Geophysical Research Abstracts
Vol. 16, EGU2014-15111-1, 2014
EGU General Assembly 2014

Comparing the impacts of the 2003 and 2005 fire seasons and the 2004 drought on NPP in the Iberian Peninsula

Ana Bastos (1), Célia M. Gouveia (1,2), Ana Russo (1), and Ricardo M. Trigo (1)

(1) Universidade de Lisboa, Instituto Dom Luiz, IDL, LISBOA, Portugal (cmgouveia@fc.ul.pt), (2) Escola Superior de Tecnologia de Setúbal, Instituto Politécnico de Setúbal, Portugal

Mediterranean ecosystems have evolved together with relatively frequent disturbances such as wildfires and long dry periods. However, in recent decades fire regimes have been changing due to widespread socio-economic factors (e.g. rural abandonment) as well as in response to climatic trends. In particular, drought have become more frequent and intense, a pattern that is expected to increase in future decades. Despite Mediterranean ecosystems being adapted to fire and drought occurrence, changes in the characteristics of disturbances may affect the ability of ecosystems to recover to their previous state.
The years 2003, 2004 and 2005 were particularly severe for ecosystems in the Iberia Peninsula, as a devastating fire season (2003, ∼574.000ha burnt) was followed by a very intense drought (2004/2005) that affected 2/3 of Iberian vegetation for more than 9 months. In 2005, a very destructive fire season was again registered, with ∼727.000ha burnt. These disturbances have been shown to have a severe impact on vegetation phenology, as assessed by remote sensing imagery. One of the more relevant societal impacts of these disturbances is the decrease in net primary production (NPP) of vegetation, both for practical issues such as food production, fiber and fuel and for carbon balance assessments.
This work focuses on 2003 and 2005 fire seasons in the Iberia Peninsula and in the 2004/05 drought. Burnt scars in all fire seasons were identified by cluster analysis; the area affected by the drought event of 2004/2005 was selected as the region where vegetative stress was observed for 9 or more months. Remote sensing allows large scale studies of the evolution of vegetation dynamics at relatively fine spatial resolution. We rely on satellite NDVI data from SPOT/VEGETATION (1km) to identify burnt scars and drought-stricken regions. To quantify the impacts in terms of carbon uptake by vegetation, the MOD17A2 (annual NPP) and MOD17A3 (monthly net photosynthesis, PsN) datasets were used. Despite not including growth respiration terms, PsN provides a satisfactory assessment of the seasonal evolution of carbon uptake by vegetation.
Wildfires in 2005 led to greater drops in carbon uptake by vegetation than the ones in 2003. However 2005 fire scars recovered faster than the areas burnt in 2003, mostly likely as a consequence of the combined impact of drought during the first growing season after the 2003 fire season. The 2004 drought, besides leading to very large decreases in photosynthetic activity, also affected a much larger extent than the combined areas affected by the two extreme fire seasons in 2003 and 2005. Thus, the integrated impact of the drought over the peninsula was significantly larger (-0.24 MtonC) than the impacts of the two fire seasons combined (-0.04 MtonC).

Acknowledgments:
This work was partially supported by national funds through FCT (Fundação para a Ciência e a Tecnologia, Portugal) under project QSECA (PTDC/AAG-GLO/4155/2012)