Solar active region magnetic complexity

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We have studied the Mount Wilson Classification of solar Active Regions (ARs) for the period from 1996 to 2015. Sunspots are visual indicators of ARs where the solar magnetic field is disturbed. Major manifestations of solar magnetic activity, such as solar flares and Coronal Mass Ejections (CMEs), are associated with solar ARs.

There has been so many attempts to classify solar ARs based on their magnetic complexity as a measure of their acitivity. For this study we applied the Mount Wilson Classification which groups ARs in terms of their magnetic complexity from the least complex alpha to the most complex one beta-gamma-delta. We compared the magnetic complexity data to two sets of sunspot number:

1- International Sunspot Number (ISSN)
2- NOAA sunspot number

We have been found that the number of more complex structures reach its maximum two years after solar maximum. We also compared the result to our identified geomagnetic storm list. The results showed the more complex ARs are responsible for the strongest geomagnetic storms.