Geophysical Research Abstracts
Vol. 12, EGU2010-803, 2010
EGU General Assembly 2010

The dynamics of fire regimes in tropical peatlands in Central Kalimantan, Borneo

Agata Hoscilo, Susan Page, and Kevin Tansey
University of Leicester, Department of Geography, United Kingdom (ah165@le.ac.uk)

As a carbon-rich ecosystem, tropical peatland contributes significantly to terrestrial carbon storage and stability of the global carbon cycle. Vast areas of tropical peatland in SE Asia are degraded by the increasingly intensive scale of human activities, illustrated by high rates of deforestation, poor land-use management, selective illegal logging, and frequently repeated fires. Analysis of time-series satellite images performed in this study confirmed that fire regimes have dramatically changed in tropical peatlands over the last three decades (1973-2005). The study was conducted in the southern part of Central Kalimantan (Indonesian Borneo). We found that there was an evident increase in fire frequency and a decline in the fire return interval after implementation of the Mega Rice Project (1997-2005). Up until 1997, fires had affected a relatively small area, in total 23% of the study area, and were largely related to land clearance. This situation changed significantly during the last decade (1997-2005), when the widespread, intensive fires of 1997 affected a much larger area. Five years later, in 2002, extensive fires returned, affecting again 22% of the study area. Then, in 2004 and 2005, a further large area of peatland was on fire. Fire frequency analysis showed that during the period 1997-2005, around 45% of the study area was subject to multiple fires, with 37% burnt twice and 8% burnt three or more times. Near-annual occurrence of fire events reduces the rate and nature of vegetation regrowth. Hence, we observed a shift in the fire fuel type and amount over the period of investigation. After 1997, the fire fuel shifted from mainly peat swamp forest biomass towards non-woody biomass, dominated by regenerating vegetation, mainly ferns and a few trees. This secondary vegetation has been shown to be fire prone, although fire propagation is slower than in forest and restricted by both low fuel quality and load.

Furthermore, we investigated the interaction between human impacts and presence and extent of fires. We found that the majority of fire events were directly or indirectly associated with human activities (i.e. selective logging, land clearance, intensive drainage and transmigration re-settlement). The intensive drainage infrastructure associated with the Mega Rice Project initiative greatly impaired the peatland hydrological system, increasing the risk of fire. In addition, the network of canals allowed easy access for people whose activities provided ignition sources. Hence, multiple fires were located within close proximity to canals and declined with distance away from canals.

These results emphasise the vulnerability of degraded tropical peatlands to fire and confirm that widespread and intensive fires have become an integral part of tropical peatland ecosystem and are now associated with most dry seasons.