Hinode-3: 3rd Hinode Science Meeting
Hitotsubashi Memorial Hall, Tokyo
1–4 December, 2009

Three-dimensional magnetic topology of a flare-producing active region 10930

Satoshi Inoue

NICT

Tetsuya Magara

NAOJ

Abstract. Three-dimensional (3D) magnetic topology is a key to the understanding of an active phenomenon on the Sun, such as a solar flare and coronal mass ejections (CMEs). Unfortunately, most of observations have currently given only two-dimensional information on the magnetic field at solar surface. Therefore, 3D extrapolation based on the vectormagnetogram is one of the effective methods to understand the 3D magnetic topology. In this study, 3D magnetic field on the active region 10930, which produced an X3.4 class flare on Dec. 12, 2006, was extrapolated under the Non-Linear Force-Free (NLFF) approximation. Especially, we studied the 3D sigmoidal structure obtained by soft X-ray observation and Quasi-Separatrix Layers (QSL). Furthermore, we compared the magnetic topology before and after the flare occurred. As a result, S-shaped structure is composed of a multiple loop system where each loop has a different height. Furthermore, soft X-ray intensity is strong in the regions occupied by those loops, and photospheric footpoints of these loops have large current density concentrated. As a result of the QSL analysis where we compare QSLs before and after the flare, we clearly find that curved part of sigmoidal fields is disappeared and open field structure appears after the flare. Therefore, this result suggests a topological change where the curved structure of sigmoid changes to the open and large field structure due to the magnetic reconnection in this flare event, with a bright spine left at the center of the sigmoid. We suppose that this spine may cause the next flare on Dec. 14, 2006.