Assessment of Nitrogen and Carbon compounds emission as aftermath of wildfires in Dniester Delta (Ukraine) in 2010-2019

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Abstract

Reed-beds and aquatic plants are among main nitrogen (N) and carbon (C) depots in the Dniester Delta capable to accumulate up to 10-15% of N from annual riverine discharge. However this N and C removal pathway is often neglected. We showed that on average 10% of Dniester Delta area were exposed by wildfires in 2010-2019. We found that mean emissions of N and C from wildfires in wetland areas over 2010-2019 made ~3 $GgNyr^{-1}$ and ~96 $GgCyr^{-1}$ respectively. Thus this source should be accounted in N and C balances/ budgets for this region.

Keywords: Nitrogen emission, wildfire, wetland, Dniester

1. Introduction

Reed-beds and aquatic plants are among main nitrogen (N) and carbon (C) depots in the Dniester Delta capable to accumulate up to 10-15% of N from total annual riverine discharge. No assessment of N and C gaseous compounds' emission resulting from wildfires/burnings in river deltas have been performed until now. This study aim is the first assessment of N and C emissions as the result of wildfires in Dniester Delta.

2. Approach and methodology

Study region is Dniester Delta (Ukraine).

LandSat multispectral images were used to digitalize wildfire zones area according to methodology (Medinets et al., 2019). Experimental data on N and C content in reed and its biomass (Yakubovskiy et al., 1975; this study) were used to calculate emissions.

3. Results and Discussion

We found that average wildfires area for 2010-2019 was equal to 4150 ha (range: 326-11093 ha), which made on average 10% of total delta area. Based on our estimates we suppose that N and C emission as wildfires aftermath can be important pathway of N and C removal from deltaic areas (Table 1).

Table 1: N and C emission from wildfires in the Dniester Delta

October-April	Burned area, ha	N-emission, MgN	C-emission, MgC
2010-2011	2883	1932	63426
2011-2012	5852	3921	128737
2012-2013	1202	805	26433
2013-2014	6892	4617	151615
2014-2015	326	219	7176
2015-2016	11093	7432	244042
2016-2017	4054	2716	89186
2017-2018	1183	793	26033
2018-2019	5663	3794	124579
Total 2010-2019	39147	26228	861227
Average	4350	2914	95692

Thus we state that wildfires (as important N and C emission source to the atmosphere) cannot be neglected upon C and N balance assessments at regional and global scales.

4. Conclusion

The first estimation of N and C compounds emission from wildfires in Dniester Delta showed that average fluxes into atmosphere made ~3 $GgNyr^{-1}$ and ~96 $GgCyr^{-1}$ respectively, and should be accounted in N and C balances/ budgets for this region.

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References

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