



## Comparing the impact of the 2003 and 2010 heatwaves on Net Primary Production in Europe

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Climate variability is known to influence primary productivity on land ecosystems (Nemani et al., 2003). In particular, extreme climatic events such as major droughts and heatwaves are known to have severe impact on primary productivity and, therefore, to affect significantly the carbon dioxide uptake by land ecosystems at regional (Ciais et al., 2005) or even global scale (Zhao and Running, 2010). In the last decade, Europe was struck by two outstanding heatwaves, the 2003 event in Western Europe and the recent 2010 episode over Eastern Europe. Both were characterised by record breaking temperatures at the daily, weekly, monthly and seasonal scales, although the amplitude and spatial extent of the 2010 mega-heatwave surpassed the 2003 event (Barriopedro et al., 2011). This work aims to assess the influence of both mega-heatwaves on yearly Net Primary Production (NPP) and seasonal Net Photosynthesis (NP), which corresponds to the difference between Gross Primary Production and maintenance respiration. The work relies on yearly NPP and monthly NP data derived from satellite imagery obtained from MODIS (Moderate Resolution Imaging Spectroradiometer) sensor at 1km spatial resolution. Data were selected for the period between 2000 and 2011 over a region extending from 34.6N to 73.5N and 12.1W to 46.8E, covering Eurasia.

In 2010 very low primary production anomalies are observed over a very large area in Eastern Europe, at the monthly, seasonal and yearly scale. In western Russia, yearly NPP anomalies fall below 50% of average. These widespread negative anomalous values of NP fields over the western Russia region match the patterns of very high temperature values combined with below-average precipitation, at the seasonal (summer) scale. Moreover, the impact of the heatwave is not only evident at the regional level but also at the wider continental (European) scale and is significantly more extensive and intense than the corresponding heatwave of 2003 in Western Europe (Ciais et al., 2005).

### References

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