

# GLOBAL DISTRIBUTION AND VARIATIONS OF THE F-SPREAD OCCURRENCE PROBABILITY IN THE NORTHERN AND SOUTHERN HEMISPHERES FOR THE WINTER SOLSTICE PERIOD

**Karpachev A.T., Telegin V.A., Telegina A.V. and Nepomnyaschaya E.V.**

*IZMIRAN, 142190, Troitsk, Moscow region, karp@izmiran.ru, telegin@izmiran.ru*

A global distribution (in the both hemispheres, at all longitudes, for all local times) of occurrence probability (P) of the F-spread was built. About 30.000 topside ionograms obtained on the board of the Intercosmos-19 satellite in a period of the high solar activity for the two winter solstices 1979-1981 were used. The different types of F-spread are classified, but only range type spread at F2-layer maximum height similar to the bottomside spread is analysed. It is shown, that the F-spread exists in the day-time at the auroral latitudes and at some longitudes over the magnetic equator. Intense F-spread appears after sunset at the auroral, the subauroral and the equatorial latitudes, keeps global features during all night, slightly increasing its intensity to morning. Intense F-spread exists in winter night-time conditions even at the mid-latitudes, reaching its peak at the latitudes of the main ionospheric trough minimum. The latitudinal-longitudinal variations in the F-spread occurrence probability were investigated. Our analysis shows that the longitudinal variations in P in the first approximation anticorrelate with the NmF2 variations, both in the winter and summer conditions:  $P = 1$  if  $foF2 \leq 2$  MHz, and  $P = 0$  if  $foF2 \geq 14$  MHz. Amplitude of the longitudinal effect in P in the night-time conditions reaches factor of 2 in the Northern hemisphere and factor of 4 in the Southern one. As a result the longitudinal sectors stand out where P has a maximum or a minimum in a broad belt of the latitudes (60-120°E and 240-270°E correspondingly in the Southern hemisphere). The pattern has a more complicated character in the Northern hemisphere. Above the magnetic equator the F-spread occurrence probability has a maximum ( $P \sim 60\%$ ) at the longitudes around 330°E, and has a minimum ( $P \sim 10\%$ ) at the longitudes of 180°E. Diurnal variations in the F-spread occurrence probability for the subauroral, the mid- and the equatorial latitudes were investigated. They were compared with the corresponding ground stations data. It is shown that at all the latitudes P in the topside ionosphere is greater than in the bottomside one. The reasons of the revealed F-spread occurrence probability variations including the dependences on the F2-layer maximum height and the exospheric temperature are discussed.