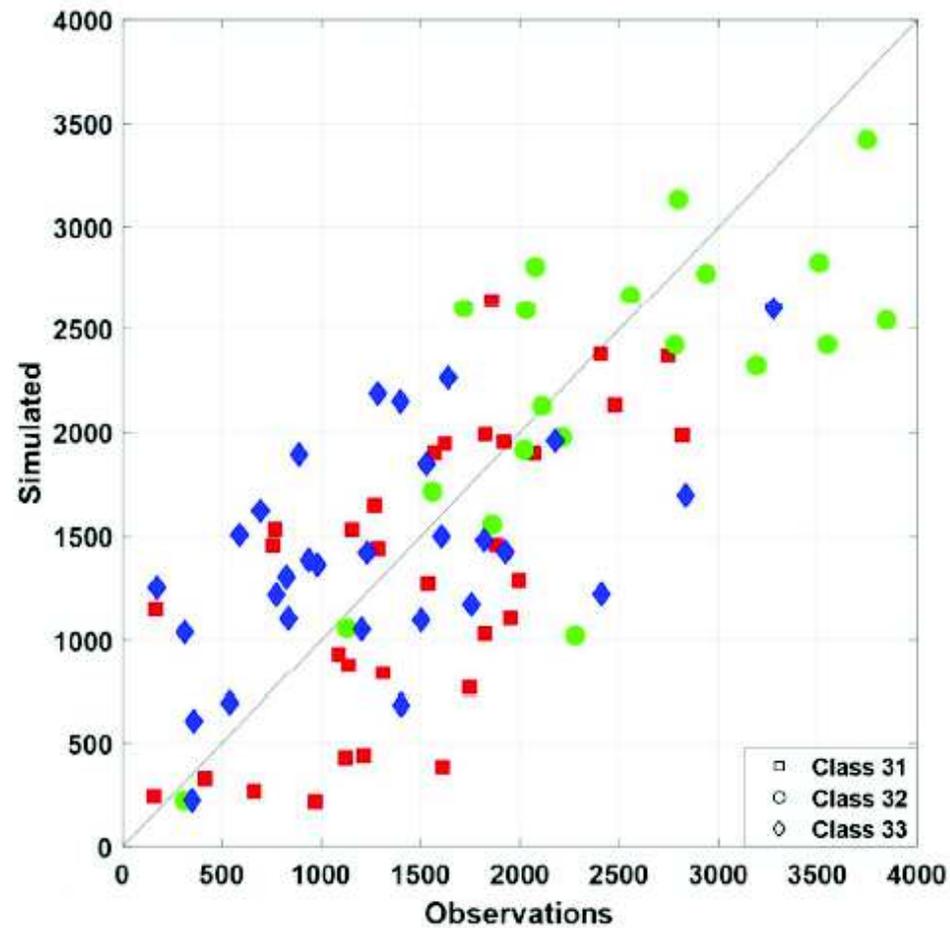
VALIDAZIONE: INVERNO



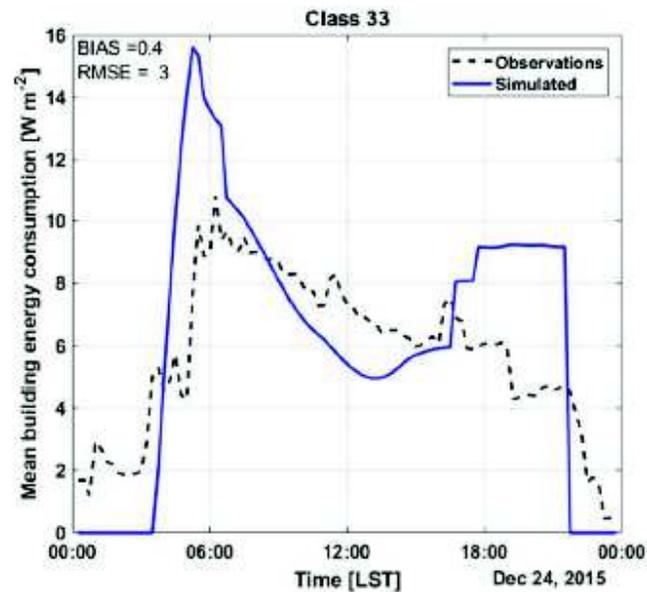
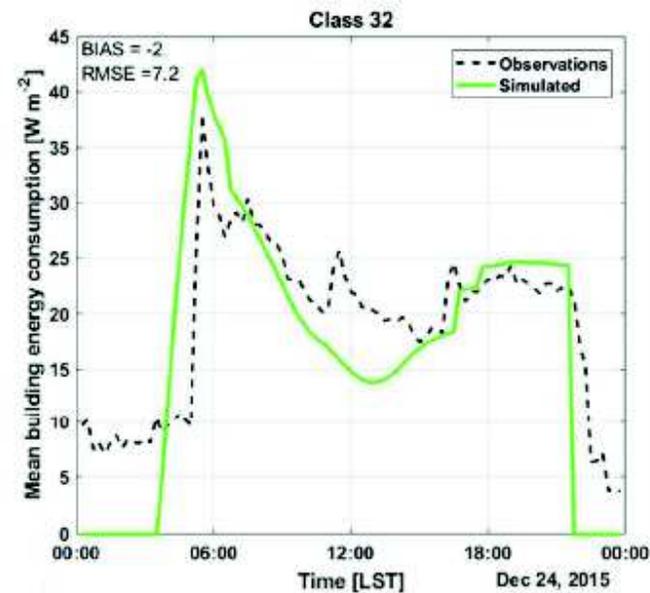
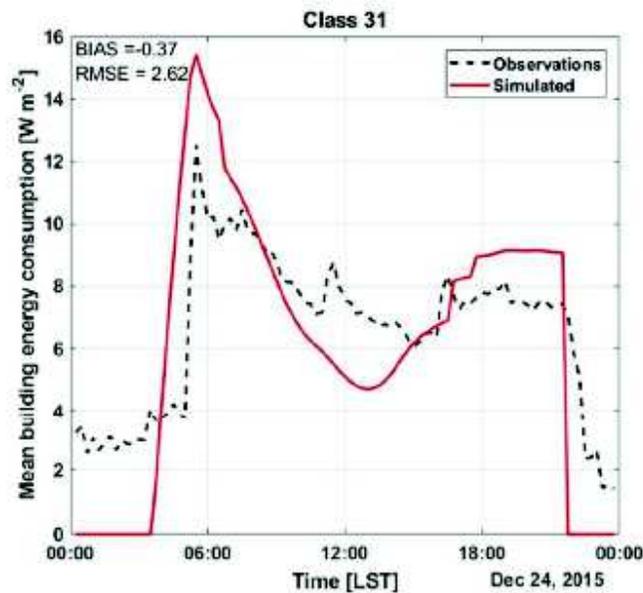
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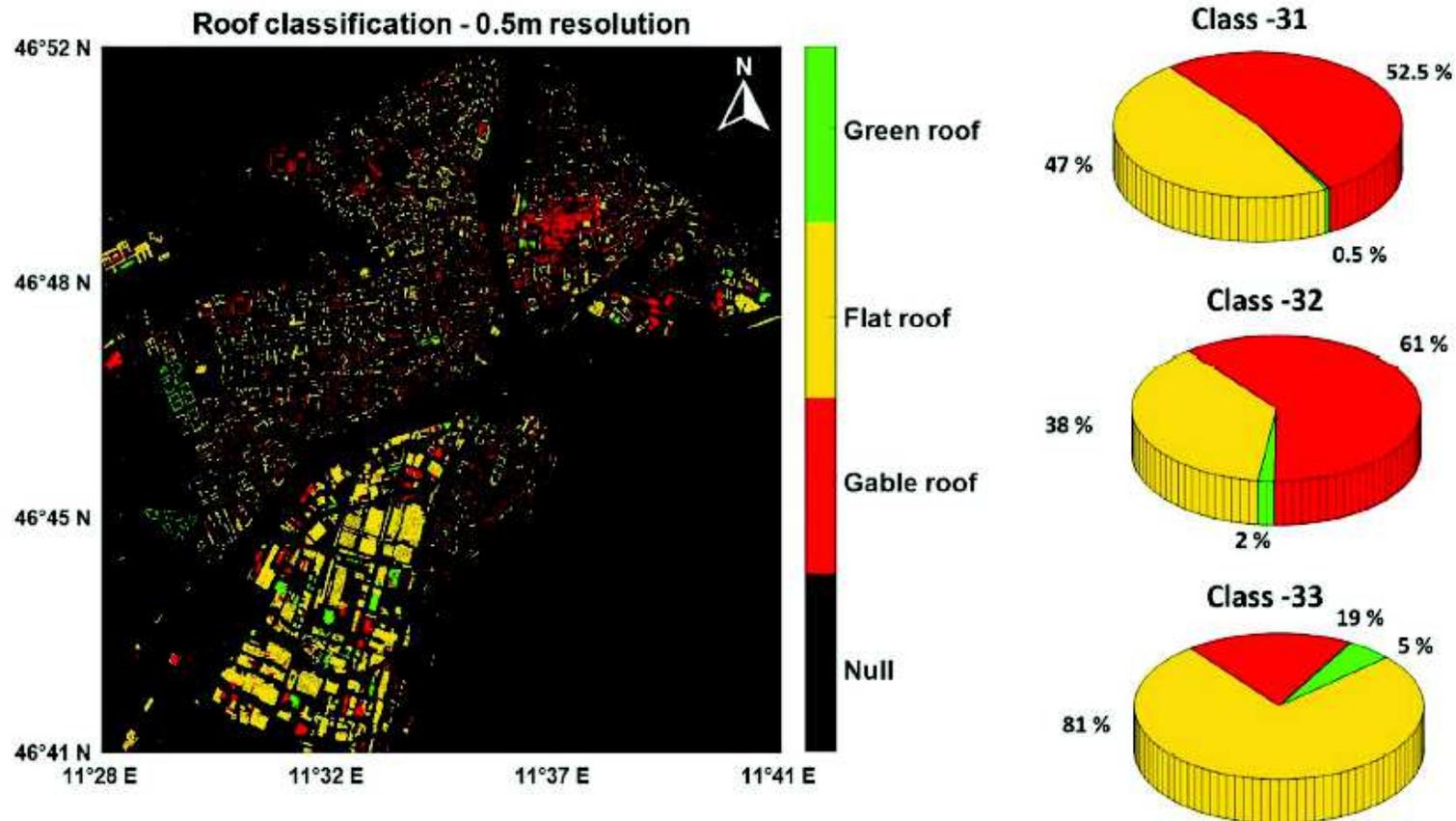
VALIDAZIONE: CONSUMI PER RISCALDAMENTO



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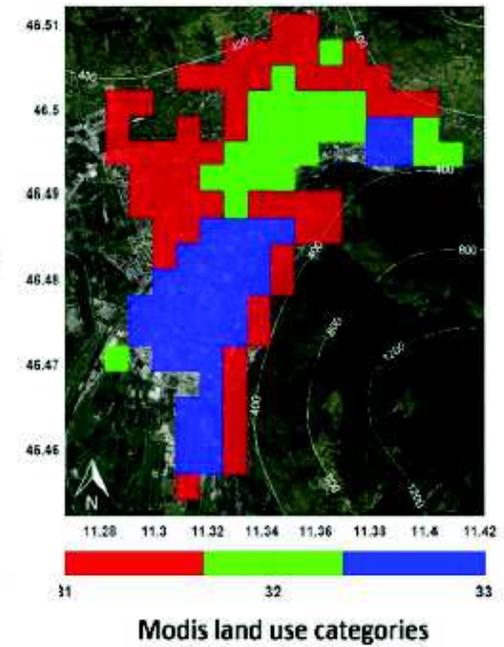
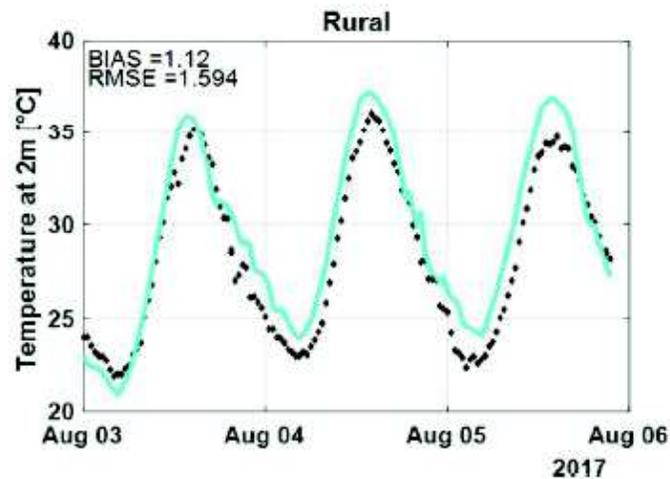
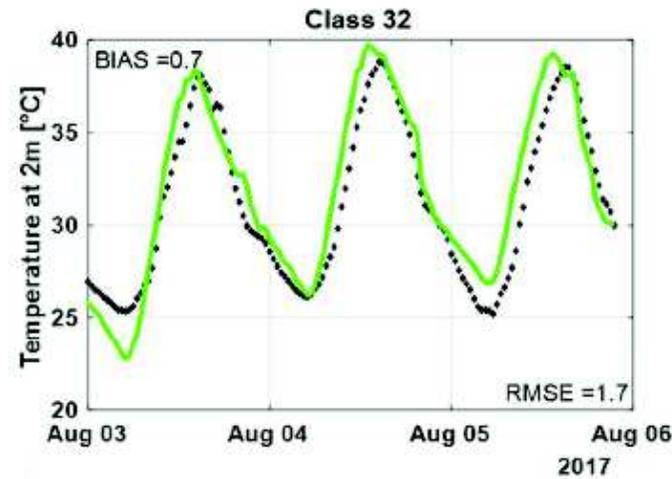
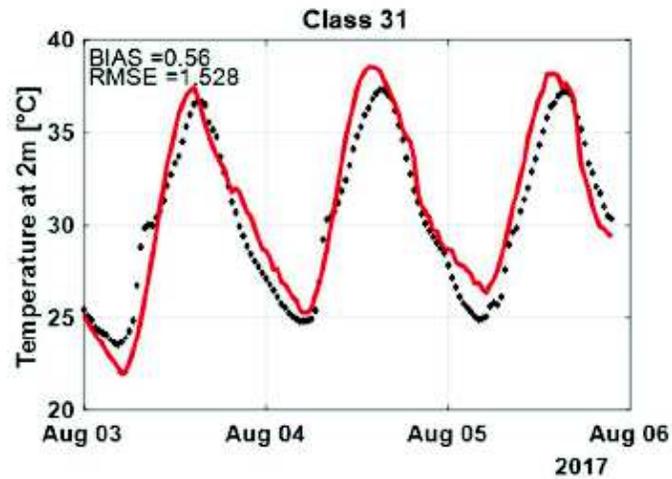


TETTI VERDI E TETTI "FRESCHI"

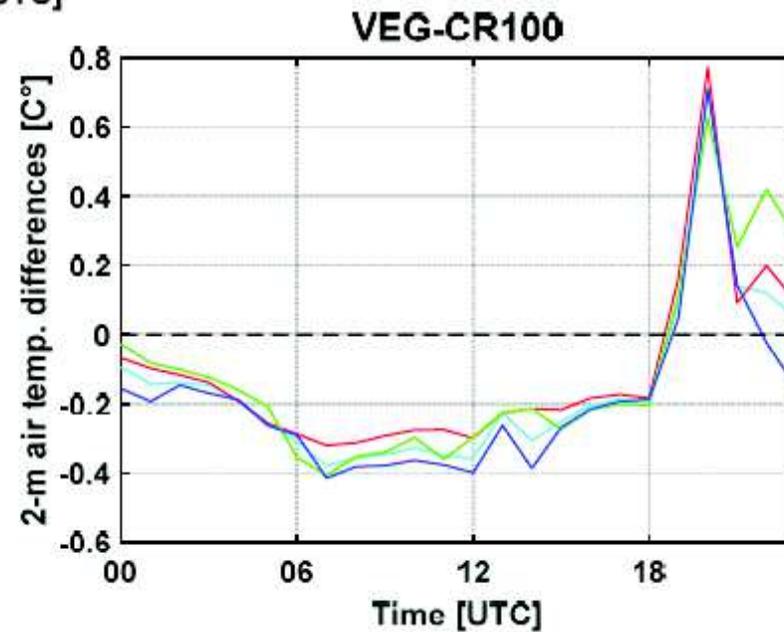
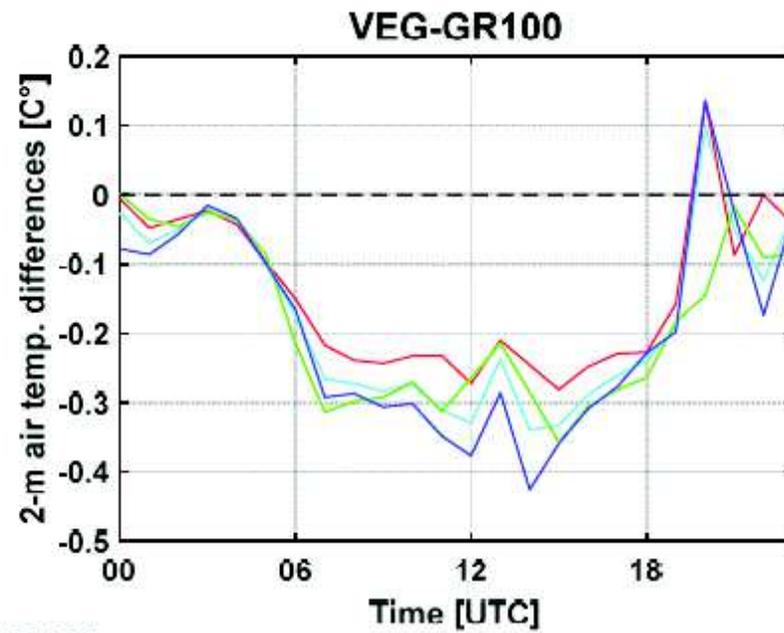
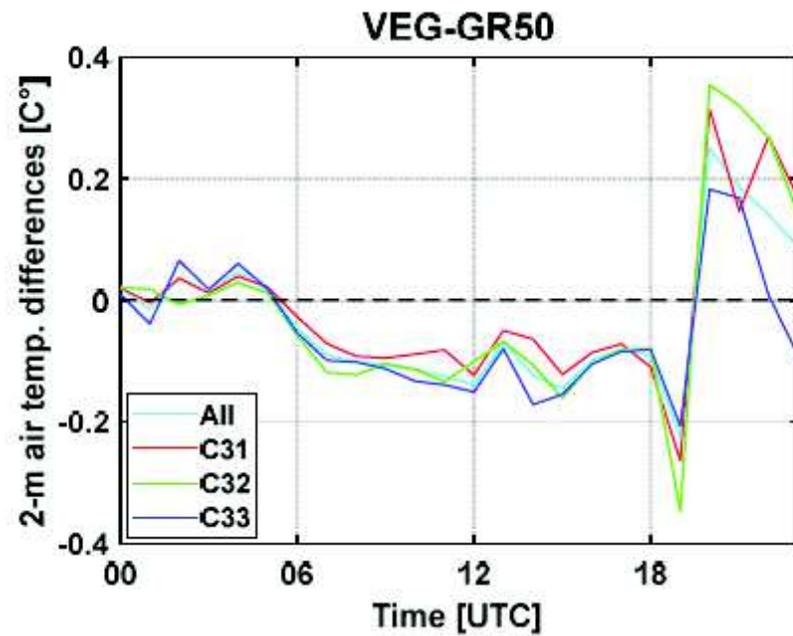


Scenario acronym	Vegetation	Green/cool roof coverage		
		LI-R	HI-R	I/C
STD	No	0%	0%	0%
VEG	Yes	0%	0%	0%
VEG-GR50	Yes	24%	20%	43%
VEG-GR100	Yes	48%	40%	86%
VEG-CR100	Yes	48%	40%	86%

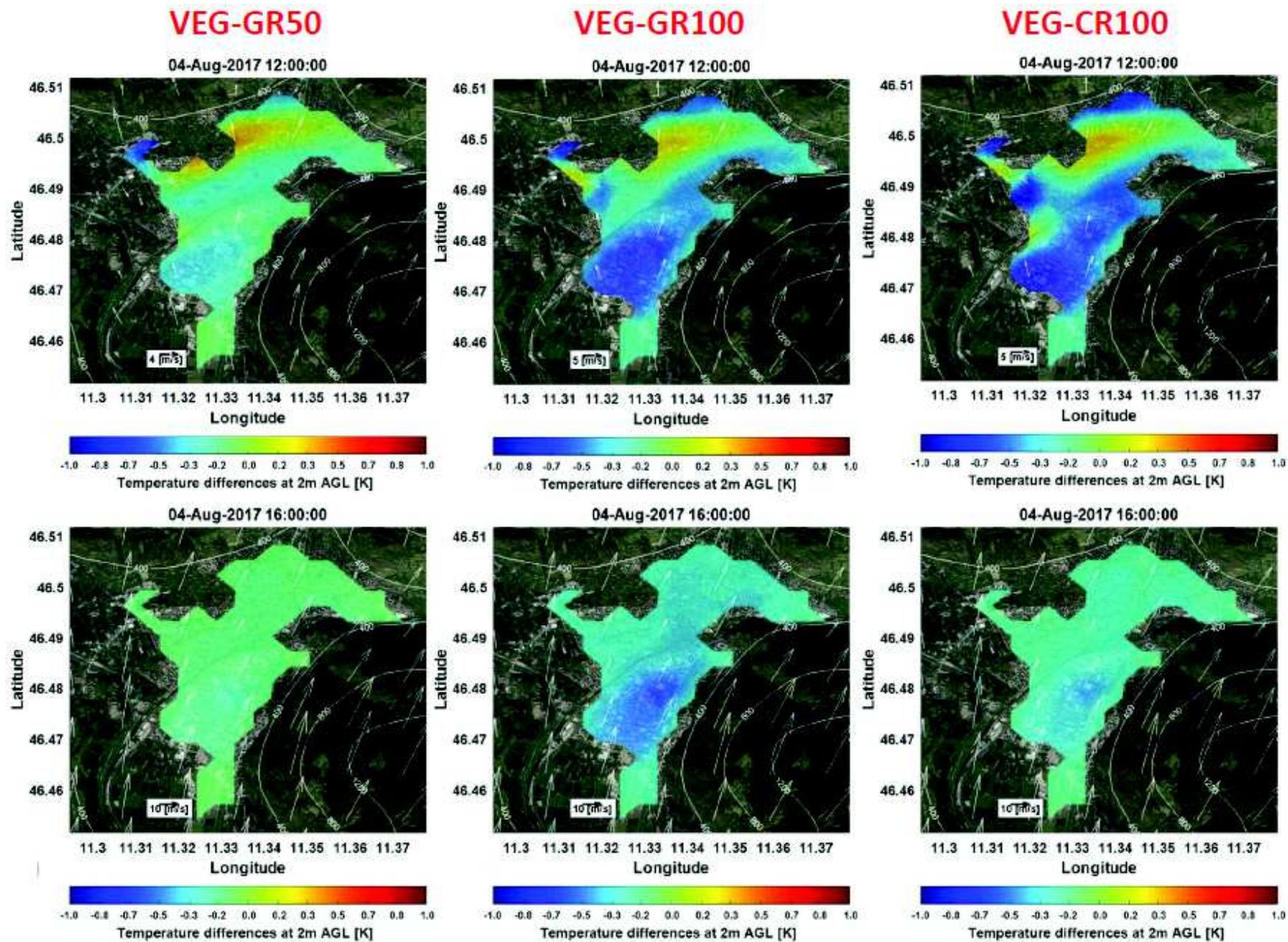
VALIDAZIONE: ESTATE



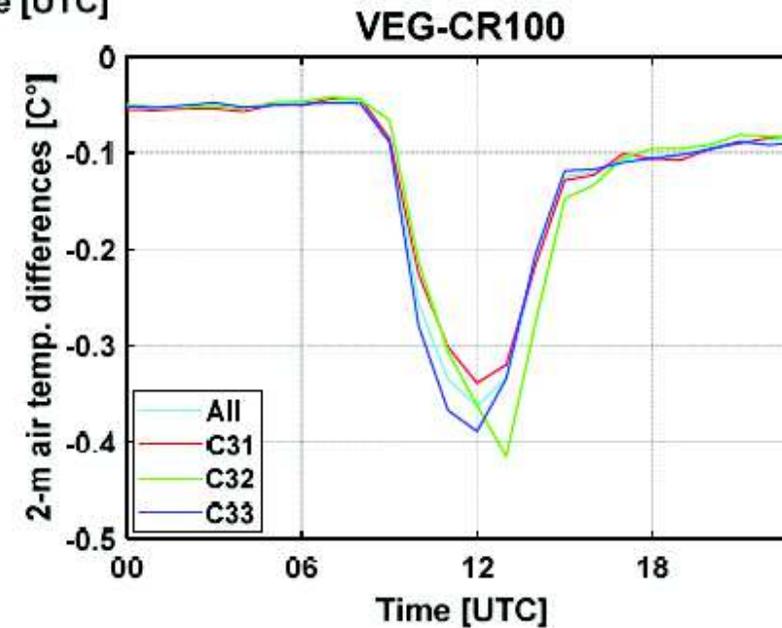
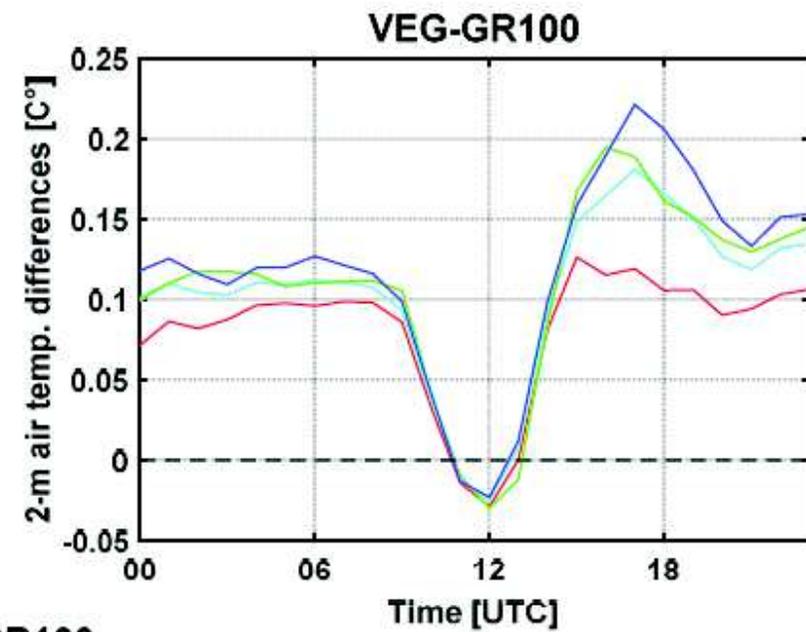
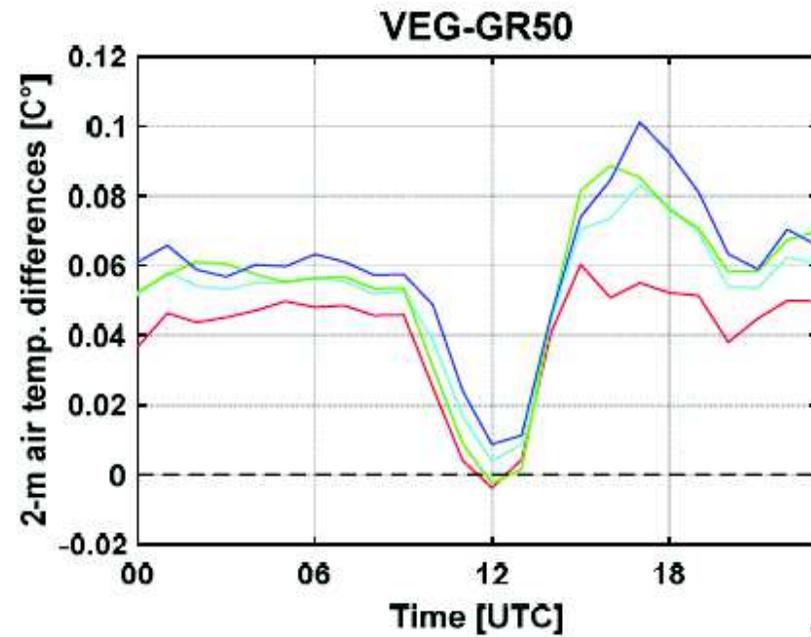
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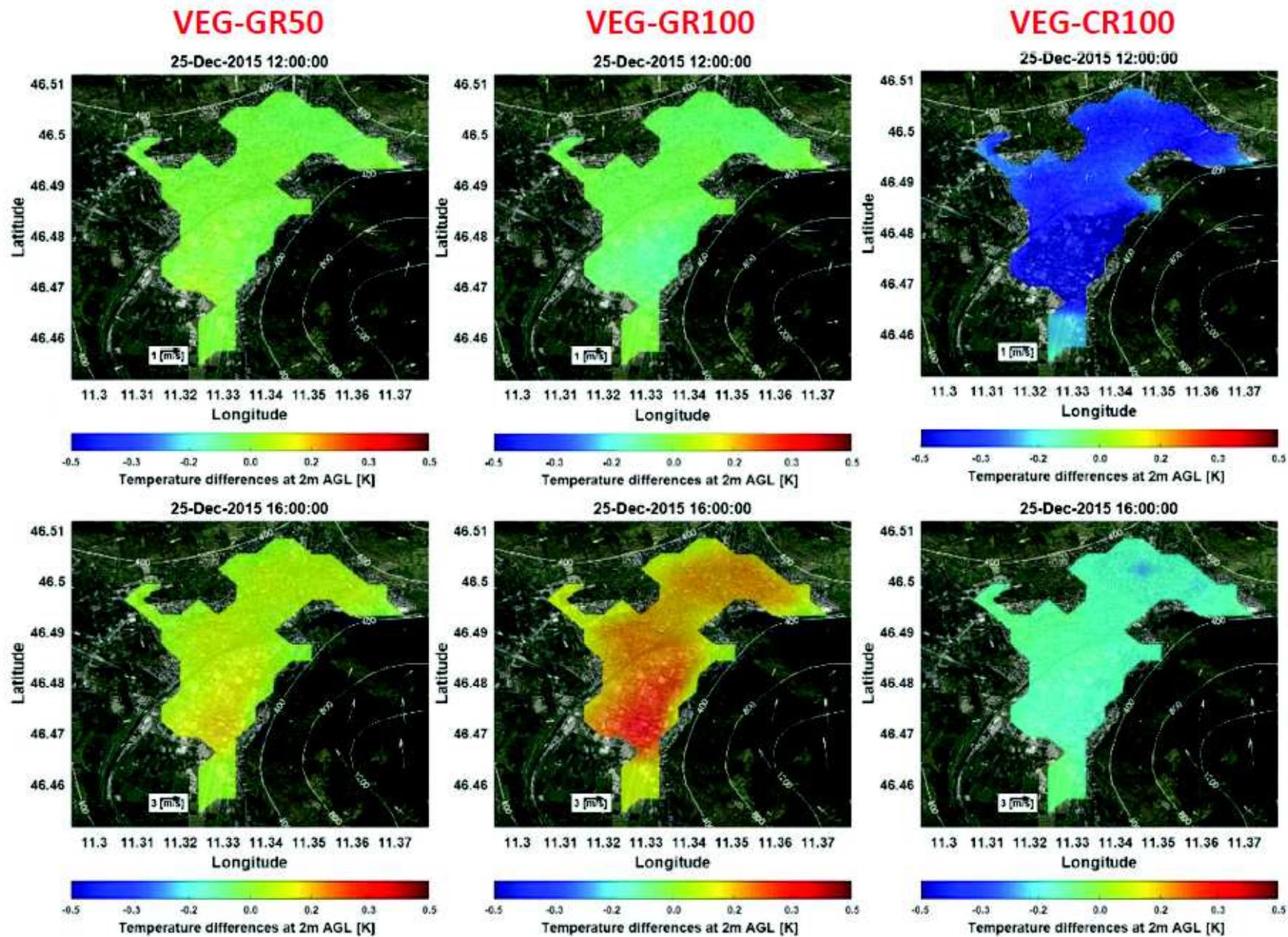
TETTI VERDI E TETTI FRESCHI: ESTATE



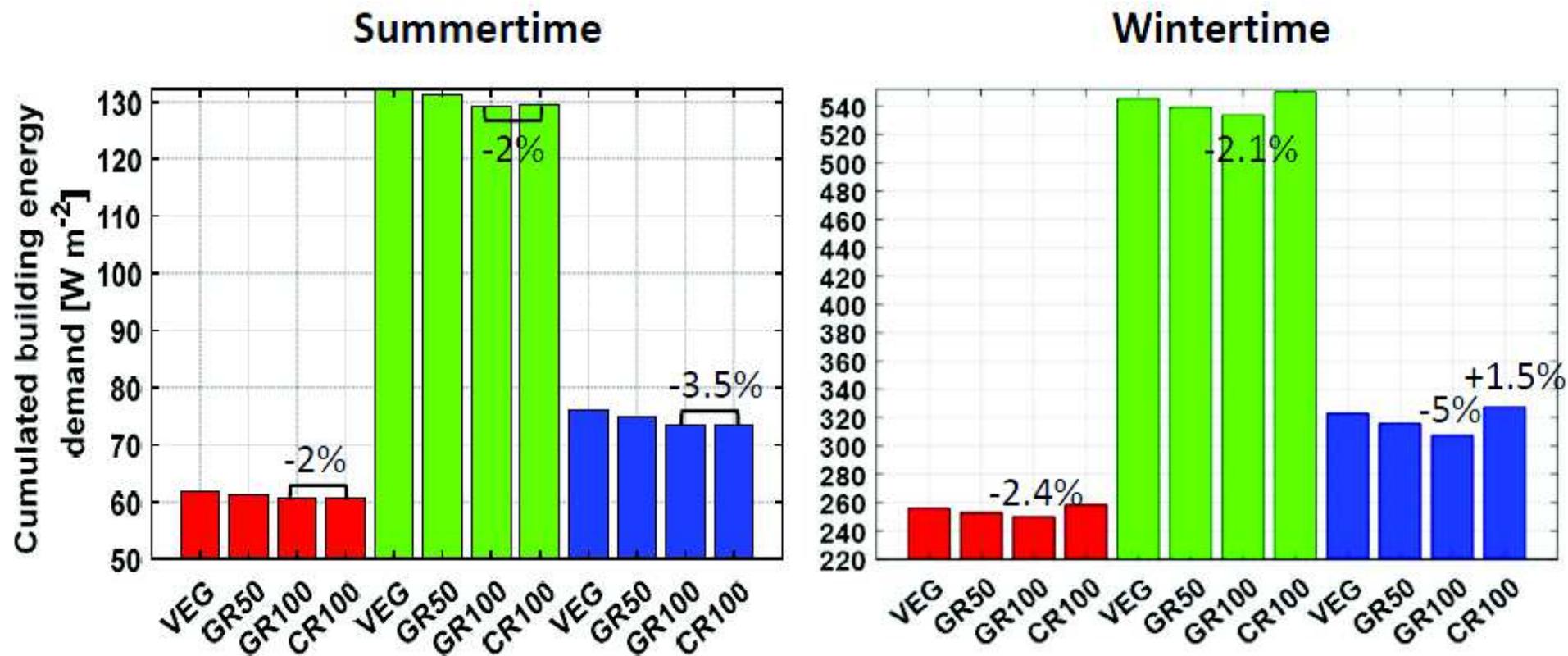
TETTI VERDI E TETTI FRESCHI: INVERNO



TETTI VERDI E TETTI FRESCHI: INVERNO



TETTI VERDI E TETTI FRESCHI: CONSUMI



GRAZIE PER L'ATTENZIONE!

