

# **Homologous Emerging Flux and associated Solar Activity**

**G. Zhou** and J. Wang

National Astronomical Observatories, Chinese Academy of Sciences  
A20 Datun Road, Chaoyang District, Beijing 100012, China

zhougp@ourstar.bao.ac.cn / Fax: 86-10-64851469 / Phone: 86-10-64888707

There are 69 GOES X-ray flares produced in the active regions (ARs) 10486 and 10488 during the famous Oct.-Nov. 2003 solar event. Among them, the X28 flare in AR10488 on Nov. 04 2003 may have been the largest X-ray event since observations began in 1976. Part of the associated large flare/CMEs form magnetic clouds in the interplanetary space. By investigating the photosphere magnetograms, we find that the emerging flux in AR10486, 10488, 10489, 10491 and 10492 appear homologous. The homologous behaviors are further confirmed by the evidence from the sub-photospheric flow maps, vertical velocity and meridional vorticity, as well as these ARs evolutions in MDI synoptic charts. We also find that there is large-scale magnetic connectivity among these ARs whether from EIT images or from the global magnetic force lines reconstructed by the potential extrapolation, which indicate these referred ARs are not isolated each other. The ARs are probably involved in a same topological magnetic system since we find a predominant negative helicity sign in these ARs and their associated magnetic clouds. With more analysis on the other observations in TRACE, RHESSI, GOES and so on, it is speculated that the associated flares/CMEs initiate during the evolutions of this topological isolated magnetic system, especially when it interacted with the other environmental flux.