The interaction between coronal mass ejections and streamers as viewed by LASCO over 15 years

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The question of the relationship of coronal mass ejections (CMEs) to streamers dates back to the early observations of CMEs with space coronagraphs and subsequent efforts to understand their origin. Whereas the mass and kinetic energy losses of CMEs are insignificant in the corona, they are considered a key player as a means to remove magnetic flux and helicity that would otherwise build up in the corona. How this may work essentially boils down to the nature of the CME-streamer interaction i.e. as to whether CMEs respond passively or contribute dynamically to the coronal field restructuring. We are reconsidering this question on the basis of high resolution synoptic maps at 3 Rsun constructed from the LASCO-C2 images of the corona over 15 years (1996-2010) thus encompassing cycle 23 and the rising phase of cycle 24. During that period, our ARTEMIS II catalog of LASCO CMEs reports 21394 events and studying their interaction with the streamer belt requires an automated procedure. For this purpose, we consider that streamers are prominently one dimensional objects, manifesting the boundary between regions of opposite magnetic polarities that can be represented by the line of maximum radiance along them. As such, streamers are defined as ridges on the synoptic maps and an efficient way to detect these ridges consist in applying a watershed filter. Then for each CME (which appears as a vertical streak on the synoptic maps), we detect the streamer ridges present before and after its occurence all along its latitudinal extent. The CME-streamer interaction is then quantified in terms of geometric changes (appearance/disappearance or displacement of the streamer) and photometric changes (brightening/dimming of the streamer). We will present statistical data on these interactions for the 1996-2010 time period.