

The role of magnetic reconnection in the generation of jets and plumes

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Abstract. Recent Hinode observations have revealed that coronal jets are a more frequent phenomenon than previously believed. This higher frequency results, in part, from the fact that jets exhibit a homologous behavior: successive jets re-occur at the same location. Hinode has also revealed that plumes, despite having very different lifetimes and morphological properties than jets, tend to be tightly linked with the jet-like events. The latter are frequent precursors for plumes.

We present the results of a series of 3D MHD numerical simulations of jets. The simulations were performed with our state-of-art adaptive mesh MHD solver ARMS. The results of these simulations, in which reconnection can occur, is compared with the results of the FLUX code, which was run with nearly identical magnetic configuration and driving. Since FLUX is a strictly ideal code, reconnection is not permitted. We conclude from these simulations that magnetic reconnection is necessary for the generation of jets. In addition, we find that two very different regimes of reconnection can occur in the ARMS simulations: a very impulsive 3D evolution during the jet-generation phase; and a quasi-steady mode, which can account for the plume phenomena. The succession of these regimes may explain the observed link between jets and plumes and the recurring properties of jets.

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