



Solar Open Flux Migration from Pole to Pole: Magnetic Field Reversal

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Coronal holes are solar regions with low soft X-ray or low extreme ultraviolet intensities. The magnetic fields from coronal holes extend far away from the Sun, and thus they are identified as regions with open magnetic field lines. Coronal holes are concentrated in the polar regions during the sunspot minimum phase, and spread to lower latitude during the rising phase of solar activity. In this work, we identify coronal holes with outward and inward open magnetic fluxes being in the opposite poles during solar quiet period. We find that during the sunspot rising phase, the outward and inward open fluxes perform pole-to-pole trans-equatorial migrations in opposite directions. The migration of the open fluxes consists of three parts: open flux areas migrating across the equator, new open flux areas generated in the low latitude and migrating poleward, and new open flux areas locally generated in the polar region. All three components contribute to the reversal of magnetic polarity. The percentage of contribution from each component is different for different solar cycle. Our results also show that the sunspot number is positively correlated with the lower-latitude open magnetic flux area, but negatively correlated with the total open flux area.