Interaction between active region and coronal hole: A role for making a trans-equatorial loop system

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The Soft X-ray Telescope (SXT) onboard Yohkoh (Tsuneta et al., 1991) often observed large-scale coronal loops connecting two active regions that were located on opposite sides of the solar equator. Such large-scale coronal loops are called trans-equatorial loop systems. It is not obvious how localized magnetic fields in active regions are related to large-scale coronal loop systems such as TLSs, which connect distant two active regions. And, there are other reasons why TLSs are interested in. Because TLSs have North-South orientation, the erupting TLS loops may have great geomagnetic effects, and it seems that TLSs play an important role in Babcock's dynamo model in the restoration of the poloidal field. Therefore, we can say that it is very important for space weather and solar physics to make formation mechanism of TLSs clear. In previous our study (Yokoyama and Masuda, in press), we analyzed a TLS event of 27-30 May 1998. From the analyses, we suggested a new scenario that interaction between active region and coronal hole forms the TLS is an important role. According to the suggestion, we expect that interchange reconnection will take place between open and closed field lines at coronal hole boundary region and that it will result in forming a new closed loop there. To make confirmation of the scenario we investigated time evolution of soft X-ray intensity around coronal hole boundary region using Yohkoh/SXT image data. An active region (Active region number: 8226) which we targeted here began to emerge from 23 May 1998 at north foot-point of the TLS. The active region was located nearby the north polar coronal hole. Then, the active region developed and reached to the west limb of the Sun on 27 May 1998 with solar rotation. We found that a new soft X-ray loop was formed which is connected between the active region and the coronal hole boundary on the 27th. This is what our scenario exactly expected. Therefore, our scenario of the TLS formation is morphologically supported from the observation at least. We will also report temperature and emission measure analyses of the event in presentation.