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The link between precipitation and recent outbreak of anthrax in North-West Siberia

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Anthrax is a bacterial disease affecting mainly livestock but also posing a risk for humans. During the outbreak of anthrax on Yamal peninsula in 2016, 36 humans were infected and more than 2.5 thousand reindeer died or were killed to prevent further contamination [1]. Anthrax is a natural focal disease, which means that its agents depend on climatic conditions. The revival of bacteria in previously epidemiologically stable region was attributed to thawing permafrost, intensified during the heat wave of 2016. We studied recent dynamics of air temperature as well as summer and winter precipitation in the region. In addition, we analysed the effect of winter precipitation and air temperature on the dynamics of active layer thickness using data from Circumpolar Active Layer Monitoring sites [2]. Our analysis suggests that permafrost was thawing intensively during several years before the outbreak, when snowy cold winters followed warmer winters. Thick snow prevented soil from freezing and enhanced permafrost thawing. In addition, we showed that summer precipitation drastically decreased in the region of outbreak during recent years, likely contributing to the spread of disease.

[1] Popova, A.Yu. et al. Outbreak of Anthrax in the Yamalo-Nenets Autonomous District in 2016, Epidemiological Peculiarities. Problemy Osobo Opasnykh Infektsii [Problems of Particularly Dangerous Infections]. **4**, 42–46 (2016).

[2] Circumpolar Active Layer Monitoring site: https://www2.gwu.edu/~calm/ [2/08/2019].