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Sampling hydrometeors in clouds in-situ - the replicator technique

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For the examination of ice crystals in clouds, concerning their number concentrations, sizes and shapes, often instruments mounted on fast flying aircraft are used. One related disadvantage is possible shattering of the ice crystals on inlets, which has been improved with the introduction of the “Korolev-tip” and by accounting for inter-arrival times (Korolev et al., 2013, 2015), but additionally, the typically fast flying aircraft allow only for a low spatial resolution. Alternative sampling methods have been introduced as e.g., a replicator by Miloshevich & Heymsfield (1997) and an in-situ imager by by Kuhn & Heymsfield (2016). They both sample ice crystals onto an advancing stripe while ascending on a balloon, conserving the ice crystals either in formvar for later off-line analysis under a microscope (Miloshevich & Heymsfield, 1997) or imaging them upon their impaction on silicone oil (Kuhn & Heymsfield, 2016), both yielding vertical profiles for different ice crystal properties.

A measurement campaign was performed at the Lindenberg Meteorological Observatory of the German Meteorological Service (DWD) in Germany in October 2016, during which both types of instruments were used during balloon ascents, while ground-based Lidar and cloud-radar measurements were performed simultaneously. The two ice particle sondes were operated by people from the Lulea University of Technology and from TROPOS, where the latter one was made operational only recently. Here, we will show first results of the TROPOS replicator on ice crystals sampled during one ascent, for which the collected ice crystals were analyzed off-line using a microscope.

Literature:

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