PERFORMANCE OF THE CURRENT AND EXTENDED GLOBAL NM NETWORK FOR SOLAR PARTICLE REGISTRATION AND ASSESSMENT OF RELATED TERRESTRIAL EFFECTS.

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Introduction: Over several decades, starting from the mid-1950s, the global neutron monitor network was successfully used to study cosmic ray variations and fluxes of accelerated solar ions, the latter known as energetic solar particles, specifically the strong events registered at the ground-level, that is, ground-level enhancements (GLEs) [1].

Here, we discuss the current status and applications of the global neutron monitor network, namely its capability to study solar energetic particles, that is assessment of their spectral and angular distribution, for strong solar proton events leading to GLEs. Several examples of studies of GLEs are presented.

We also discuss the existing gaps in the network and propose an improvement of the network, namely a plan for an extension of the existing network with several new monitors, in order to provide a more precise analysis of strong solar proton events and to improve the current space weather services (Fig.1).

We discuss the ability of the optimized global neutron monitor network to study various populations of solar energetic particles and to provide reliable space weather services, specifically quantification of the atmospheric ionization and effective doses at flight altitudes [2].

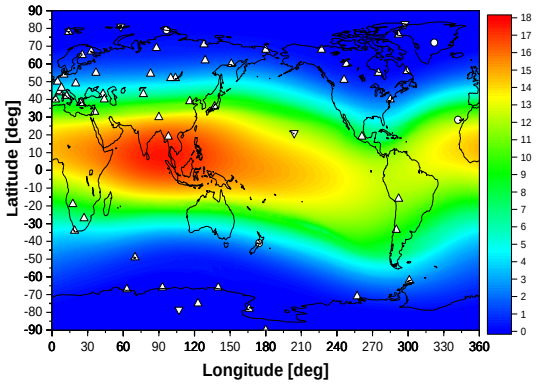

Fig.1 Present status of the global neutron monitor network and proposition for further extension. The up triangles correspond to presently operational stations. The down triangles correspond to previously existed stations. Circles correspond to the new stations proposed here. The color diagram depicts rigidity cut-off map computed in quiet magnetospheric conditions employing the IGRF model corresponding to epoch 2015

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References:

[1] Poluianov S. et al., (2017) *Sol. Phys.* 292:176,
[2] Mishev A. L. and Usoskin I.G. (2020) *J. Space Weather Space Climate.*, *10*, 17.

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