[SO03] Gound/Space Observations of New Centaur Comet 174P/Echeclus

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Centaur objects are small solar system bodies whose orbits are located between the gas giant planets. We report the first detection of cometary activity in Centaur 174P/Echeclus. (60558) 2000 EC98, its previous designation, was known as a Centaur object with no visible coma or non-rotational photometric variations since its discovery by Spacewatch in 2000. However, a massive cometary outburst was detected on 2005 December 30.50 UT, using the Palomar 5-m reflector and Large Format Camera. The object was subsequently assigned the designation 174P/Echeclus. Total magnitude of 174P was R = 15.0 at the time of the discovery of activity, while the magnitude of the bare nucleus was expected to be only R ~ 20.0. The coma showed asymmetric structure with two major inner arcs and a well-shaped outer boundary, and extended 20 arc-seconds from the nucleus condensation, equivalent to a projected distance of 190,000 km at the comets distance of 13.07 AU. Spitzer MIPS Director's Discretionary observations at late February showed strong signal at both 24 and 70 micron bands and the analysis yielded estimates of the coma signal contribution in excess of 2/3rd of the total signal in the 24 micron band. Interestingly, observations during the next five months showed that the apparent source of activity moved away from the primary body in late February, then moved back towards in early May.

[SO04] Dynamical Simulation for Probing the Dust Environment of Comet 22P/Kopff

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There have been many efforts to model the dust tail of comets. One of the most successful approaches was on the basis of syndyne and synchrone curves, from which the surface density map can be constructed over the tails (Finson & Probstein 1968). An analytical model was also developed by Fulle (1989), who assumed Keplerian motions for the cometary dust particles with orbital elements modified by the ejection velocity and radiation pressure. These models has acquired definite success in describing some comets' tails. But they did not take into account the Poynting-Robertson and the solar wind drags, nor the gravitational perturbations by planets. The last one is especially important for cometary trails of large particles. We will adopt Runge-Kutta method powered by Gauss-Radau spacing and integrate the equation of motion which includes all the forces acting on the dust particles. We apply this method to the dust particles of size ranging from 4 μm to 4 cm ejected from a periodic comet, 22P/Kopff and compare the results with the optical images and its analytical models. After some refinement, this method will be utilized to model numerous trail observations we have made with Kiso telescope, Japan, and with the CFHT, Hawaii. This will guide us to the dust production rate of comets and the cometary contribution to the interplanetary dust cloud.