

Advanced Whole Air Sampler

AWAS

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Data Collection/Creation Process

- Sample collection:
 - Evacuate the AWAS canisters (1.5 L, stainless steel), add 15 Torr water vapor to passivate surfaces
 - Install 32 evacuated canisters into a custom-built manifold to fit in ER-2 belly pod
 - During flight, open canister valve on command and pressurize cans to capture whole air samples (~3 atm)
 - After set time or pressure limit, canisters are closed automatically.



1. Manifold in ER-2 belly pod (nose cone off)



2. AWAS canister

Data Collection/Creation Process

- Send sampled canisters for analysis at University of Miami
- Separation of compounds in the sample using gas chromatography (GC)
- Detection and quantification using three techniques:
 - Mass Spectrometry (MS)
 - Flame Ionization detection (FID)
 - Electron Capture detection (ECD)

File Structure & Content

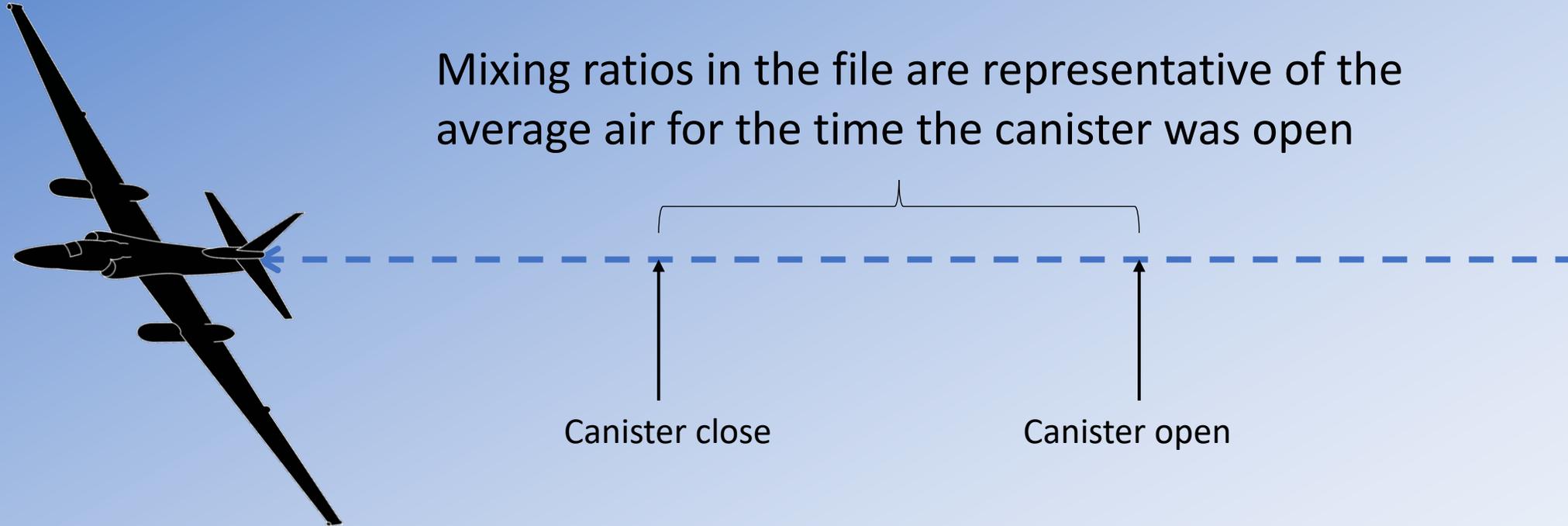
- 1 file per flight, each called DCOTSS-AWAS_ER2_2021MMDD_R#
- Files for TF02, TF03 and RF01 through RF11.
- One row of data per canister (up to 32 rows)
- Size: 15 KB
- Three time columns for when the can opened (TIME_START), closed (TIME_STOP) and the mid point of the open and close times (TIME_MID). All times in UTC seconds since midnight
- After the times, each line contains compound mixing ratios for the trace gas heading the column

Content: Compounds

- CFCs: 11, 12, 13, 112, 112a, 113, 114, 115
- HCFCs: 22, 141b, 142b
- HFCs: 23, 134a, 125, 143a, 152a, 227ea, 365mfc
- PFC: 218, 318
- Halons: 1211, 2402, 1301
- Chlorinated species: CH_3Cl , CH_2Cl_2 , CHCl_3 , CCl_4 , C_2Cl_4 , 1,2- $\text{C}_2\text{H}_4\text{Cl}_2$, CH_3CCl_3
- Brominated species: CH_3Br , CH_2Br_2 , CHBr_3
- Mixed halogenated: CH_2BrCl , CHBr_2Cl
- Hydrocarbons: ethane, ethyne, propane, iButane, nButane, iPentane, nPentane, benzene
- Other: OCS , MeONO_2 , EtONO_2 , iPrONO_2 , 2-BuONO_2

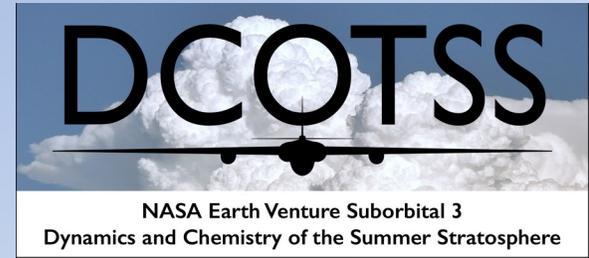
Data Limitations & Considerations

Mixing ratios in the file are representative of the average air for the time the canister was open



- Not a continuous dataset or fast response instrument
- Able to measure sub-ppt values
- Samples taken with low flow rates (at high altitudes) may occasionally lead to contamination or artifacts – some data has therefore been removed at altitudes greater than 19 km.
- Some gases have only undergone preliminary calibrations

Tentative Archival Timeline



- First round of AWAS data uploaded on 9th November 2021
- Make available to public: by end of February 2022