An error in the external parameters computed from the GlobCover2009 land use data set

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**COSMO WG3b / CLM SOILVEG Workshop, 5 Mar. 2012, Offenbach**

Introduction

The characteristics of the vegetation and the land sea mask in the COSMO mesoscale atmospheric model are computed based on the GLC2000 land use data set. This was created by the Joint Research Centre (JRC), Ispra, for the year 2000 and has a spatial resolution of about 1 km.

More recently, the European Space Agency (ESA) created the GlobCover2009 land use data set. It is based on data for 2009 and has a spatial resolution of 300 m, about three times finer than GLC2000.

When evaluating the data set it turned out that some parts of it appear to be horizontally shifted, e.g. in the Mediterranean region.

Land fraction aggregated to 2.8 x 2.8 km² grid
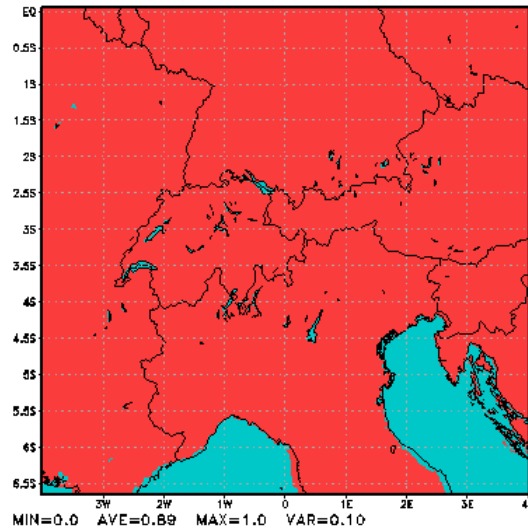
GlobCover2009
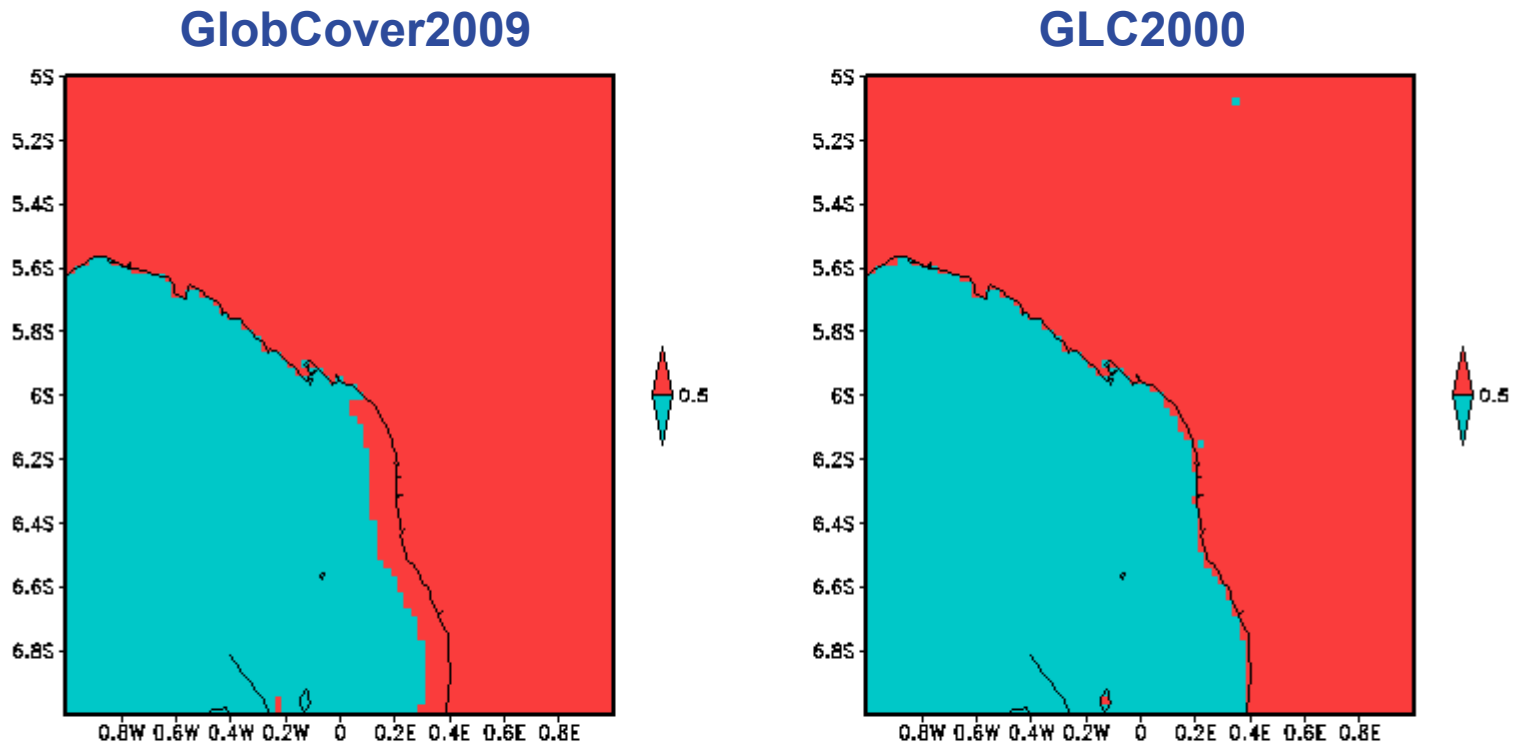
GLC2000

The figures show the eastern part of the Ligurian Sea with the Gulf of Genoa in the north.
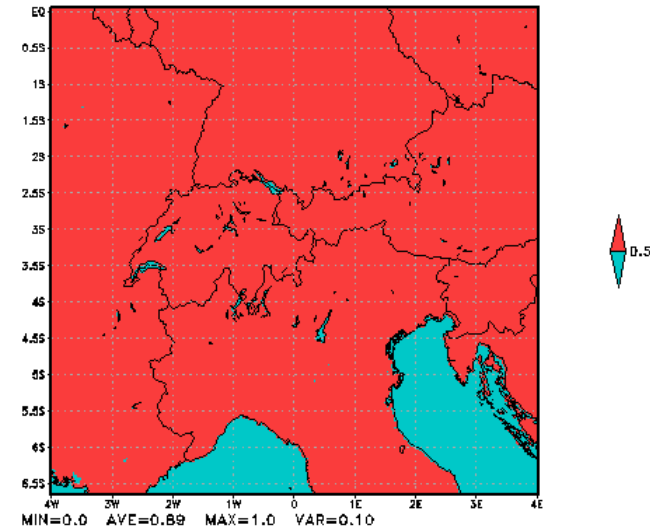
The land sea mask based on the GLC2000 land use data set very well matches the coast line (of the GrADS visualization software), while south of 44ºN (geogr. coord.) the one based on **GlobCover2009 data shows a shift to the west by about 0.1º**.

Land fraction aggregated to 2.8 x 2.8 km^2 grid
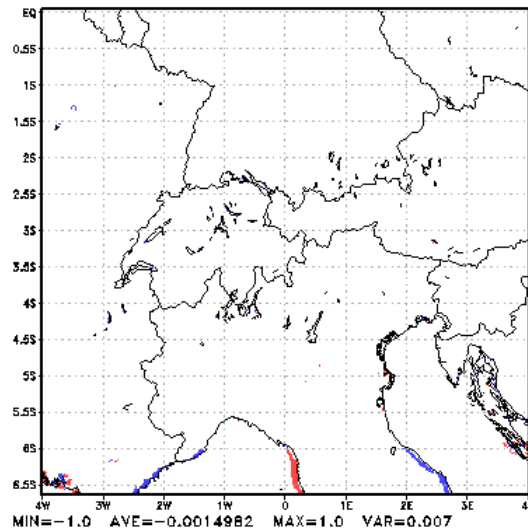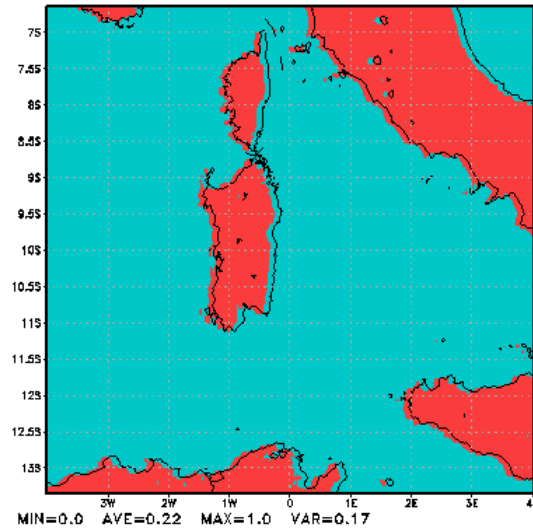
GlobCover2009

MIN=0.0   AVE=0.89   MAX=1.0   VAR=0.10

GLC2000

MIN=0.0   AVE=0.89   MAX=1.0   VAR=0.10

GlobCover2009 - GLC2000

MIN=-1.0   AVE=-0.0014982   MAX=1.0   VAR=0.007

Land fraction aggregated to 2.8 x 2.8 km² grid

GlobCover2009

MIN=0.0   AVE=0.22   MAX=1.0   VAR=0.17

GLC2000

MIN=0.0   AVE=0.22   MAX=1.0   VAR=0.17

GlobCover2009 - GLC2000

MIN=-1.0   AVE=0.006   MAX=1.0   VAR=0.036

Land fraction aggregated to 2.8 x 2.8 km² grid

GlobCover2009

MIN=0.0   AVE=0.6   MAX=1.0   VAR=0.24

GLC2000

MIN=0.0   AVE=0.6   MAX=1.0   VAR=0.24

GlobCover2009 - GLC2000

MIN=-1.0   AVE=-0.0014658   MAX=1.0   VAR=0.006

Land fraction aggregated to 2.8 x 2.8 km² grid

GlobCover2009

MIN=0.0   AVE=0.4   MAX=1.0   VAR=0.25

GLC2000

MIN=0.0   AVE=0.4   MAX=1.0   VAR=0.25

GlobCover2009 - GLC2000

MIN=-1.0   AVE=-0.00111971   MAX=1.0   VAR=0.014
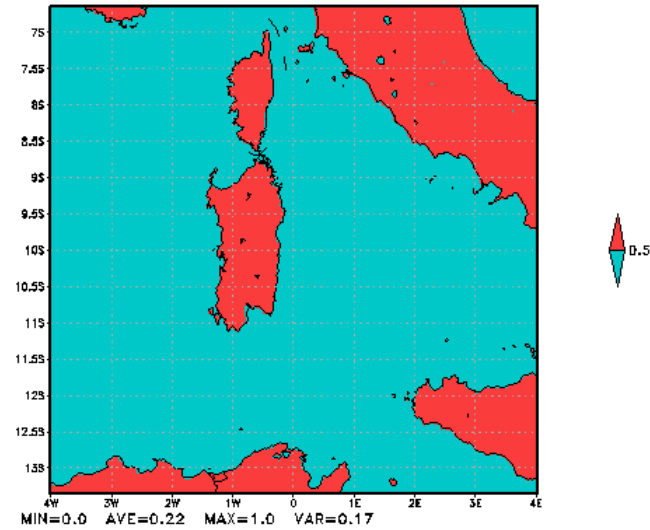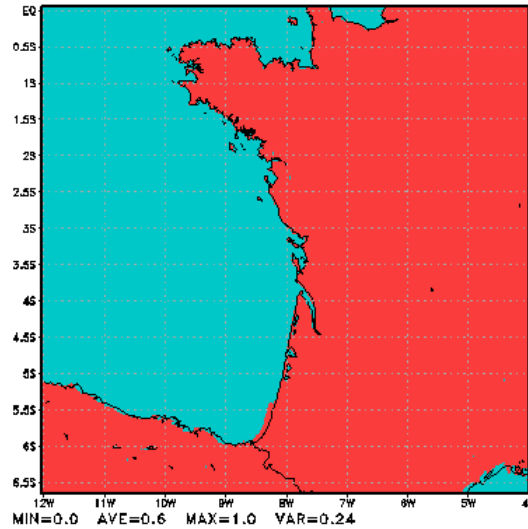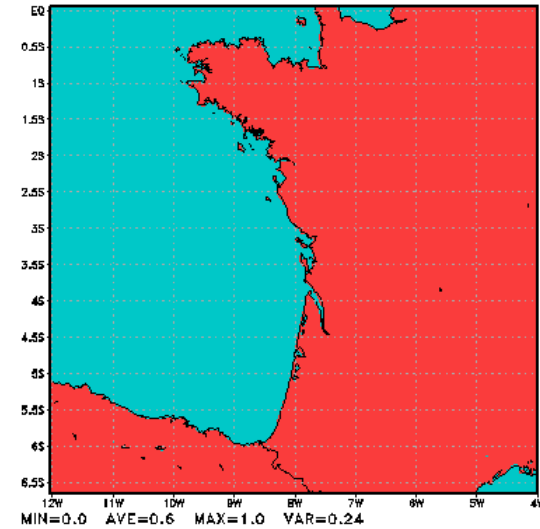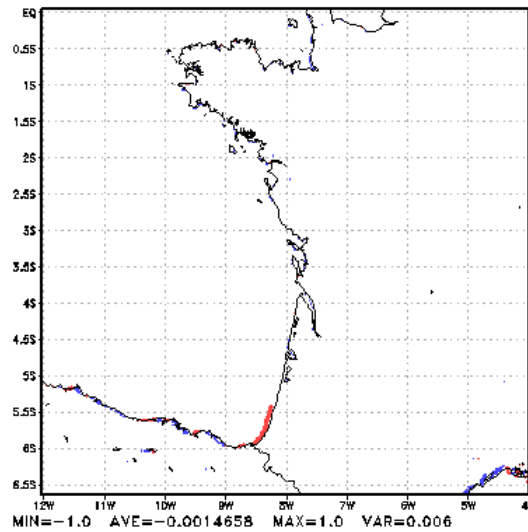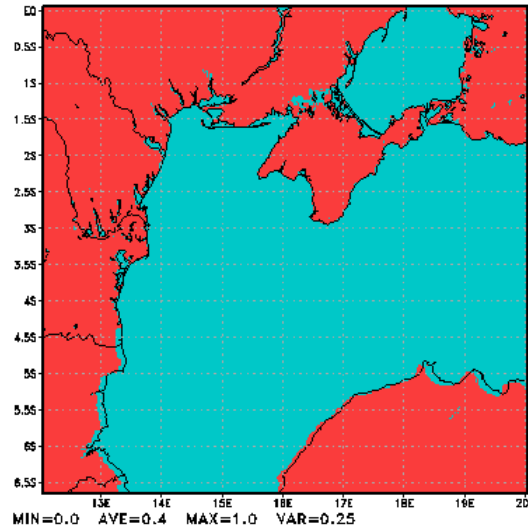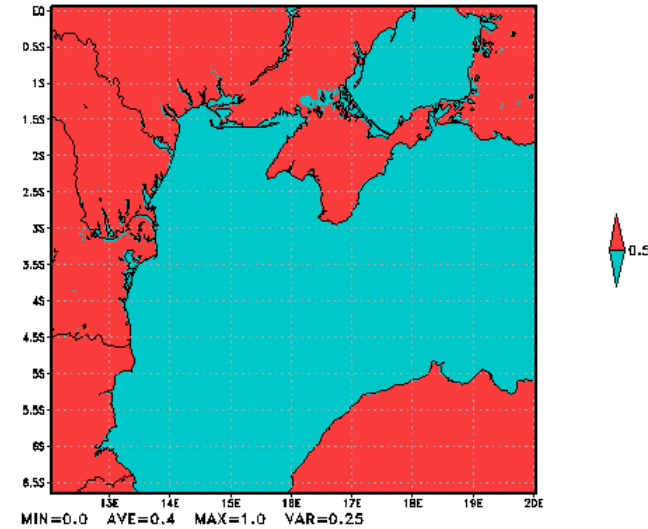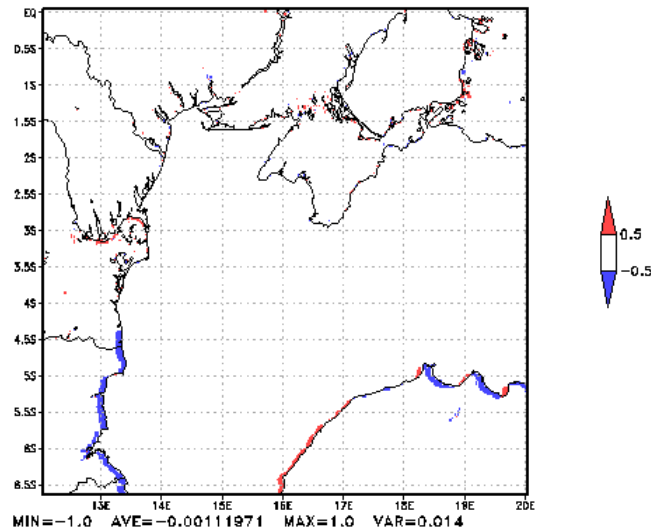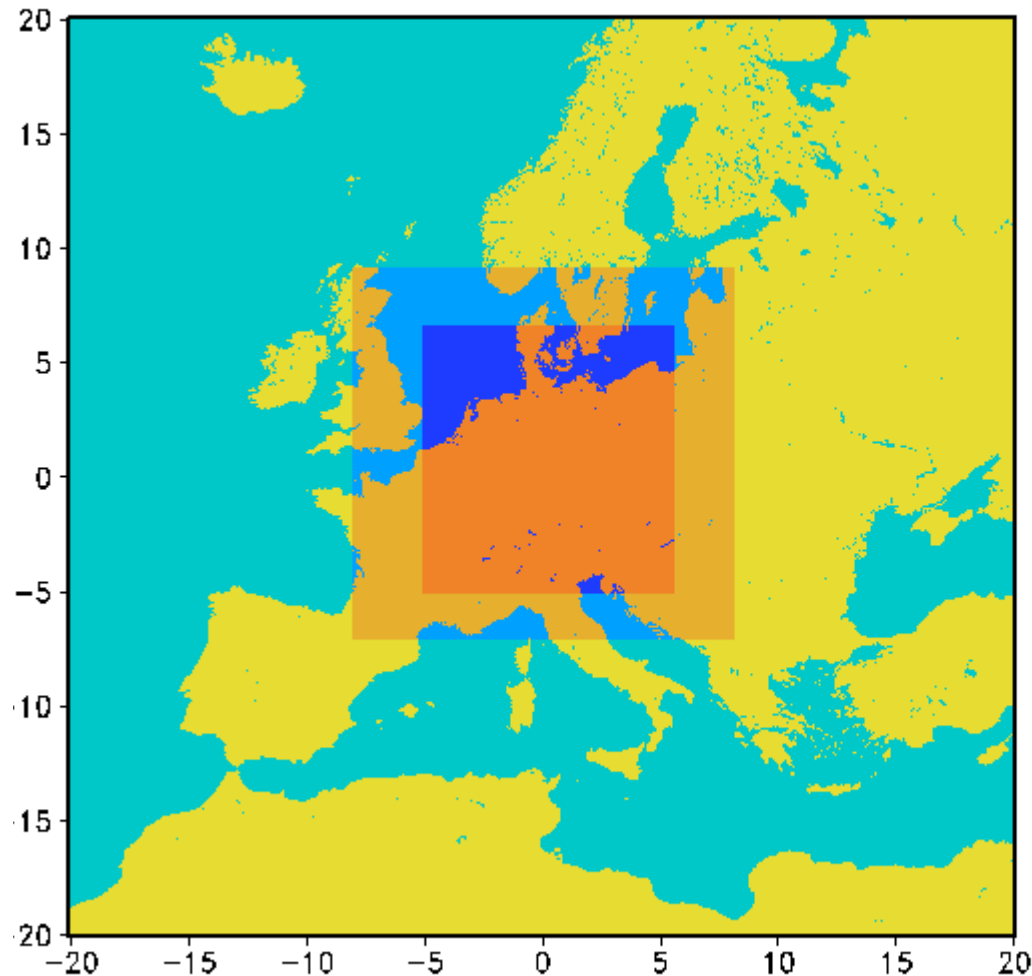
Land fraction aggregated to 2.8 x 2.8 km² grid

The small frame indicates the domain of the operational COSMO-DE model at DWD. It is completely outside the area which is affected by the shift error in the external parameters computed from GlobCover2009.

The external parameters are computed on the medium frame, it is only affected by the error at the very southern edge.

Conclusions

- In the European domain, south of 44°N (in geographical coordinates), the external parameters computed from the GlobCover2009 land use data set are shifted to the west by about 0.1°.

- Therefore, it can be used in the operational COSMO-DE model at DWD, its domain is not affected by the error.

- But it can not be used in the operational COSMO-EU model at DWD covering almost all Europe.

- This error should be corrected by the creator of the data set in the near future.