The counterflow virtual impactor (CVI) (Noone et al., 1988; Twohy et al., 1997) has been utilized both in the air and on the ground in studies of aerosol/cloud interactions, cloud physics, and climate. At the CVI inlet tip (Figure 1), cloud droplets or ice crystals larger than about 8 μm aerodynamic diameter are separated from the interstitial aerosol and impacted into dry nitrogen gas. This separation is possible via a counterflow stream of nitrogen out the CVI tip, which assures that only larger particles (cloud droplets or ice crystals) are sampled. Because droplets or crystals in a sampling volume of about 200 l min^{-1} are impacted into a sample stream of approximately 10 l min^{-1}, concentrations within the CVI are significantly enhanced. The water vapor and non-volatile residual nuclei remaining after droplet evaporation are sampled downstream of the inlet with selected instruments. These may include a Lyman-alpha or similar hygrometer, a condensation nucleus counter, an optical particle counter, or particle filters for various chemical analyses. For CAMEX, the primary measurement produced by the CVI will be ice water content.

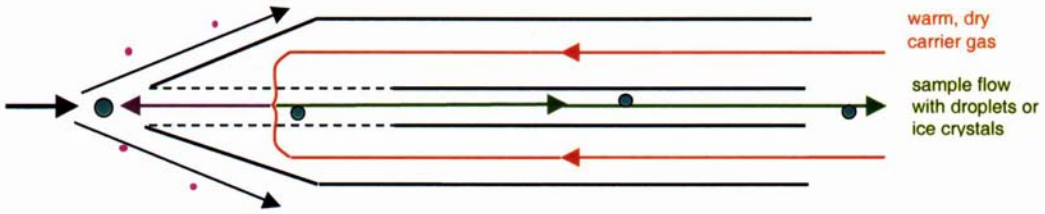

Figure 1. CVI inlet tip. Warm, dry carrier gas (red) is pumped to the tip and radially in through the porous tube, where it splits into the sample flow (green) and the counterflow (purple). Droplets or ice crystals (blue) approaching the probe tip have sufficient inertia to penetrate the counterflow and enter the sample flow, while unactivated aerosol particles (pink) follow the airflow streamlines around the probe tip.

Noone, K.J., Ogren, J.A., Heintzenberg, J., Charlson, R.J. and D.S. Covert, Design and calibration of a counterflow virtual impactor for sampling of atmospheric fog and cloud droplets, Aer. Sci. Technol., 8, 235-244, 1988.

Twohy, C.H., Schanot, A.J. and W.A. Cooper, Measurement of condensed water content in liquid and ice clouds using an airborne counterflow virtual impactor, J. Atmos. Oceanic Technol., 14, 197-202, 1997.