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Interpretation of pre- and post-equinox neutral Rosetta ROSINA observations in terms of nucleus temperatures and heterogeneity

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Pre-equinox ROSINA/DFMS measurements revealed a strongly heterogeneous coma. The concentrations of major and various minor volatile species were found to depend on the latitude and longitude of the nadir point of the spacecraft. The observed time variability of coma species remained consistent for about three months up to equinox. The chemical variability could be generally interpreted in terms of temperature and seasonal effects superposed on some kind of nucleus heterogeneity. We compare here pre-equinox measurements from 2014 to measurements taken after the second equinox in 2016, both at heliocentric distances larger than 3 AU. With the expected similar conditions over these time periods in mind, the presence of any significant difference, or the lack thereof, in the concentrations and time variability of species between pre- and post-equinox provides insight into the thermal evolution and possible chemical heterogeneity of the nucleus of comet 67P.