Project: 1369

Project title: WCRP CORDEX Flagship Pilot Study: "URBan environments and Regional Climate Change (FPS URB-RCC)"

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The STAGE-0 simulations, centered around 5 months downscaled runs covering a temperature and a precipitation extreme, have been successfully completed. 18 institutions contributed to STAGE-0, utilizing 9 Regional Climate Models (RCMs). A total of 42 simulations were conducted and shared via the DKRZ (Table 1) using the joint analysis protocol, which provides guidance for the structure of the datasets and the naming conventions (link). The latter are in alignment with the new overarching CORDEX protocol to ensure that the data could be included into the ESGF at a later stage. Sensitivity runs included 28 using WRF, 3 with CNRM-AROME, 2 with CCLM, and 2 with RegCM. Various analyses of the STAGE-0 data are currently underway, focusing on five main topics: Urban Heat Island (UHI, Fig. 1) and overall energy balance analysis, land-surface characteristics, heat stress and biometeorology, precipitation analysis, and WRF sensitivity simulations, differences, and land-atmosphere feedbacks, all led by scientists from different participating institutions. For the analysis of land-surface feedbacks and precipitation DKRZ resources were used.



Figure 1: Diurnal cycle of the urban heat island intensity for Paris during June-Sept. 2020 based on the STAGE-0 ensemble and on station data (Halenka et al., in preparation).

The joint protocol for the STAGE-1 simulations has been finalized (link), encompassing guidelines for the 10-year ERA-5.1 driven regional climate model simulations and incorporating the global satellite city approach (Langendijk et al., 2024). The primary focus is on the Paris domain, with smaller ensembles of simulations conducted for other cities worldwide, e.g. Buenos Aires, Shanghai, Johannesburg, Melbourne/Sydney, Montreal, among potential other cities. Currently, the total storage used for the data amounts to 3 TB (9% of the requested data), which includes results from the STAGE-0 simulations, observational data, and land cover data for Paris. However, STAGE-1 simulations for Paris are ongoing, with around institutes committed to conducting these simulations. Consequently, more data will be uploaded to Levante in the coming months.

Table 1: List of STAGE-0 model simulations	, which are uploaded to levante
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Institute	RCM	urban scheme	STAGE-0 simulations
AUTH	WRF	Bulk/TEM/TEB	2
СМСС	CCLM	TERRA_URB	1
СМСС	ICON-CLM	TERRA_URB	2
CNRM-MF	CNRM-AROME	TEB	3
CSIRO	CCAM	UCLEM	1
CUNI	WRF	BEP+BEM, BULK, SLUCM	5
CUNI	RegCM5	CLMU	1
CYI	WRF	URB0/ BEP+BEM	2
Fudan	WRF	Noah	1
GERICS	REMO	TEB	2
ICTP	RegCM5	CLMU	1
IDL-FCUL	WRF	Bulk/TEM/TEB	2
IPSL	WRF	BEP-BEM	2
кіт	CCLM	TERRA_URB	1
RMI	ALARO	TEB	1
SMHI	HCLIM-AROME	TEB	1
UBA-CIMA-IFAECI	WRF	BEP/BEM	2
UCAN	WRF	BEP+BEM	7
UCL	WRF	BEP/BEP-BEM	1
UM	WRF	Bulk	4

The FPS URB-RCC has greatly benefited from the opportunity to exchange data on Levante. It enables cross-country and cross-continent collaborations that would not have been possible without the support of DKRZ. We wish to thank you for the possibility to exchange our data via DKRZ in the context of this voluntary-based international research activity, endorsed under the WCRP CORDEX initiative.

Reference:

Langendijk G.S., Halenka T., Hoffmann P. et al. (2024): Towards better understanding the urban environment and its interactions with regional climate change - The WCRP CORDEX Flagship Pilot Study URB-RCC. Urban Climate, 10.1016/j.uclim.2024.102165