National Aeronautics and Space Administration

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SPACE LAUNCH SYSTEM

Time Correlated Wind/Atmosphere Profile Database for NASA DOL Assessments

Frank Leahy, MSFC/EV44, Natural Environments Branch
BJ Barbré, Jacobs Space Exploration Group, MSFC Natural Environments

Natural Environments Day of Launch Working Group
April 24, 2019

Background

- **MSFC Natural Environments previously developed multiple databases for SLS and Orion MPCV ascent assessments:**
  - KSC Seasonal Atmospheric Profile Triplets
    - Sumer, Transition, and Winter seasons
    - 4000 triplets per season
    - L-2, L-1, L-0
  - KSC Seasonal Atmospheric Profile Quintuplets
    - Summer, Transition, and Winter seasons
    - 2000 triplets per season
    - L-2, L-1, L-0, L+1, L+2
    - The L-0, L+1, and L+2 profiles are a subset of the triplets
- **DOLILU Integrated Ad Hoc Team (DOLIAHT) requested a more robust database, which could be used to assess multiple time lines, and to develop knockdowns for various time intervals**

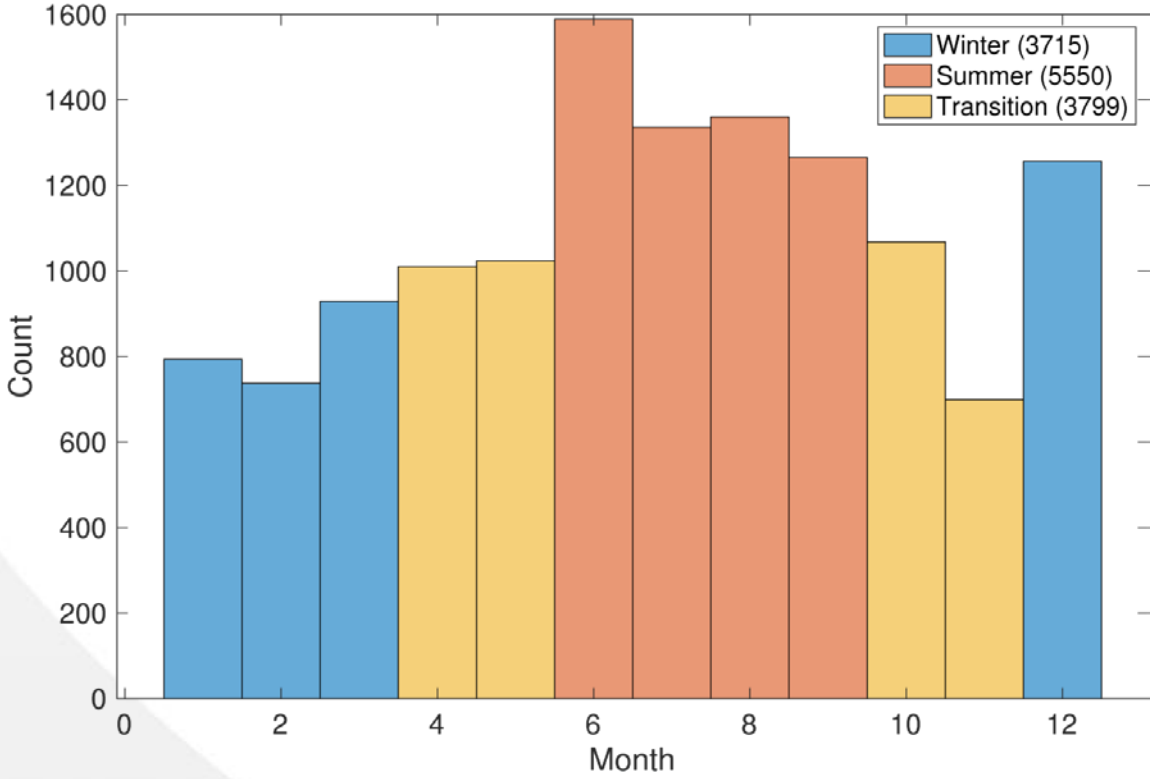
KSC Seasonal Atmospheric Profile Duodecaplets

- **Decision was made to develop a set of 12 profiles (duodecaplets)**
- **Profiles are separated by 30 minutes from L-3 to L+2**
- **An additional profile is added at L-6**
- **L-6, L-3, L-2.5, L-2, L-1.5, L-1, L-0.5, L-0, L+0.5, L+1, L+1.5, L+2**

- **MSFC has large database of spliced 915 MHz and 50 MHz Doppler Radar Wind Profiler (DRWP) wind profiles**
- **Select as many duodecaplets as possible for each season**
  - Summer: 5550
  - Transition: 3799
  - Winter: 3715
- **All DRWP profiles reach at least 15 km, with a max of 18.45 km**
- **DRWP profiles are spliced into Earth GRAM generated wind profiles up to 250 km**
  - Wind value at the top of the L-6 profile is used to initialize Earth GRAM
  - Correlated profile function within Earth GRAM used to generate subsequent profiles
  - Ran the same process which was used to develop the triplets and quintuplets
- **Thermodynamic profiles (temperature, pressure, and density) are generated from Earth GRAM**

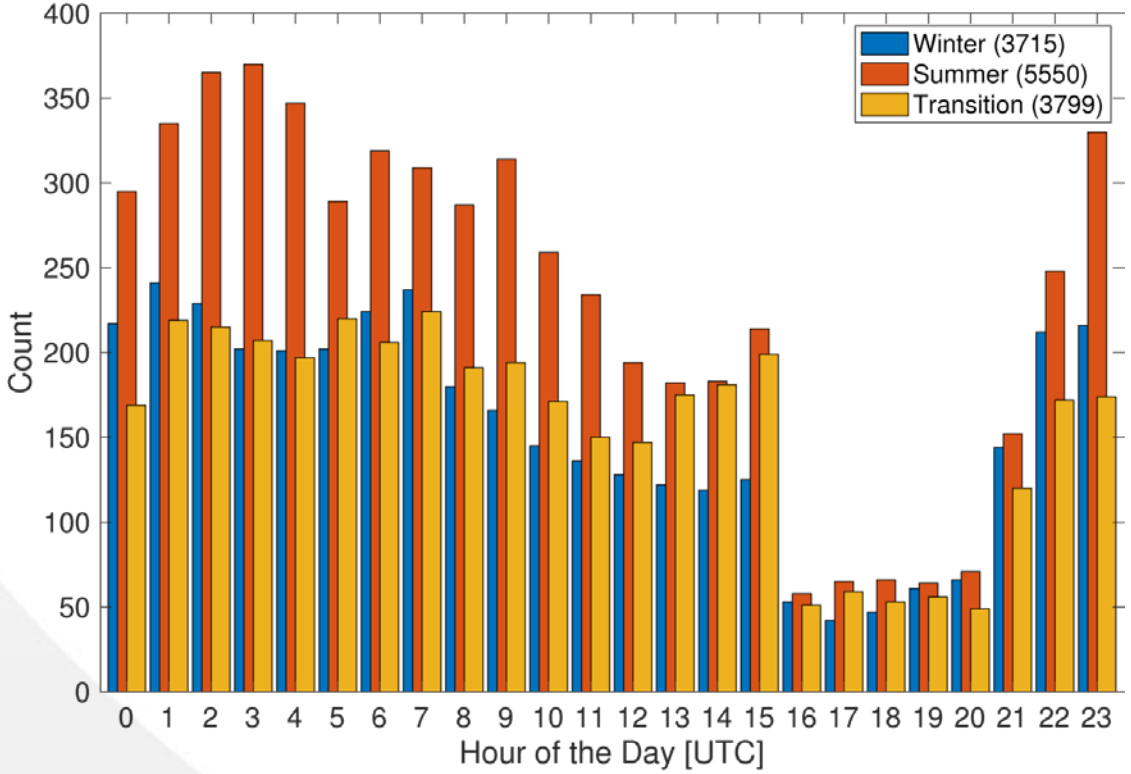
KSC Seasonal Atmospheric Profile Duodecaplets

- **Monthly distribution of the duodecaplets for each season (first profile, L-6)**



KSC Seasonal Atmospheric Profile Duodecaplets

- **Hourly distribution of the duodecaplets for each season (first profile, L-6)**



KSC Seasonal Atmospheric Profile Duodecaplets

- **Summary**
- **Seasonal duodecaplets generated for use in DOL assessments**
  - Summer: 5550
  - Transition: 3799
  - Winter: 3715
- **Number per season can be cut down if desired (e.g., 2000 per season)**
- **Minimum time between duodecaplets not considered**
- **Questions?**