As a part of the **A**rctic **R**esearch of the **C**omposition of the **T**roposphere from **A**ircraft and **S**atellites (ARCTAS) program, two particle-into-liquid samplers (PILS) will be operated on the NASA DC-8 aircraft to measure fine particle bulk chemical composition. One PILS will be coupled to a Sievers total organic carbon analyzer (GE Water Systems, Model 800T). This setup will be referred to as PILS_TOC. This configuration will be used for water soluble organic carbon (WSOC) measurements. A second PILS will be integrated with a liquid sample fraction collector (PIS_FC). The collected liquid will be frozen and analyzed using an Ion Chromatography system (Dionex, IC20). This instrument setup will be used to measure various organic and inorganic ions in the atmosphere. A list of the species to be measured and more details on each measurement are presented in Table one.

Species to be measured	Limit of Detection	Uncertainty	Measurement integration period
Na^+	0.1 ugm^{-3}	20%	5 minutes
NH4$^+$	0.1 ugm^{-3}	20%	5 minutes
K^+	0.1 ugm^{-3}	20%	5 minutes
Mg^+	0.1 ugm^{-3}	20%	5 minutes
Ca^+	0.1 ugm^{-3}	20%	5 minutes
Cl–	0.1 ugm^{-3}	20%	5 minutes
NO2–	0.1 ugm^{-3}	20%	5 minutes
NO3–	0.1 ugm^{-3}	20%	5 minutes
SO4–	0.02 ugm^{-3}	20%	5 minutes
PO4–	0.1 ugm^{-3}	20%	5 minutes
Organic Acid ions (such as Acetate, Pyruvate, Formate, Oxalate, Methanesulfonate and 12 other organic acids)	Less than 0.1 ugm^{-3}	20%	5 minutes
WSOC	0.1 ugCm^{-3}	8%	3 seconds

Table 1: Chemical Species measured by PILS_FC and PILS_TOC and the details of the measurements

Figure one represents a simplified schematic of the two systems. Ambient air is passed through denuders to eliminate background interference from organic and inorganic gaseous species. Figure two is a photo of the PILS_TOC system as it was deployed during a similar research project. And figure three is a close-up of PILS.
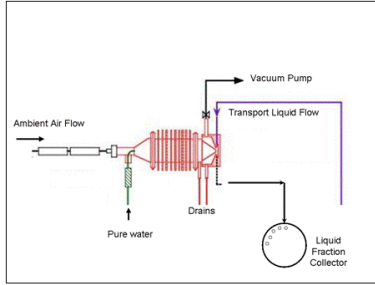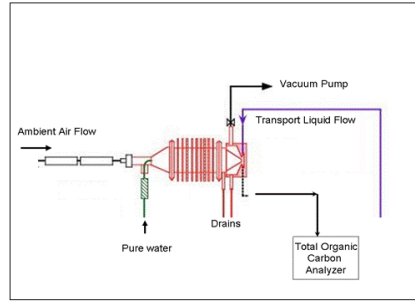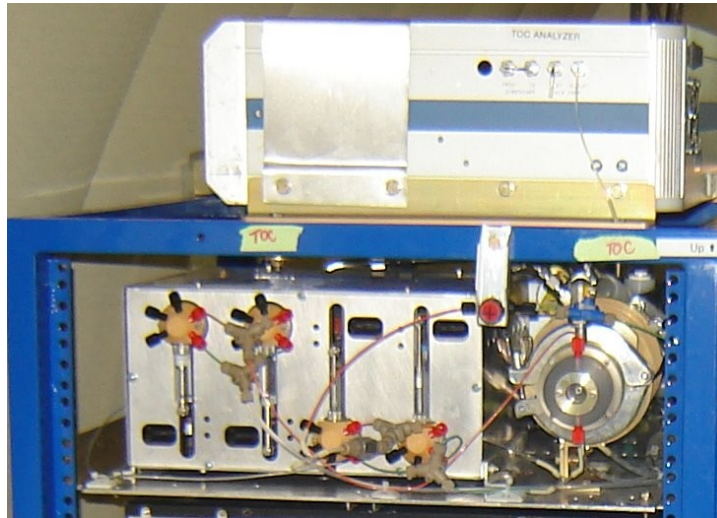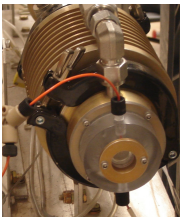
Figure 1: A simple schematic of PILS_FC and PILS_TOC

Figure 2: A photo of the PILS_TOC system

Figure 3: a photo of PILS