Sublimating grains in the coma of new comets originating from the Oort Cloud

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It is expected that a billion of years of space weathering (see, e.g., Kanuchova et al., 2012, Icarus, 221, 12) produces a crust of organic matter that will be released when a comet enters, for the first time, in the inner Solar System. When approaching to the Sun, a comet is at heliocentric distances r_h greater than 3 au, the sublimation of CO and CO_2 is the main source of cometary activity. At shorter distances, the sublimation of water becomes the most important mechanism of activity. The gases escaping from the nucleus cause drag for the coma grains that can be refractory dust (silicates, carbon), water ice, and/or organic ices. Oort comets at their first passage in the inner Solar System, should produce an halo of organic or water ice particles. Recently, our group started to monitor new, inbound, bright Oort comets (C/2011 F1, C/2012 S1, C/2012 K1, C/2013 V5, C/2012 F3) to search for these grains. The method consists of detecting the cloud of sublimating grains in the inner coma by using the $\Sigma Af(\rho)$ function (Tozzi et al., 2007, A&A, 476, 979). However, this over-population of grains, beside the sublimation, can be also due to short-time activity (outburst) or too large grains expanding at very slow velocity, as it has been found in comet 67P/C-G (Tozzi et al., 2011, A&A, 531, 54). To discriminate between the phenomena, it is necessary to monitor the comet both at short timescales for the outbursts (by repeating the observations after a few nights), and in a longer term (weeks to months). If the cloud does not expand with decreasing heliocentric distance, there is a high probability that organic and/or water-ice grains are present. We can discriminate between organic and water-ice grains by measuring their color and spectra. In this work, we will present the results obtained from the observations of C/2011 F1 (LINEAR) and C/2012 S1 (ISON). The comparison between data and theoretical simulations, obtained with a simple model assuming sublimating grains, shows that this phenomenon is the most probable phenomenon occurring in those cometary comae.