

## Solar proton events as source of local radiation effects in biosystem

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The phenomenon of cell fusion was found in our research [1,2] carried out during of dramatic increase of Solar flux energetic protons and a major geomagnetic disturbances in October, 1989. It is shown that each solar flare associated with flux of high energetic protons leads to cell fusion with appearance of multinuclear cells in all cell lines [3]. The great solar energetic particle events in October 1989 observed from geosynchronous orbit had properties determined not only by the flare source mechanism but also by properties of the interplanetary medium [4] The first event, on 19 October, was associated with a major solar flare located 9° E of central meridian. The resulting interplanetary shock (and presumed coronal mass ejection) reached the earth in less than 20 hours. With the arrival of this interplanetary shock, a sudden increase in the solar proton intensity was recorded on 20 October. A second discrete solar proton event occurred on 22 October associated with solar activity at 32°W. The third event, on 24 October, was associate with solar activity at 57°W. The major solar proton fluence occurred in the combined particle increase on 19 October and associated interplanetary shock particle enhancement on 20 October. The largest peak flux event is associated with solar activity on 24 October [5]. The value  $2,17 \times 10^9 \text{ (cm}^2 \text{ sr)}^{-1}$  was the integral over the October 20,23,25 events for the fluence above 10 Mev. It was shown that the dynamics of cell fusion in diverse cell lines have a high correlation ( $P \leq 0,05$ ) with neutron count at Apatity station [6]. Moreover the variations of fusion indices was more similar with variations of solar particle fluence in the near-earth spatial environment than with the peaks of neutron count increase. The extraordinary figures arising from several fusing cells, cell substance streams and sprays had been found at the time when the energetic spectrum of solar protons had maximum values. These phenomena had striking resemblance with biological effects of high energetic adron affecting (local radiation effects) observed during of biological experiments on space crafts in the near-earth spatial environment [7]. The first local radiation effect in biosystems was discovered on the earth surface in the course of solar proton events in October 1989.

### Referances:

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