Enabling Climate Information Services for Europe

Report

DELIVERABLE 6.4
High resolution gridded precipitation dataset for past decades

Activity:	*WP6 – Energy*
Activity number:	*Task 6.2 - Dams management in hydropower generation in Alpine and Appenines regions*
Deliverable:	*High resolution gridded precipitation dataset for past decades*
Deliverable number:	*6.4*
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Summary

The deliverable consists of maps showing the distribution of monthly and yearly temperature and precipitation normal values over the upper part of the Piave river catchment for six consecutive 10-year periods starting from 1951-1960. The spatial resolution is 30-arc-second. The temperature maps which are non included in ECLISE deliverable list, are included in order to fulfil a request of the user.

1. Introduction

Spatial climate data sets in digital form are currently in great demand and gridded estimates of monthly temperature and precipitation climatological normals are requested by a variety of models and decision support tools, such as those used in agriculture, engineering, hydrology, ecology and natural resource conservation (Daly et al., 2002; Daly, 2006). Beside the spatial distribution of the climatological normals, it is also important to describe the spatio-temporal behaviour of climate variability and change. Such information turns out to be fundamental within climate impact-related researches which may concern local scales such as, e.g., a winter resort or an experimental crop field.

2. Description of the procedure

We have recently developed a methodology to construct high resolution temperature and precipitation grids (30-arc-second-resolution) over complex terrain (Brunetti et al., 2009a; 2009b; 2012). It assumes that the spatio-temporal structure of the signal of a meteorological variable over a given area can be described by the superimposition of two fields (New et al., 2000; Mitchell and Jones, 2005): the climatological normals over a given reference period (i.e. the climatologies) and the departures from them (i.e. the anomalies). The former are basically linked to the geographical features (elevation in particular) of the territory and they can manifest remarkable spatial gradients. On the contrary, the latter are linked to climate variability and change and they are generally characterized by higher spatial coherence.

This methodology has been applied to a new version of the dataset presented in Brunetti et al. (2012), which was enriched with 175 new precipitation series and 184 new temperature series. It allowed to obtain high resolution fields both for temperature and precipitation climatologies (three different methods were used for temperature: Multi Linear Regression with Local Improvements; ii) Regression Kriging; iii) Local Weighted Linear Regression of Temperature versus Elevation. The Local Weighted Linear Regression of Temperature versus Elevation method was used for precipitation) and for the corresponding time-dependent anomalies (a subset of 29 (70) quality checked and homogenised temperature (precipitation) anomaly records was used). The superimposition of the two fields allowed to get high-resolution monthly virtual temperature and precipitation records for any point of the study area. These records were obtained to calculate the 10-year average fields which are provided in this deliverable. They were constructed using the climatologies obtained with the Local Weighted Linear Regression of Temperature versus Elevation both for temperature and precipitation.

Figure 1 shows the geographical location of the catchment considered in the case study. Figure 2 show the maps of the yearly normal temperature values for the six 10-year period. Figure 3 shows the same maps for precipitation.

2. Conclusions

A methodology which allows to obtain virtual temperature and precipitation records for any cell of a high resolution grid covering the upper part of the Piave river catchment has been developed. The results allow both to describe the spatial distribution of temperature and precipitation over this area and to show the spatio-temporal behaviour of temperature and precipitation variability and change.

References

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Links to concrete results: http://www.eclise-project.eu/

References to activity meetings: The objectives of these maps have been presented at the ECLISE Kick-off meeting (De Bilt - 09 March 2011); the methods and results have been presented at the First ECLISE meeting (Norrkhoping - 6-7 March 2012).

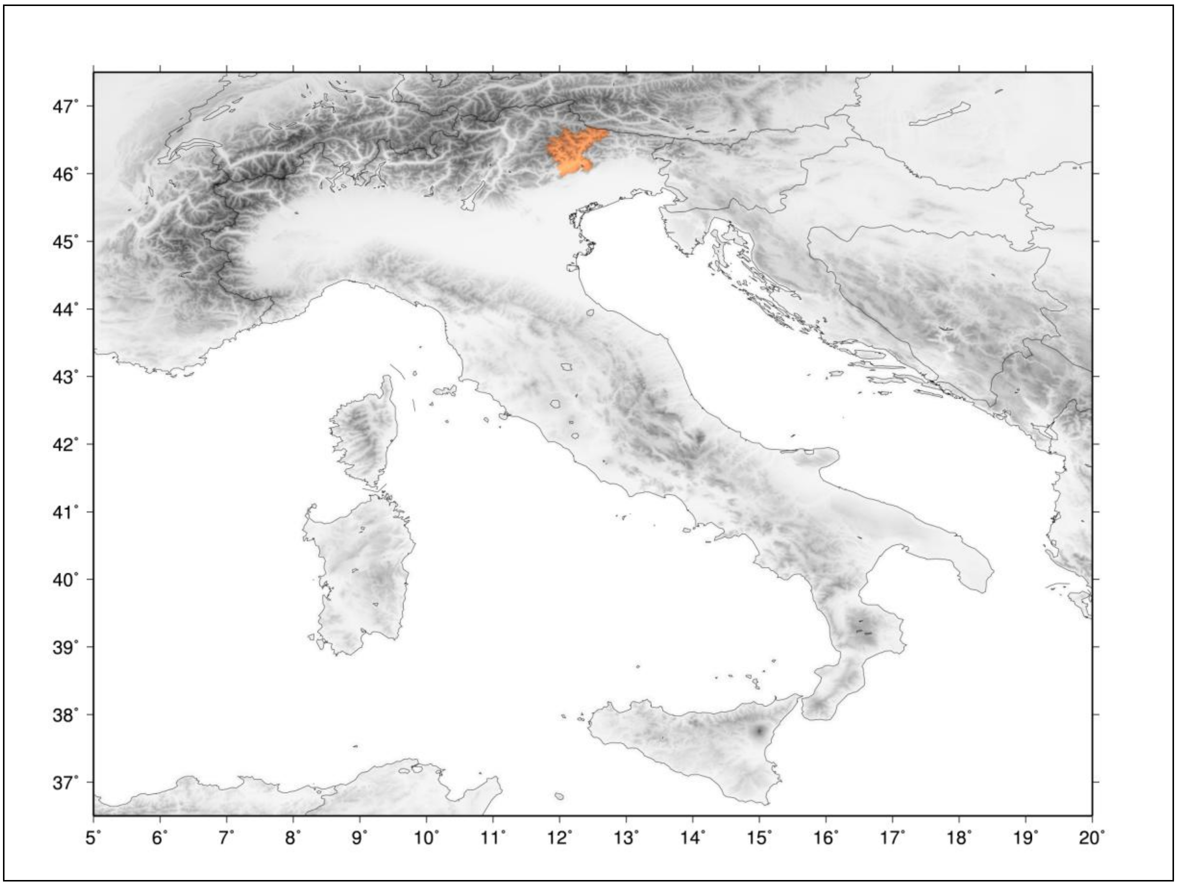

Figure 1 – Geographical location of the catchment considered in the case study.

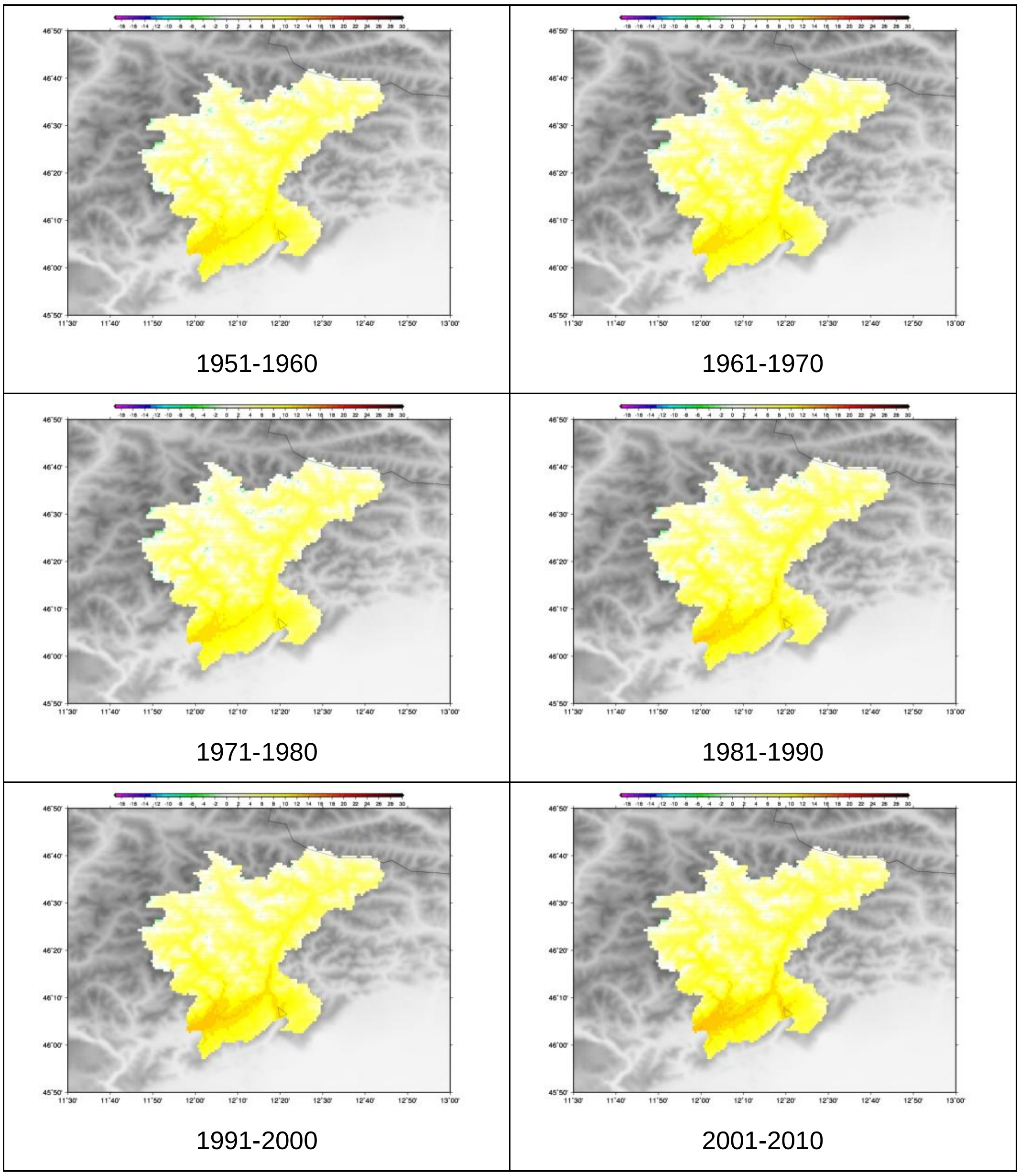

Figure 2 - yearly temperature normal values for six consecutive 10-year periods

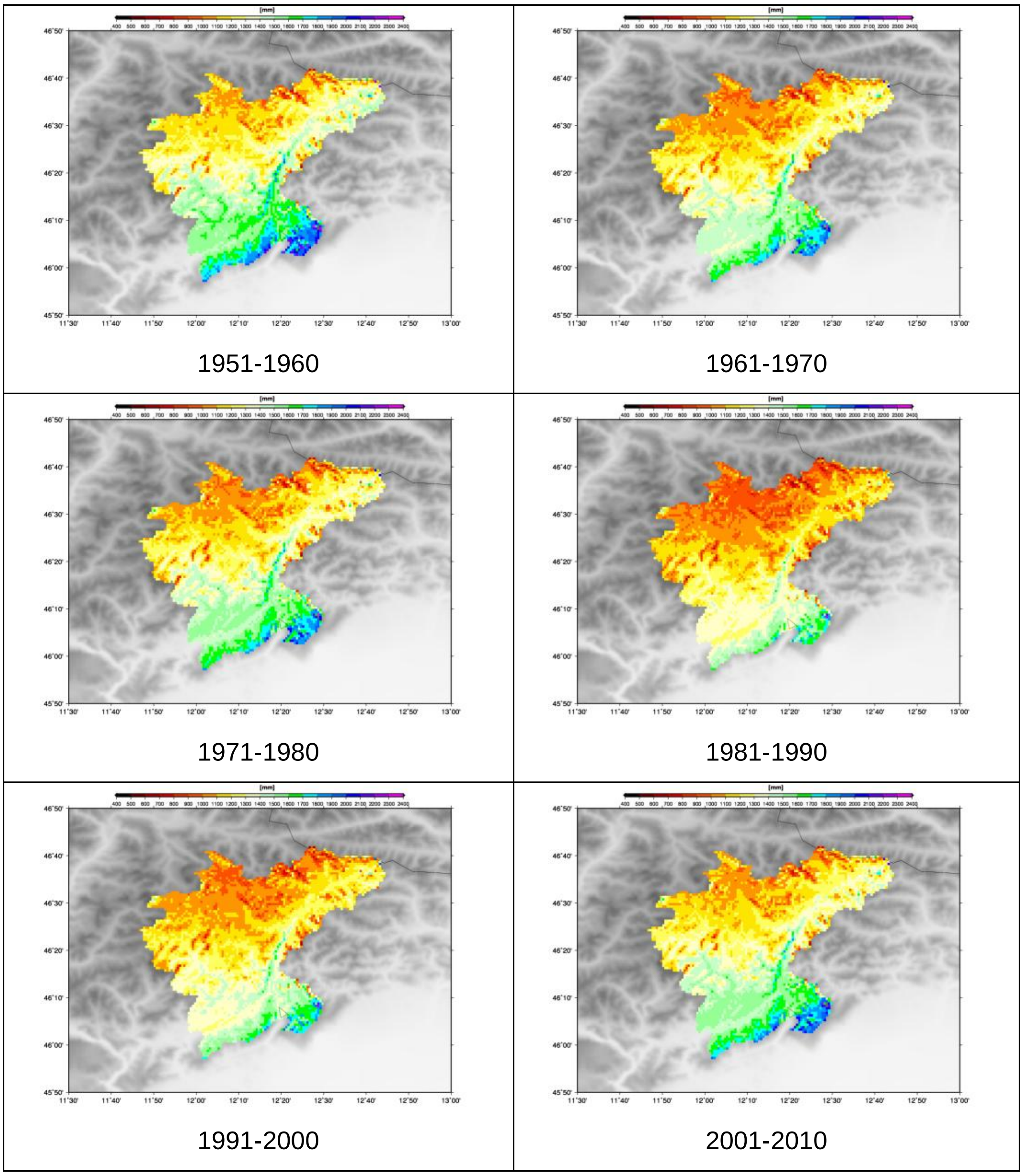

Figure 3 - yearly precipitation normal values for six consecutive 10-year periods