

## **TITLE: CASF\_1hz\_Size distributions**

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### **1. Data Set Overview:**

The CASF files contain size distributions of aerosol and cloud particles measured by the forward (F) –scatter (CAS) section of the CAPS probe.

### **2. Instrument description:**

The Cloud Aerosol and Precipitation Spectrometer (CAPS) is manufactured by Droplet Measurement Technologies, Inc. in Boulder Colorado (DMT). It consists of a scatter probe, which measure both forward and backward scatter of illuminating laser light when particles pass through it. Only the scatter probe was polled at 10hz, so only scatter measurements are provided here. Backscatter signals require huge corrections from calibrated inversion, and are for most parts useless. They are not provided. The range of the forward scatter probe is roughly 0.5 to 50 micrometers in diameter. This is resolved into 20 channels that are defined by voltage levels spaced at equal  $\text{Log}(V)$  increments.

### **3. Data Collection and Processing:**

The probe bins the pulse heights it measures into the 20 channels and provides a pulse height distribution each time it is polled. The data are transported via a serial line, and stamped with a synchronizing timestamp upon arrival at the central data system of the aircraft.

#### **4: Data Format:**

The data are provided in column tab delimited ASCII. Each row in the file corresponds to a given time. Missing data are indicated by a -9999. The column definitions are as follows. The pulse counts per channel have been converted to concentration per channel, i.e., number of particles per cubic centimeter for each channel. Thus total concentration of particles in the probe detection range is a simple sum of the numbers provided.

*UTC mm:dd:hh:mm:ss.x universal time*

*CH1 CONC: Concentration of particles in channel 1.*

*CH2 CONC: Concentration of particles in channel 2.*

*CH3 CONC: Concentration of particles in channel 3.*

*CH4 CONC: Concentration of particles in channel 4.*

*CH5 CONC: Concentration of particles in channel 5.*

*CH6 CONC: Concentration of particles in channel 6.*

*CH7 CONC: Concentration of particles in channel 7.*

*CH8 CONC: Concentration of particles in channel 8.*

*CH9 CONC: Concentration of particles in channel 9.*

*CH10 CONC: Concentration of particles in channel 10.*

*CH11 CONC: Concentration of particles in channel 11.*

*CH12 CONC: Concentration of particles in channel 12.*

*CH13 CONC: Concentration of particles in channel 13.*

*CH14 CONC: Concentration of particles in channel 14.*

*CH15 CONC: Concentration of particles in channel 15.*

*CH16 CONC: Concentration of particles in channel 16.*

*CH17 CONC: Concentration of particles in channel 17.*

*CH18 CONC: Concentration of particles in channel 18.*

*CH19 CONC: Concentration of particles in channel 19.*

*CH20 CONC: Concentration of particles in channel 20.*

#### **5: Data Remarks:**

Based on glass bead and PSL calibrations the following table of correspondence between channel boundaries and liquid water drop diameter has been established:

<b>Channel:</b>	<b>Lower Bound Diameter (<math>\mu\text{m}</math>)</b>	<b>Upper Bound Diameter (<math>\mu\text{m}</math>)</b>	<b>Geometric Mean Diameter (<math>\mu\text{m}</math>)</b>
<b>CH1:</b>	<b>0.58</b>	<b>0.62</b>	<b>0.60</b>
<b>CH2:</b>	<b>0.62</b>	<b>0.67</b>	<b>0.64</b>
<b>CH3:</b>	<b>0.67</b>	<b>0.74</b>	<b>0.70</b>
<b>CH4:</b>	<b>0.74</b>	<b>0.81</b>	<b>0.77</b>
<b>CH5:</b>	<b>0.81</b>	<b>0.90</b>	<b>0.85</b>
<b>CH6:</b>	<b>0.90</b>	<b>1.00</b>	<b>0.95</b>
<b>CH7:</b>	<b>1.00</b>	<b>1.12</b>	<b>1.06</b>
<b>CH8:</b>	<b>1.12</b>	<b>1.29</b>	<b>1.20</b>
<b>CH9:</b>	<b>1.29</b>	<b>1.58</b>	<b>1.43</b>
<b>CH10:</b>	<b>1.58</b>	<b>2.07</b>	<b>1.81</b>
<b>CH11:</b>	<b>2.07</b>	<b>2.84</b>	<b>2.42</b>
<b>CH12:</b>	<b>2.84</b>	<b>4.17</b>	<b>3.44</b>
<b>CH13:</b>	<b>4.17</b>	<b>7.40</b>	<b>5.55</b>
<b>CH14:</b>	<b>7.40</b>	<b>10.8</b>	<b>8.94</b>
<b>CH15:</b>	<b>10.8</b>	<b>13.7</b>	<b>12.2</b>
<b>CH16:</b>	<b>13.7</b>	<b>18.2</b>	<b>15.8</b>
<b>CH17:</b>	<b>18.2</b>	<b>23.7</b>	<b>20.8</b>
<b>CH18:</b>	<b>23.7</b>	<b>30.7</b>	<b>27.0</b>
<b>CH19:</b>	<b>30.7</b>	<b>40.2</b>	<b>35.1</b>
<b>CH20:</b>	<b>40.2</b>	<b>50.9</b>	<b>45.2</b>