

FORERUNNERS AND EFFECTS OF POWERFUL SOLAR FLARES IN ACTIVE REGION 12673 IN SEPTEMBER, 2017

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Investigation of peculiarities of the structure and dynamics of the NOAA active region 12673, which produced the extremely mighty solar flare of the 24-th solar cycle, magnitude X9.3 (September 6, 2017), is contained in many publications. The available data, obtained with HMI SDO and SOT Hinode, gave the opportunity to study forerunners of mighty flares. They can be used as predictors in the forecast.

The analysis made in [Yan et al., 2018; Anfinogentov et al., 2019], had shown the presence of the mighty magnetic rope, with extremal magnetic induction B_{\max} to 5000 G before the flares. The curve $B_{\max}(t)$ with cadence 45 s, plotted in [Golovko and Salakhutdinova, 2023], revealed short-time (1 min) bursts with 700–800 G amplitude. At the moments of the bursts, at the main Polarity Inversion Line there appeared arc-shaped structures. The second peculiarity of the magnetic field in flare-related dynamics is the fast increase of the magnetic flux imbalance, with the rate up to 1.7×10^9 Wb/s, followed by decrease to zero during a flare. It correlates with variations of the area of intermittent structure patches, revealed by multifractal analysis.

The observed effects of flares are magnetic configuration changes, as well as 4-minute quasiperiodic pulsations of the B_{\max} and of the Doppler velocity V_{\max} .

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