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Innovative, mini, biodegradable radiosondes to track small-scale fluctuations in warm cloud and clear air environments

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Abstract Submitted
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Innovative, mini, biodegradable radiosondes to track small-scale fluctuations in warm cloud and clear air environments SHAHBOZBEK ABDUNABIEV, TESSA C. BASSO, DANIELA TORDELLA, Politecnico di Torino, MIRYAM PAREDES, Envisens Technologies s.r.l., Politecnico di Torino, EROS PASERO, FLAVIO CANAVERO, Politecnico di Torino — Modelling clouds depends on a variety of chemical and physical processes. These processes range from the nanometer scale, where nucleation, coalescence and rain formation take place, to airflow dynamics which can range up to kilometres. Turbulence plays an important role in the behaviour of these processes and can be noted on different scales. The innovative, ultralight green radiosondes presented here are designed to passively track fluctuations of temperature, humidity, pressure and velocity for several hours on isopycnic surfaces in cloud and clear air environments at altitudes between 1-3 km. To equalize the buoyancy force to the weight of the system, the balloon is filled with a mixture of helium gas and air. The sonde incorporates various set of sensors and a long range/low power radio module, which makes it possible to track fluctuations. A Lagrangian set of data can then be obtained by fusion of GPS (Global Positioning System) and IMU (Inertial Measurement Unit) sensor output. GPS and IMU data can be integrated using the Kalman filter, where GPS provides the periodic updates for removing drifts in the IMU output. This data set can be of help in developing stochastic models to account for turbulence effects on cloud formation.

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