Airborne Data Processing and Analysis (ADPAA)

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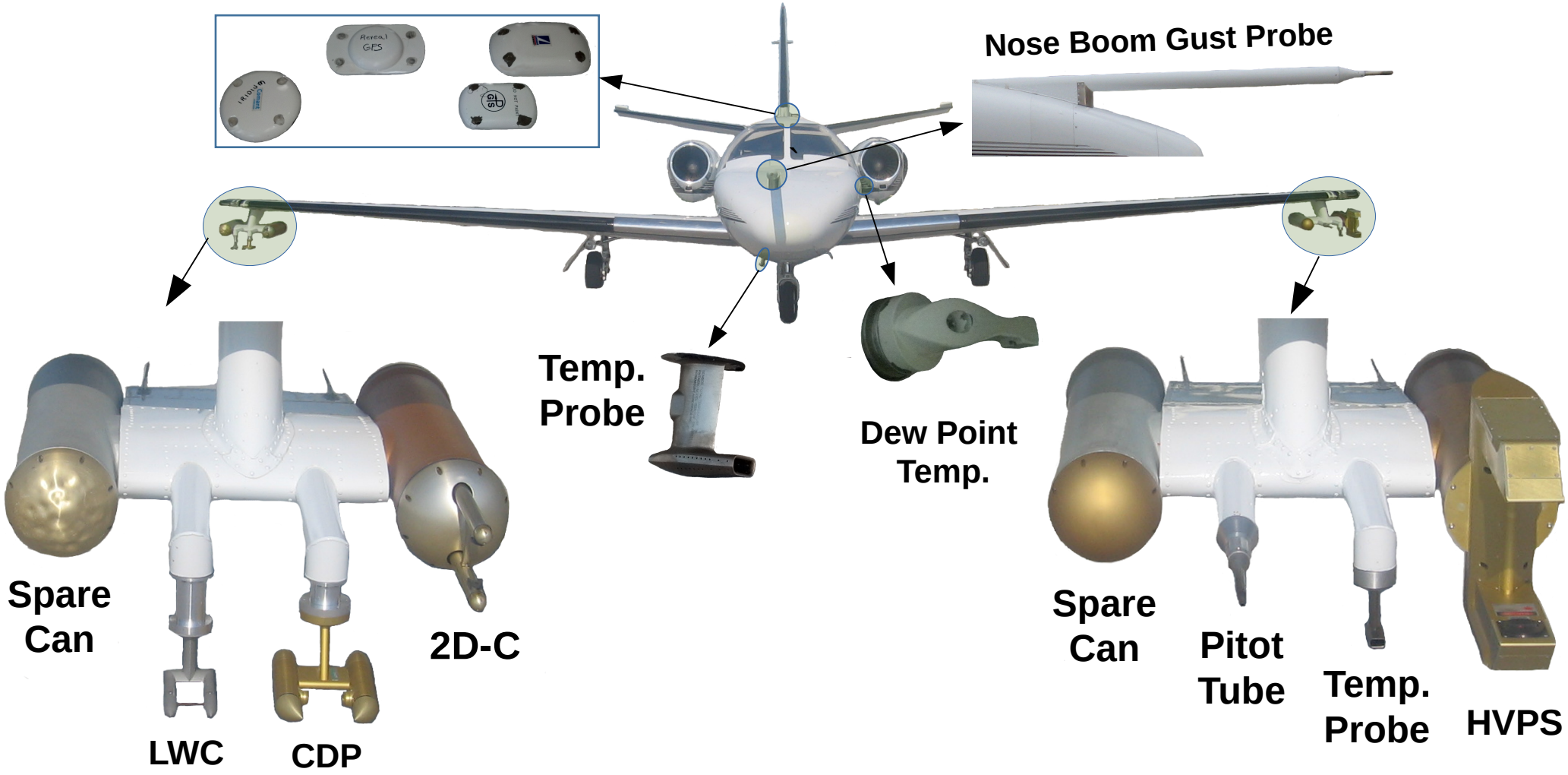
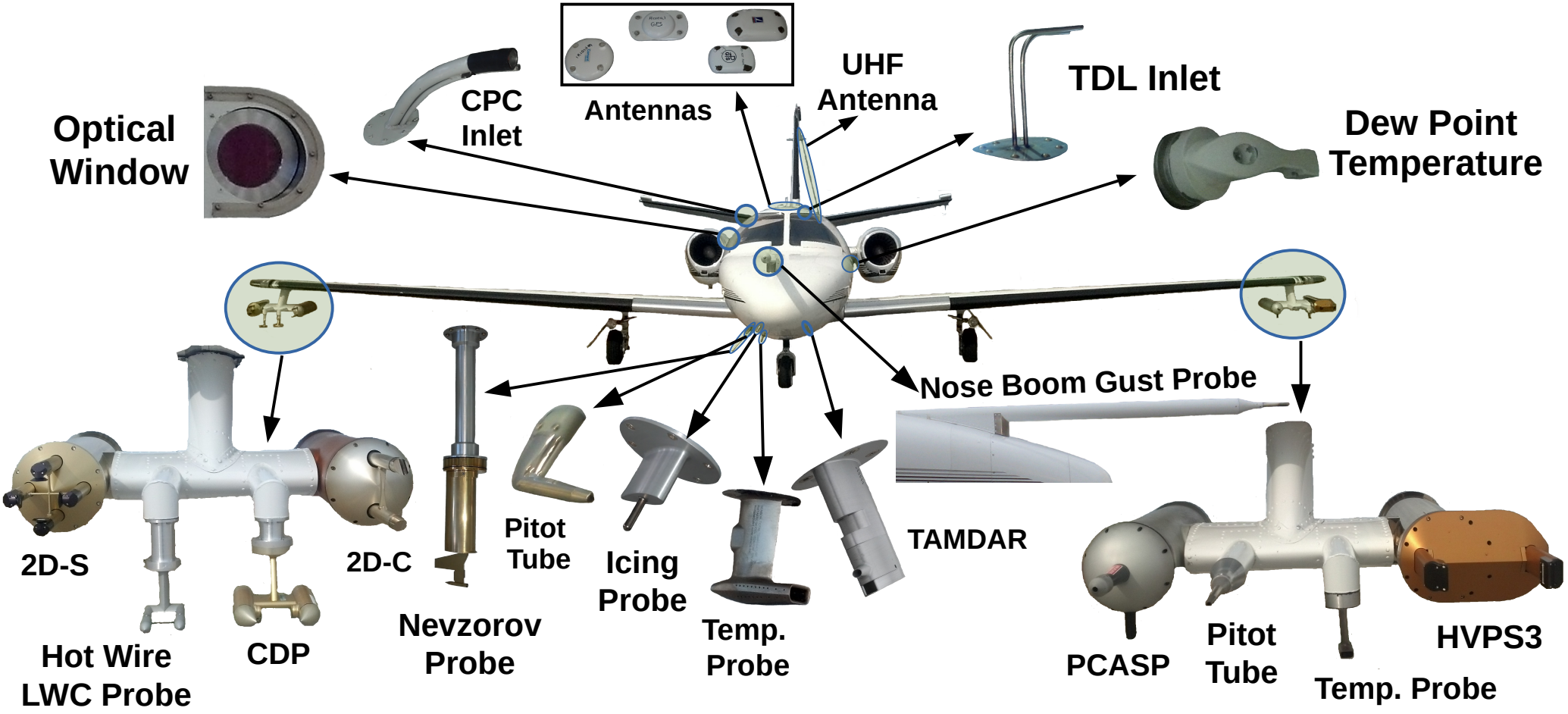
Overview, Outline, and Objective

- Research Aircraft
  - Instrumentation and Data Processing for different platforms.
  - Choice of a platform for a project.
    - Necessary of a “large” research aircraft.
      - What is the research objective and science analysis?
- Airborne Data Processing and Analysis(ADPAA)
  - Features of ADPAA
    - What can ADPAA do?
  - Documentation Provided
    - Getting answers for questions.
      - How are tag numbers used?

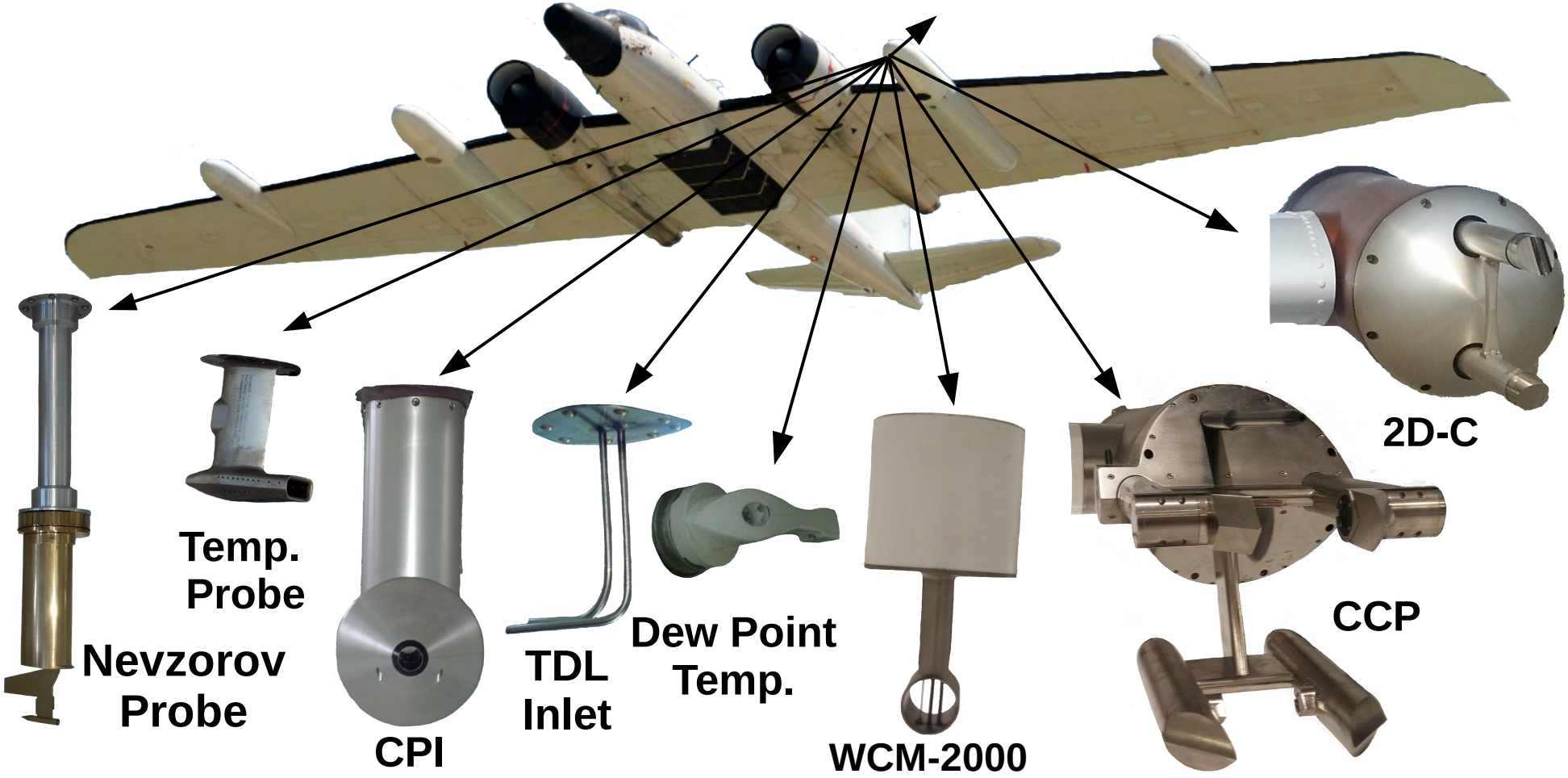
Citation Research Aircraft: 2010



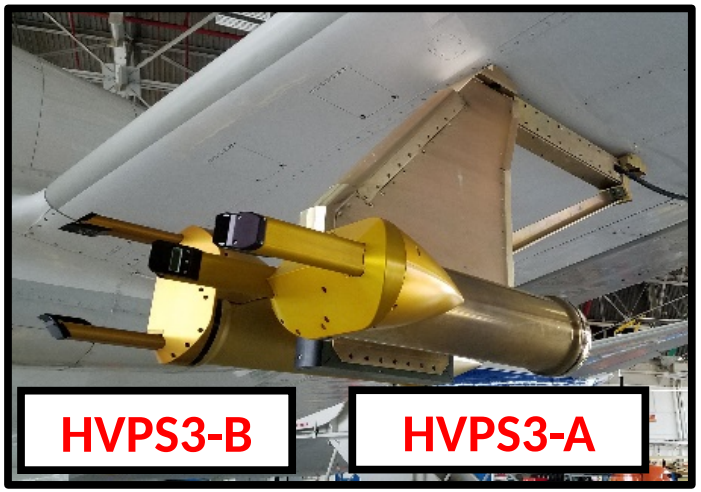
Citation Research Aircraft: 2015 (CAPE2015)

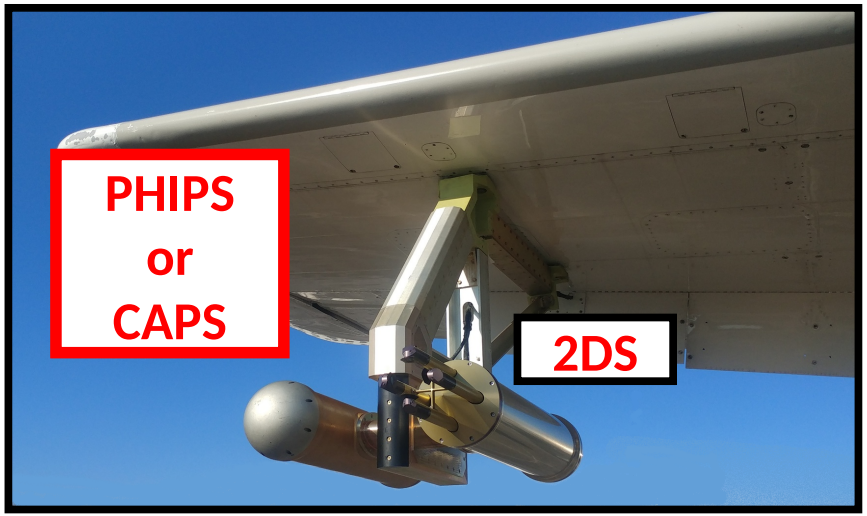


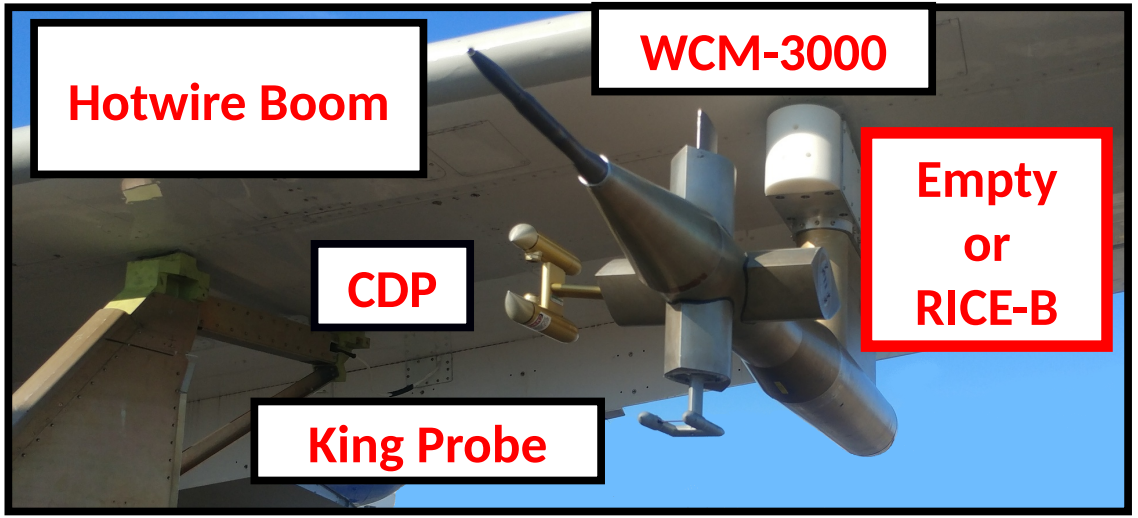
WB-57: 2017 (Cirrus Clouds)



NASA P-3: 2023 (IMPACTS)







ADPAA Processing of Measurements

- Data Processing
  - Flight and Project Processing Scripts
- Analysis
  - Cplot/Cplot2 (IDL) & aplot (Python) Visualization Packages

ADPAA Package Programming Language(s)

- Main Language
  - IDL (New Code in Python)
- Additional Languages
  - Perl
  - Bash
  - Csh
  - FORTRAN
  - C
  - Matlab
  - Scilab

```
delene@ice:/nas/und/NorthDakota/2014/Aircraft/CitationII_N555DS/FI
[delene@ice 20140306_174537]$ process_all_ophir
Processing the 14_03_06_17_45_37.sea file ....................... Done
Creating 14_03_06_17_45_37.applanix.1Hz ......................... Done
Creating 14_03_06_17_45_37.analog.1Hz ........................... Done
Processing the 14_03_06_17_45_37.analog.??? file ................ Done
Processing the 14_03_06_17_45_37.2dc file ....................... Done
Processing the 14_03_06_17_45_37.serial.GPS.raw ................. Done
Creating 14_03_06_17_45_37.physical.clean ....................... Done
Creating 14_03_06_17_45_37.physical.filtered .................... Done
Creating the 14_03_06_17_45_37.physical.10Hz file ............... Done
Creating the 14_03_06_17_45_37.physical.1Hz file ................ Done
Processing the 14_03_06_17_45_37.physical.? file ................ Done
Creating 14_03_06_17_45_37.basicP1T1.1Hz ........................ Done
Creating 14_03_06_17_45_37.basicP1T2.1Hz ........................ Done
Creating 14_03_06_17_45_37.basicP2T1.1Hz ........................ Done
Creating 14_03_06_17_45_37.basicP2T2.1Hz ........................ Done
Creating 14_03_06_17_45_37.basic.10Hz ........................... Done
Creating 14_03_06_17_45_37.basic.1Hz ............................ Done
Processing the 14_03_06_17_45_37.counts.pcasp.raw ............... Done
Creating 14_03_06_17_45_37.basic.8Hz ............................ Done
Processing the 14_03_06_17_45_37.counts.cdp.raw ................. Done
Creating 14_03_06_17_45_37.king.raw ............................. Done
Processing the 14_03_06_17_45_37.applanix.raw ................... Done
Creating 14_03_06_17_45_37.angles.applanix.1Hz .................. Done
Creating 14_03_06_17_45_37.king.1Hz ............................. Done
Creating 14_03_06_17_45_37.conc.cdp.1Hz ......................... Done
Creating 14_03_06_17_45_37.egg.raw .............................. Done
Creating 14_03_06_17_45_37.wind.raw ............................. Done
Creating 14_03_06_17_45_37.nevwc.raw file ....................... Done
Creating 14_03_06_17_45_37.nevwc.1Hz ............................ Done
Creating 14_03_06_17_45_37.serial.GPS.10sec ..................... Done
Creating 14_03_06_17_45_37.REAL.winds.1Hz ....................... Done
Creating 14_03_06_17_45_37.550nm.scat.raw ....................... Done
Creating 14_03_06_17_45_37.conc_stp.pcasp.raw ................... Done
Creating 14_03_06_17_45_37.oph file ............................. Done
Creating 14_03_06_17_45_37.air file ............................. Done
Using 14_03_06_17_45_37.2dc to create 2DC images ................ Done
[delene@ice 20140306_174537]$
```

Data Formats Supported

- Input from any M300 (*.sea) Acquisition File
  - Conversion scripts support instrument recorded data.
- Main Data Format
  - Gzipped (compressed) NASA/UND ASCII 1001 Format
- Output Format
  - NASA/UND ASCII 1001 Format
  - 2013 ICARTT NASA Format (ict)
  - NetCDF
- Data File Import Routines (IDL, Python, Matlab, Scilab, Igor)
- Many Conversion Routines

ADPAA Supported Instruments

- Companies (Applanix, Aventech, Alicat, BMI, DMT, Honeywell, SEA, SPEC, Thermo, TSI)
- Processing Tag Number Standard
  - https://adpaa.sourceforge.io/wiki/index.php/.:M300Tags:home

Data Processing

- Data Quality Control
  - Calibration Checks
  - Data Missing Values Codes
  - Levels of Data Processing
    - Raw Recorded Data
    - Engineering to Physical Units
    - Single Instrument Data Files
    - Combined Instrument Data File
- Data Quality Assurance
  - Scientific Data Review

Comments on Scientific Data

- Quick Visualization of data is very Important.
  - Fast creation of preliminary version of the data.
  - Create a final data set after the project is over by applying manual edits to the “raw” data files which replace “bad” data with missing value codes.
- Archive the raw data and any editing files.
- Work with ASCII data as much as possible.
  - Compress ASCII files.
- Use a standard data format, which includes Meta data in all data files.

Availability and Copyright

- SourceForge Repository (SVN)
  - Current version 4264
  - 4 Administrators
  - 14 Active Developers
  - 19 Past Developers
- Download
  - svn checkout: svn://svn.code.sf.net/p/adpaa/code/trunk adpaa-code
- GNU/GPL v3 Licensed
  - Have to remain open, even when forked.

References

Gateway - http://aerosol.atmos.und.edu/ADPAA/index.html

Web Site - https://sourceforge.net/projects/adpaa/

Wiki - http://adpaa.sourceforge.net/wiki/index.php/Main_Page

Delene, David J., A. Skow, J. O'Brien, N. Gapp, S. Wagner, K. Hibert, K. Sand, and G. Sova, Airborne Data Processing and Analysis Software Package (Version 4267), Zenodo, 22 June 2022,doi:10.5281/zenodo.6685679.

Delene, D. J., Airborne Data Processing and Analysis Software Package, Earth Science Informatics, 4(1), 29-44, 2011, URL: http://dx.doi.org/10.1007/s12145-010-0061-4, DOI: 10.1007/s12145-010-0061-4