

Anomaly in sodium emission in comets at high spatial resolution

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The origin of anomalous distribution of the intensity of sodium atoms emission in the head of comet Mrkos 1957 V, the displacement of the brightness maximum of sodium atoms D-lines towards the Sun to cometocentric distance $r(\text{max}) = 2000$ km, discovered by high angular resolution spectral observations of the comet at heliocentric distances $R = 0.55\text{-}0.59$ AU with the 5-meter Palomar telescope, is considered. The idea of depression of cometary dust temperature and, hence, its evaporation rate, by expanding cool/cryogenic gas flow from the cometary nucleus is developed theoretically and a connection between $r(\text{max})$ and gas production rate of cometary nuclei is found. The anomalous phenomenon considered may be revealed in the inner comas of bright comets by spectral observations with high spatial / angular resolution as well as by in situ measurements of the Na atoms density distribution during space missions to comets.