

Can active regions in the solar atmosphere explain the high solar wind variability?

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Active regions in the solar atmosphere are known as being the birthplace of highly energetic events like flares and coronal mass ejections (CMEs). Although active regions are mostly made of magnetically confined plasma, they are also suspected to influence the solar wind, a continuous stream of charged particles originating from the solar atmosphere. The solar wind properties are fundamental in space weather predictions at Earth, and yet have a high variability that remains to be explained. The slow and dense solar wind is the most variable of all, a property which is likely associated to its various sources down to the lower solar atmosphere. In particular, part of the slow solar wind is suspected to take sources in the vicinity of active regions, where interchange magnetic reconnection between closed and open magnetic fields provides a channel for matter and energy exchange. This mechanism remains poorly understood, and yet could explain why slow solar winds have a similar composition in heavy ions as active regions. In this contribution I will give an overview of recent observations and novel numerical models that can help better understanding the solar wind sources. For such purpose one needs to follow a global and multi-physics approach that goes from the lower solar atmosphere all the way up to the corona and heliosphere.