Enabling Climate Information Services for Europe

Report

DELIVERABLE 6.16
High resolution gridded temperature dataset over Italy for the past 6 decades

Activity:	*WP6 - Energy*
Activity number:	*Task 6.8 - Future energy demand in Italy*
Deliverable:	*High resolution gridded temperature dataset over Italy for the past 6 decades*
Deliverable number:	*6.16*
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Summary

The deliverable consists of maps showing the distribution of monthly and yearly temperature normal values over Italy for six consecutive 10-year periods starting from 1951-1960. The spatial resolution is 30-arc-second.

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 grids (30-arc-second-resolution) over complex terrain (Brunetti et al., 2009). 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 set of 1484 stations with mean monthly temperature data. It allowed to obtain high resolution fields both for temperature climatologies (three different methods were used: Multi Linear Regression with Local Improvements; ii) Regression Kriging; iii) Local Weighted Linear Regression of Temperature versus Elevation) and for the corresponding time-dependent anomalies (a subset of 103 quality checked and homogenised anomaly records was used). The superimposition of the two fields allowed to get high-resolution monthly virtual temperature records for any point of Italy. 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 which turned out to show the smallest error.

Figure 1 show the maps of the yearly normal values for the six 10-year period.

2. Conclusions

A methodology which allows to obtain virtual temperature records for any cell of a high resolution grid covering the whole Italian territory has been developed. The results allow both to describe the spatial distribution of temperature over Italy and to show the spatio-temporal behaviour of temperature 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).

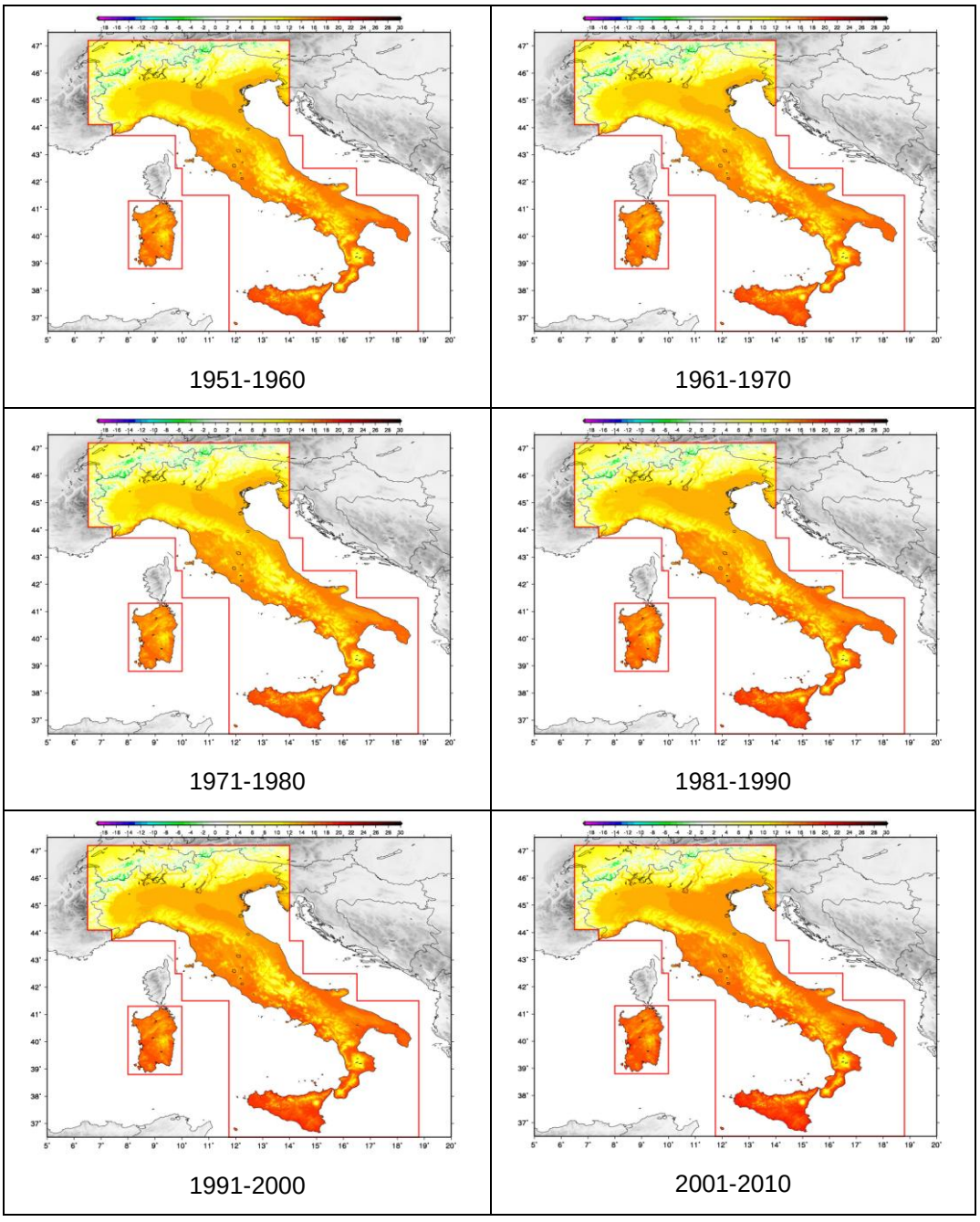

Figure 1 - yearly temperature normal values over Italy for six consecutive 10-year periods