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Contribution of agricultural and forest fires in Ukraine to impact of Eurasian burnings on Arctic

S. Zibtsev (1), J.G. Goldammer (2), and D. Gilitukha (3)

(1) National University of Life and Environmental Sciences of Ukraine, Kyiv, Ukraine (sergiy.zibtsev@gmail.com, +380445278528), (2) The Global Fire Monitoring Centre, Germany (johann.goldammer@fire.uni-freiburg.de), (3) National University of Life and Environmental Sciences of Ukraine (dmitriy.nau@gmail.com)

Burning potentially can occur on major part of lands of Ukraine (total 57.93 million ha) and, first of all, on agricultural ones - that occupy 71% of total area of the country. Forests occupy 17.6% of the area of country, where from 2 to 4 thousands fires happens annually. Good wildfire statistics, as well as proper fire management system only for part of forest lands of Ukraine - 68% is established, in particularly, for forests that managed by State Agency of Forest Resources of Ukraine. While other 2 million ha of forests that managed by other Ministries are out of regular fire management action, detection and protection. There are no reliable detection and accounting of wildfires, outdated or absent fire engines, lack of fire crews and facilities on most part of agricultural, grass, abandoned lands, pastures. During emergency wildfires situation in Ukraine in August 2010 only full mobilization of forest personal together with forces of internal affairs (police) for patrolling of wildfire situation nationwide allows to avoid catastrophic scenario in spite of general low preparedness and unsatisfactory technical provision of fire management on agricultural lands. That year in forest lands totally 3065 cases of fires were registered with total area burned 8916 ha (fire season 2010) and 3145 cases of wildfires on agricultural lands (August 2010). There are no reliable statistics and effective fire management system on grass and agricultural lands in Ukraine even agricultural fires burned much larger area of lands then forest fires and produce significant amount of black carbon both during spring and summer fire events.
Results of analysis of wildfire cases in Ukraine at 1x1 km spatial resolution for the period 2006-2008 based on active detection of thermals anomaly by MODIS shows that annually, during the period nearly 20,000 cases of wildfires were detected. In extreme years like 2008, amount of fires doubled. Wildfires in Ukraine make important input in total Eurasian impact of biomass burning on Arctic. In particularly, the fire hazard period, characterized by highest fire activity - 30% of the total cases of detected active ignitions, occurs in the spring (March, April, May) and 55% in summer (July, August and September). Analysis of land use type of burnings shows that 93% of fires for the period occur on agricultural land and other 7% - on forest lands. Near 23% of forest fires could be ignited as a result of transfer of fires from nearest agricultural lands. Comparing of remote sensing data with official forest fire statistics of State Agency of Forest Resources of Ukraine shows that only 15% of the total official amount of forest fires was detected by MODIS. This is because the accordingly to statistics, average area of forest fires in Ukraine is near 1.1 ha, and large part of fires do not exceed 0.5 ha and less, while this area is lowest threshold of detection by MODIS.