Photometric study of cometary analogs in the LOSSy laboratory at the University of Bern

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We have set up the LOSSy laboratory (Laboratory for Outflow Studies of Sublimating Materials) to study the spectro-photometric properties of various analogs of planetary-object surfaces, with a special emphasis on icy samples and their evolution under simulated space conditions. This laboratory is currently equipped with two facilities: the PHIRE-2 radio-goniometer, designed to measure the bidirectional visible reflectance of samples under a wide range of geometries and the SCITEAS simulation chamber, designed to follow the evolution of icy samples subliming under low temperature and low pressure conditions by means of VIS-NIR hyperspectral imaging. We will report on the characterization of cometary analogs using both facilities. We produce these analogs by mixing in various proportions fine-grained ice, mineral and organic matter. Various preparation protocols have been defined to produce different textures of sample. Using the PHIRE-2 radio-goniometer, we are building a catalog of bidirectional reflectance data for various cometary analogs, varying by steps the different parameters susceptible to affect the reflectance phase function. In particular, we have recently upgraded the instrument to be able to characterize in detail the opposition effect by allowing measurements of the reflectance at very low phase angle. This laboratory dataset is intended to be used for the analysis of the data acquired by the OSIRIS imager onboard Rosetta. Using the SCITEAS simulation chamber, we have followed for 30 hours the evolution of a cometary analog placed under secondary vacuum ($<10^{-6}$ mbar) and maintained at low temperature (170–200 K) for more than 30 hours. We analyzed the temporal evolution of the morphology and the photometry of the surface of the sample to identify which processes affect the surfaces of cometary nuclei during sublimation and how they affect their visible and near-infrared surface properties.