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The Magnetic Topology Analysis on the Solar Active Region 10930

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Solar flares and coronal mass ejections(CMEs)are most dynamic phenomena in our Heliosphere nd the source of magnetic disturbance causing space storm. One of the reasons as unresolved the trigger mechanism for these phenomena is not to enough understand the three?dimensional (3D) magnetic field on the solar active region. Unfortunately, because the 3D magnetic structure cannot be directly observed with our current observational technology, the observation gives us the only 2D information on the photosphere. Therefore the extrapolation method as a boundary value problem from vector-field obtained by the observation is one of effective tool to understand the coronal magnetic field. In this study, we investigated 3D magnetic structure which is especially the magnetic topology of the field line forming sigmoid before the flare, and the change of the topology between before and after the flare based on the Quasi-Separatrix Layer(QSL) structure.

As a result, sigmoid is not formed by a single magnetic flux but composed of the multiple and non-uniform magnetic field lines. Furthermore, the field line forming the spine and curved part structure of sigmoid belonging to the same flux domain bounded by QSL. Because the high current density is distributed at chromospheric footpoints of the loops forming the sigmoid, this result suggests the Jule heating as cause of the corona loop heating. Furthermore, as a result of analyzing the magnetic topology between before and after the flare occurring, since the curved part of structure of sigmoid is disappeared after the flare, this result suggests the possibility of the eruption of this part during the flare. Furthermore, because the part of the spine of the sigmoid relaxes to the potential like field, this result suggests this flare has a relation of magnetic reconnection.

Keywords: Solar coronal magnetic fIeld, Solar active region, Solar flare