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LANDSAT 7 IMAGES USE FOR ASSESSMENT OF FIRE TRACES AREAS

Pavlik T.V., Medinets V.I., Lebediev D.G.
Odessa National I.I. Mechnikov University, Odessa, Ukraine
E-mail: tatyanakorzun88@gmail.com

Establishing of protected and strictly protected areas in particular in the Dnister Delta is the main instrument for environmental management of natural processes aimed at biological diversity conservation. Uncontrolled fires damage irreparably unique nature resources in the Dnister Delta over the last years. To make objective managerial decisions permanent control of the areas and consequences of the fires should be performed. The most efficient method to assess squares and boundaries of the fire-damaged areas in the delta is to make use of high-resolution space images (Medinets and Korzun, 2010).

Aim of the paper is to generalize the experience of free LANDSAT 7 space images use to determine squares and boundaries of the Dnister Delta areas (within the Lower Dnister National Nature Park (LDNNP)) affected by fires in winter-spring period of 2011-2012.

Methodology of LANDSAT 7 space images processing to assess areas and boundaries of fire traces using ArcGIS 9.2 has been described.

Characteristics of the LandSat 7 space images used to map fire traces in the entire LDNNP, as well as in every zone (strictly protected, regulated recreation, stationary recreation and economic zone) of the Park have been analyzed.

Analysis of the results received has shown that fire traces areas in the Dnister Delta in 2012 made 5075.0 ha, including 3582.8 ha in the LDNNP, and in 2011 – 3071.1 ha and 2704.3 ha respectively. It is pointed out than no fires have been observed in economic zone in 2011 and 2012. It is revealed that the strictly protected zone happened to be the most affected with fires in 2011-2012. The maximal square of burned territories within the strictly protected area made 772 ha (23.83%) and was registered in the period from 06.11.2011 to 29.11.2011. During the periods from 10.02.2012 to 13.03.2012, from 13.03.2012 to 20.03.2012 and from 29.11.2011 to 10.02.2012 in the strictly protected area burned out respectively 570.1 ha, 43.8 ha and 22.1 ha. For the zone of regulated recreation the period from 21.10.2011 to 06.11.2011 happened to be the time of maximal fire danger, as in this period fire traces area made 772 ha (9.06% of the total zone area).

It is recommended to use LANDSAT 7 space images to assess the squares and boundaries of fire traces, which are periodically observed in the studied territory and in the other reed-bed and deltaic areas. This would be helpful for cost-effective planning of restoration activities and development of the measures aimed at fire danger decrease for the unique Dnister Delta areas.

The study has been performed in the framework of the project "To assess influence of agro-industrial activities and fires on ecosystems of the Lower Dnister and emission of greenhouse gasses into the atmosphere" No 505 funded by the Ministry of Education and Science of Ukraine since 2013.

SEASONAL VARIATION OF SOIL BULK DENSITY IN SOUTHERN CHERNOZEM OF ARABLE LAND

Pitsyk V., Medinets S., Medinets V., Goshurenko L., Bilanchin Ya.
Odessa National I. I. Mechnikov University (ONU), Odessa, Ukraine
E-mail: v.z.pitsyk@gmail.com

As a result of a long-term intensive anthropogenic impact on Chernozem soils of the southern Ukraine, their physical properties undergo significant alterations, leading, in many cases, to declining of fertility and degradation the most precious, soil organic matter (SOM) reached surface layer (Medvedev et al., 2012).

The goal of our study was the determination of seasonal variations of soil bulk density of southern Chernozem under intensive agricultural loading in 2010 at the field near monitoring station "Petrodolinskoe", 30 km far from Odessa city.

Soil bulk density determination was carried by classical method of Kachinskiy (Kachinskiy, 1965) with using soil rings for sampling at 5-6 replicas.

It was demonstrated that average bulk density of surface layer (0-10 cm) was 1.27±0.15 g cm^{-3} in 2010, corresponded with mean bulk density (1.15 g cm^{-3}) by Kaurichev (1982). A decrease of bulk density on ca. 0.2 g cm^{-3} was shown after a ploughing in March (1.00±0.30 g cm^{-3}), followed by an increasing up to 1.14±0.03 g cm^{-3} in April via self-packing (Medvedev, 1979). A significant soil packing was detected in irrigation period and active agricultural machine activity, initiated from June (1.29±0.04 g cm^{-3}) and reached the peak magnitudes in August – September (1.42±0.03 g cm^{-3}), which confirmed previous results by Kaurichev (1982), who found that bulk density could exceed 1.30 g cm^{-3} under the same condition.

It was observed that soil oversaturation by water together with intensive machine usage on the field led to a compaction of surface soil, enriched by humic acids (Mikhayluk et al., 2008), as a consequence a decreasing of soil pore spaces, causing to a declining of soil aeration (Davidson and Kingerlee, 1991; Kim et al., 2012). Such conditions, by our opinion, could provide a formation of huge amount of anaerobic microsites, colonized actively by denitrifiers, thus activation of denitrification took place, leading to significant losses of surface labile N as N_2O and N_2 (Skiba, 2008; Medinets et al., 2011), i. e. surface layer soil depletion of mineral N and SOM (Medvedev et al., 2012). It was discussed the recommendations of a preservation of optimal soil bilk density