The Impact of Long Term Evolution in Active Region Outflows

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Since their discovery, outflows at the edges of active regions have attracted a lot of interest primarily as they potentially could contribute to the slow solar wind. Evidence is accumulating that the abundances measurements at these regions are similar to those in the slow solar wind as measured by in-situ measurements (e.g. Brooks and Warren 2012). There have been different theories put forward to explain them the origin which include reconnection or waves occurring in the lower atmosphere or high in the corona. These works tend to use single case examples. Recent work by Fazakerley et al. (2016) have tracked a full Carrington rotation and analysed the active region outflows and the slow solar wind behaviour during that time. In locations where active regions are situated beside coronal holes there was enhanced - velocity solar wind. The surroundings of active regions are key to understanding how much they can contribute to the solar wind. One aspect that hasn’t been studied yet is how long term evolution impacts the outflows. In this work, we analyse four active regions that survive at least two solar rotations. We track how the flows change with time. We use both local and global modelling to determine how the age of the active region will impact the extent of the open magnetic field. We discuss the importance of new emerging flux and surroundings in terms of understanding the solar wind emitted by these regions.