Highlights of Spanish Astrophysics VII, Proceedings of the X Scientific Meeting of the Spanish Astronomical Society held on July 9 - 13, 2012, in Valencia, Spain. J. C. Guirado, L.M. Lara, V. Quilis, and J. Gorgas (eds.)

The Dust Environment of Comets 22P/Kopff and 81P/Wild 2

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Abstract

In this work we present optical observations and Monte Carlo models of the dust environment of comet 22P/Kopff and a preliminary study of 81P/Wild 2. For the first one, we derived the dust loss rates, ejection velocities, and power law size distribution as functions of the heliocentric distance using pre- and post-perihelion imaging observations during the 2002 and 2009 apparitions. The best fit obtained is for an anisotropic ejection model. The asymmetries are inbound at r_h = 2.5 AU and outbound at r_h = 2.6 AU and they are compatible with a scenario where dust ejection is mostly seasonally-driven, coming mainly from regions near subsolar latitudes at far heliocentric distances inbound and outbound but at intermediate to near-perihelion distances, the outgassing would affect much more extended latitude regions becoming nearly isotropic. The model has also been extended to the thermal infrared to be applied to available trail observations with IRAS and ISO spacecrafts of this comet. The resulting trail intensities are in good agreement with those observations, which is remarkable taking into account that those data are sensitive to dust ejection patterns corresponding to several orbits before the 2002 and 2009 apparitions. For 81P/Wild 2 we run more than 8000 parameters combination for an isotropic particle emission pattern in a first step but an anisotropic ejection model is required to fit the complex structure shown by the comet. We also include the asymmetry in the dust parameters respect to perihelion.

Acknowledgments

This work is based on observations obtained at Sierra Nevada Observatory. We thank the staff members for their assistance. Part of the data are taken from the ESO/ST-ECF Science Archive Facility. We are grateful to the amateur astronomers of the association *Cometas-Obs* for providing us with comets observations.