CLIM-RUN Product Information Sheet: March 2014

Applications of the UC statistical downscaling portal for wild fire and tourism studies.

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Target groups

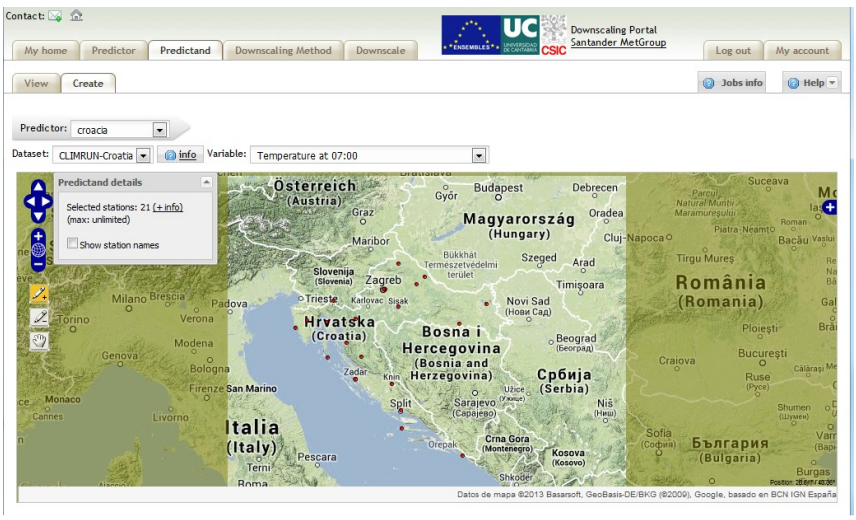
- **Tourism institutions, Fire planners and policy makers**
- **Professional organisations and federations**
- **Ministries and Regional authorities**

Relevance to the case-study requirements

Many stakeholders request local climate information to assess the relationships between climate and impacts on ecosystems. However, Global Circulation Models (GCMs) are not able to produce future climate scenarios at the proper spatial scale required for the different impact-orientated applications. The statistical downscaling approach bridges the gap between the coarse resolution of the GCMs and the high resolution required by end-user applications, taking into account empirical relationships between large and local scale variables.

The approach

Interactive user-friendly tools are necessary in order to ease the downscaling process for end users, thus maximizing the exploitation of the available climate projections. The University of Cantabria (UC) has developed a statistical downscaling portal which has been adapted to the requirements of the different sectors involved in the CLIM-RUN project.



The portal has been organized in different windows (tabs) to gradually access the information necessary to define the downscaling tasks: defining the predictors, choosing the local/regional target variable to be downscaled and creating the downscaling method. More details about the use of this portal are provided in the user guide (Gutiérrez et al 2012).

This is a free tool available through the link http://www.meteo.unican.es/downscaling/climrun. We would like to remark that this portal should not be used as a black-box input-output tool and some statistical downscaling background knowledge is required.

References:

Gutiérrez, J.M., San-Martín, D., Cofiño, A.S., Herrera, S., Manzanas, R., and Frías, M.D. (2012) User Guide of the ENSEMBLES Downscaling Portal. Version 3. Technical Note 2/2012. Santander Meteorology Group. Santander. https://www.meteo.unican.es/downscaling/doc/UserGuide.pdf

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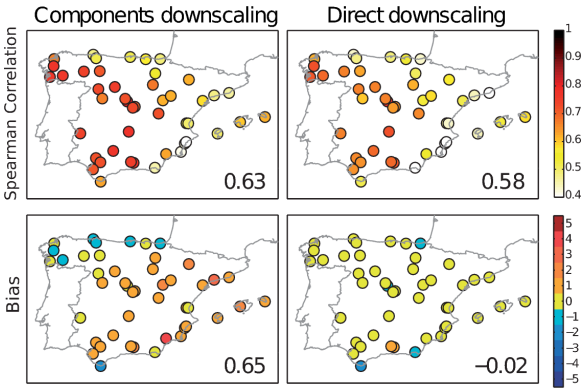
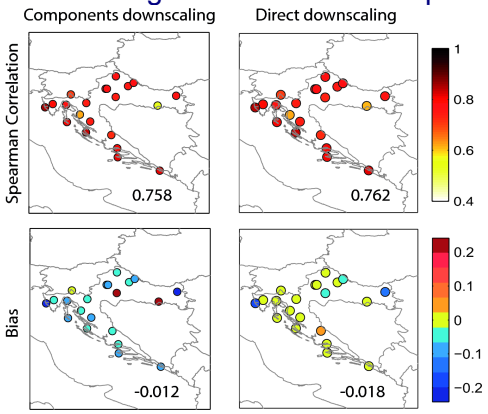
CLIM-RUN

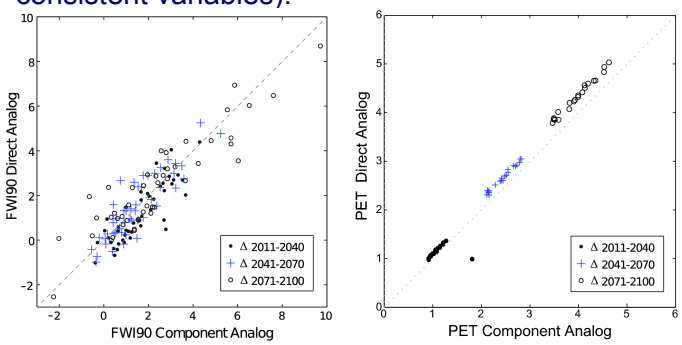
The product

The suitability of performing statistical downscaling directly on weather derived indices is assessed for two indices of interest for CLIM-RUN stakeholders: the Fire Weather Index (FWI) over Spain (wild fires) for the period 1979-2003 and the Physiological Equivalent Temperature (PET) over Croatia (tourism) for the period 1981-2010. This direct downscaling approach was compared to values resulting from applying statistical downscaling to the individual meteorological drivers (component downscaling). The component downscaling must guarantee physically and spatially coherent series for all the meteorological variables driving the FWI and PET, thus the analog method of statistical downscaling is used for this comparison.





The figures above show that the analog based downscaling method generally provides similar skill for both approaches in terms of correlation (see top row - where 1 indicates a perfect match between observed and simulated values) and bias (see top bottom row – where 0 indicates no bias), but for the FWI lower bias is found for the direct downscaling. These results show that it is legitimate to directly downscale these weather derived indices. Thus a wider range of statistical downscaling methods can be used (since only one index needs to be downscaled rather than multiple physically and spatially consistent variables).



As an example, future downscaled projections from one GCM (a single run of the ECHAM5 model, A1B scenario) are shown here as changes from the present-day baseline period for the periods 2011-2040, 2041-2070 and 2071-2100. The projected changes from the component and direct downscaling are comparable (i.e., they lie very close to the diagonal line in the figures) and show higher future values particularly in the last period and especially for the PET.

Making the product usable

The examples presented here demonstrate the added-value of the statistical downscaling approach and the way in which the portal can be readily used to perform statistical downscaling directly to weather-derived indices (FWI and PET in this example) or to the driven meteorological variables. While these examples focus on particular indices and regions of interest to CLIM-RUN stakeholders, this operational tool can be developed for any other study, area or index of interest for stakeholders. Observations, for example, can be uploaded in the portal for other regions and the access to these observations can be restricted to particular users. Thus the downscaling portal is a versatile and useful tool with many potential applications.

Note that for illustrative purposes, we used a single global climate model, although in a different context a multi-model ensemble approach should be applied, accounting for the variability of different global projections.

This information sheet was developed in the framework of the CLIM-RUN FP7 EU project. The product it describes should not be used without acknowledging the project and, particularly for any operational use, interaction with the authors is welcome and strongly encouraged.

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