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Evaluation of gcm performances in climate reconstruction: comparison with observed data over Europe and North Africa

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Reliability of GCM-generated future climate scenarios hinges on a satisfactory reconstruction of past conditions. To evaluate this, monthly temperature and precipitation data generated for the period from January 1901 to December 2000 by the global circulation model GFDL 2.0, developed at NOAA's Geophysical Fluid Dynamics Laboratory, have been compared to interpolated values reported in the CRU TS 2.1 database (Mitchell and Jones, Int. J. Climatol. 25: 693-712 (2005)) over Europe and North Africa. GFDL values are available on a 2° latitude by 2.5° longitude grid, while the CRU is built upon climate observations from meteorological stations, interpolated on a 0.5° grid over the emerged lands. Suitable spatial averages over neighbouring grid points of the CRU database have been performed, in order to obtain simultaneous spatial time series of montly temperaure and precipitation in each of the GFDL grid points. The comparison has been carried out by considering, for each grid point and for each variable, the following parameters: the overall mean; the trend slope; the climatic regime (12 month averages); the mean and the L-moments of order 2 to 4 of the annual maxima. The obtained results show that the GFDL simulations are quite accurate in terms of centennial temperature trend during the 20th century, but the overall mean of the time series is often much lower (2-3 °C on average) than the measured one. As for precipitation, GFDL data understimate the mean values in the grid points close to the mountain chains and along the African coasts, while the values are overestimated in the other areas, particularly in central Europe. In particular, regarding the fluctuations of these quantities, the variance of temperature and precipitation is understimated by the GCM in Southern Europe and Northern Africa, while it is generally overestimated

in Northern Europe.