INTERACTING GAS FLOWS IN SPLIT COMETS: A RE-EVALUATION OF THE PERIGEE OUTBURST OF C/1996B2 (HYAKUTAKE).

W. M. Harris and J. P. Morgenthaler

Split comets offer a unique insight into the cohesive structure, patterns of gas production, and composition of cometary nuclei. Splitting events can take many forms with the amount of material ejected, its stability, and intrinsic activity levels changing from event to event. Since 1996, there have been 3 comets in which a form of gas interaction between the nucleus and the liberated debris was detected. Of these, the most prominent was that of C/1996B2 (Hyakutake), which experienced a significant splitting event just prior to a close (0.102 AU) encounter with the Earth. The favorable geometry of this event made possible the detailed study of both the debris and a pair of gas interaction regions that manifested themselves as 'arcs' or 'coma wings'. The mechanism producing the arcs has been a source of debate since their initial discovery, but the state of the existing data analysis has not been adequate to unambiguously identify the more likely source. Here we present the most detailed analysis yet conducted of the arcs and the related condensation regions, with the aim of placing new constraints on the processes that may be responsible for them. In particular we provide new analysis of the extent of gas production in the debris train, the relative locations of the arc features as seen in different gas species, and the relative motion and evolution of arc and debris features.