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radio astronomical and magnetometric studies. Examples of the development of various periods of solar activity in 2022 are presented.

The results of the features of the manifestation of short-period variations of the XYZ component of the geomagnetic field, which occurred during various phenomena of solar activity and magnetic storms, are given. The presence of previously little-known stable geomagnetic variations with a basic period of about 2 minutes and two harmonics of the main period (1 minute and 30 seconds) was revealed. In addition, the change in the amplitude and periods of diurnal harmonics (6, 4, 2 hours) during magnetic storms was investigated. The presence of previously little-known stable geomagnetic variations with a basic period of about 2 minutes and two harmonics of the main period (1 minute and 30 seconds) was revealed. In addition, the change in the amplitude and periods of diurnal harmonics (6, 4, 2 hours) during magnetic storms was investigated.

Signatures of possible superstrong magnetic fields in a limb solar flare and an active prominence from polarization study of Ha and He I D3 spectral line profiles

I.I. Yakovkin[1], V.G. Lozitsky[1]

[1]Astronomical Observatory of the Taras Shevchenko National University of Kyiv, Kyiv, Ukraine

We report the signatures of possible 10^5 Gauss magnetic fields in the 14 July 2005 limb solar flare. During the post-peak phase of the flare, such strong fields are observed at altitudes between 10 and 20 Mm, manifesting as strongly split peaks (up to 4 Å apart in wavelength) in the far wings of the Ha emission. The analysis of the Stokes V profiles reveals the presence of a large antisymmetric circular polarization relative to the center of the broad emission. The shape of the Stokes V profiles differs significantly from the dI/dl intensity gradient profiles, indicating the presence of a strong magnetic field. In the He I D3 line, similar spectral features were also seen for a prominence on 12 July 2004 at heights up to 25 Mm. If these spectral features are viewed as indications of the Zeeman effect, the corresponding magnetic fields can be as strong as 130 kG. Notably, such spectral features are extremely rare and are absent from the spectra of the vast majority of flares and prominences, as we demonstrate by analyzing the spectrum of an active prominence on July 24, 1999.

To explore the possibility of interpreting such highly split spectral features as manifestations of extremely powerful magnetic fields, we conducted a theoretical analysis of the dependence of line profiles on magnetic fields of different strengths. The calculations show that at such extremely high magnetic fields, the fine structure of the spectral lines leads to profile shapes that are similar to those seen. This suggests that the patterns seen in the Stokes V profiles can indeed be a sign of extremely strong magnetic fields.

Comparison of solar activity proxies: eigen vectors versus averaged sunspot numbers

V.V. Zharkova[1,2*], I. Vasilieva [2,3], S.J. Shepherd[4] and E. Popova[5]

[1]Department of MPEE, University of Northumbria, Newcastle upon Tyne, UK
[2]ZVS Research Enterprise Ltd., London, UK
[3]Department of Solar Physics, Main Astronomical Observatory, Kyiv, Ukraine
[4]PRIMAL Research Group, Sorbonne Universite, Paris, France
[5]Centro de Investigacio´n en Astronom´ıa, Universidad Bernardo O'Higgins, Santiago, Chile

We attempt to establish links between a summary curve, or modulus summary curve, MSC, of the solar background magnetic field (SBMF) derived from Principal Component Analysis, with the averaged sunspot numbers (SSN). The comparison of MSC with the whole set of SSN reveals rather close correspondence of cycle timings, duration and maxima times for the cycles 12- 24, 6,7 and -4,-3. Although, in 1720-1760 and 1830-1860 there are discrepancies in maximum amplitudes of the cycles, durations and shifts of the maximum times between MSC and SSN curves. The MSC curve reveals pretty regular cycles with double maxima (cycles 1-4), triple maximum amplitude distributions for cycles 0 and 1 and for cycles -1 and -2 just before Maunder minimum. The MSC cycles in 1700-1750 reveal smaller maximal magnitudes in cycles -3 to 0 and in cycle 1-4 than the amplitudes of SSN, while cycles -2 to 0 have reversed maxima with minima with SSN. Close fitting of MSC or Bayesian models to the sunspot curve distorts the occurrences of either Maunder Minimum or/and modern grand solar minimum (2020-2053). These discrepancies can be caused by poor