University of North Dakota Citation

FIRE Cirrus II

Mission Summary and Data Report

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University of North Dakota Citation

FIRE Cirrus II

Mission Summary and Data Report
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FIRE Cirrus II

Mission Summary and Data Report

Prepared by

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NASA Grant NAG -1 - 1351
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The following document represents a summary overview of the data collected by the University of North Dakota Citation research aircraft during the FIRE Cirrus IFO-II. The purpose of this report is to provide a quick-look summary of select parameters to FIRE investigators to assist in the use of this data set. The full data set resides in the FIRE archive. The data presented in this report should be considered preliminary and should not be used for reproduction.

The UND Citation was based in Coffeyville, KS, for the Cirrus IFO from 13 November to 7 December, 1991. During this period, ten airborne missions were conducted, including two night missions, for a total of 35 flight hours. These flights are summarized in Table 1. The primary objective of the Citation operations was to provide in situ observations of cirrus cloud microphysical properties. Nearly all of the sampling was done through step climbs and descents through cirrus layers. Each step has been identified as a data "leg" and data from 148 legs are presented in this report.

The instrumentation carried on board the aircraft for this program is listed in Table 2. Note that many of the meteorological parameters such as winds must be derived from the basic measurements. Table 3 gives a summary of instrument operation during the IFO. Two comments from this table require further explanation. The hygrometer experienced a persistent problem at temperatures colder than about -25°C and had to be re-balanced frequently during flight. Therefore, dew point temperature data are not available for all data legs. The other note concerns the ozone monitor, which was acquired shortly before the field deployment. Although this instrument was given an initial calibration, it was not accompanied by calibration equipment in the field and as a result, there may be some baseline drift in the data from flight-to-flight.

The data in this report are presented in three parts in order to help investigators locate times of interest. Part 1 consists of time vs. altitude plots and flight tracks in latitude/longitude coordinates, showing where the measurements were conducted relative to the Coffeyville and Parsons ground instrument sites. Although these figures are rather "busy", they give an idea of the overall mission profile. Part 2 gives a summary of each mission in terms of data leg times, aircraft altitude, and notes of interest gleaned from in-flight observations. Part 3 provides a summary of key parameters for each of the data legs flown. All times given in this report are UTC.
<table>
<thead>
<tr>
<th>Date (UTC)</th>
<th>Flight Times (UTC)</th>
<th>Comments</th>
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<tbody>
<tr>
<td>11/14</td>
<td>1341-1740</td>
<td>Supercooled water</td>
</tr>
<tr>
<td>11/22-1</td>
<td>0050-0426</td>
<td>Small ice crystals</td>
</tr>
<tr>
<td>11/22-2</td>
<td>1803-2140</td>
<td>Supercooled water in wave</td>
</tr>
<tr>
<td>11/25</td>
<td>1350-1826</td>
<td>Deep deck of small ice particles</td>
</tr>
<tr>
<td>11/26</td>
<td>1629-1958</td>
<td>Deepening cirrus, contrail penetrations</td>
</tr>
<tr>
<td>11/28</td>
<td>1633-2118</td>
<td>High cirrus</td>
</tr>
<tr>
<td>11/30</td>
<td>1500-1715</td>
<td>High cirrus, all small particles. Off-hub</td>
</tr>
<tr>
<td>12/5-1</td>
<td>0612-0847</td>
<td>Two layers, lower quite dense. Good hub mission.</td>
</tr>
<tr>
<td>12/5-2</td>
<td>1756-2021</td>
<td>Cirrus profile, Coffeyville-Parsons</td>
</tr>
<tr>
<td>12/7</td>
<td>1922-2228</td>
<td>Cirrus band, coordinated with aircraft, satellite. Spectacular optical effects.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Equipment</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>----------------------------</td>
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<tr>
<td><strong>State Parameters</strong></td>
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<tr>
<td>Temperature</td>
<td>Rosemount Total Temperature</td>
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</tr>
<tr>
<td>Reverse Flow, Resistance</td>
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</tr>
<tr>
<td>Dew Point Temperature</td>
<td>EG&amp;G Cooled Mirror</td>
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<tr>
<td>Pressure</td>
<td>Rosemount</td>
<td></td>
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<tr>
<td><strong>Cloud Microphysics</strong></td>
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<tr>
<td>Cloud Droplet Spectrum</td>
<td>PMS FSSP</td>
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<tr>
<td>Cloud Particles</td>
<td>PMS Optical Array 1D-C</td>
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<td>Cloud Particles</td>
<td>PMS Optical Array 2D-C</td>
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<tr>
<td>Large Particles</td>
<td>PMS Optical Array 1D-P</td>
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</tr>
<tr>
<td>Liquid Water Content</td>
<td>J-W</td>
<td></td>
</tr>
<tr>
<td>Supercooled LWC</td>
<td>Rosemount Icing Rate Meter</td>
<td></td>
</tr>
<tr>
<td><strong>Air Chemistry and Aerosols</strong></td>
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</tr>
<tr>
<td>O₃</td>
<td>Scinrix Chemiluminescent</td>
<td></td>
</tr>
<tr>
<td>NOₓ</td>
<td>Scinrix Chemiluminescent</td>
<td></td>
</tr>
<tr>
<td>CN Counter</td>
<td>TSI Alcohol Condensing</td>
<td></td>
</tr>
<tr>
<td><strong>Air Motion and Turbulence</strong></td>
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</tr>
<tr>
<td>Horizontal, Vertical Wind</td>
<td>Flow Angle Probe, Inertial</td>
<td></td>
</tr>
<tr>
<td>Attack And Sideslip Angles,</td>
<td>Flow Angle Probe, Differential</td>
<td></td>
</tr>
<tr>
<td>Airspeed</td>
<td>Pressure Transducers</td>
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<tr>
<td><strong>Aircraft Parameters</strong></td>
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<tr>
<td>Heading, Pitch, Roll,</td>
<td>Litton LTN-76 Inertial</td>
<td></td>
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<tr>
<td>Ground Speed, Position,</td>
<td>Navigation System</td>
<td></td>
</tr>
<tr>
<td>Vertical Accelereration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Position</td>
<td>VOR/DME</td>
<td></td>
</tr>
<tr>
<td>Position, Ground Speed</td>
<td>GPS</td>
<td></td>
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<tr>
<td>Longitudinal and Lateral</td>
<td>Schaevitz</td>
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<tr>
<td>Acceleration</td>
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<tr>
<td>Engine Fan Speed</td>
<td>Tach Generator</td>
<td></td>
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<tr>
<td>Cabin Pressure</td>
<td>Setra</td>
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### UND Citation Instrumentation Status

**Date:** 11/14/91 to 12/7/91

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<tr>
<td>Rosemount Temperature</td>
<td>X</td>
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<td></td>
</tr>
<tr>
<td>Reverse Flow Temperature</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dew Point Temperature</td>
<td>X</td>
<td></td>
<td>use with caution</td>
</tr>
<tr>
<td>Static Pressure</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPS</td>
<td>X</td>
<td></td>
<td>signal not valid: 11/28 and portions of 11/22, 12/5-1</td>
</tr>
<tr>
<td>VOR/DME</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INS</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attack Angle</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sideslip Angle</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Airspeed</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J-W Liquid Water</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rosemount Icing Rate</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condensation Nuclei</td>
<td>X</td>
<td>X</td>
<td>inop before 11/26</td>
</tr>
<tr>
<td>DRI Replicator</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>PMS-FSSP</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PMS 1D-C</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PMS 2D-C</td>
<td>X</td>
<td>X</td>
<td>quit 11/26, inop 11/28</td>
</tr>
<tr>
<td>PMS 1D-P</td>
<td>X</td>
<td></td>
<td>occasional noise lowest channel</td>
</tr>
<tr>
<td>Ozone</td>
<td></td>
<td></td>
<td>qualitative use only; not calibrated</td>
</tr>
<tr>
<td>NO₂</td>
<td></td>
<td></td>
<td>11/14, 28, 11/30</td>
</tr>
<tr>
<td>Forward-looking video</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data System</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Part 1 - Position Summaries

Flight Tracks

The flight tracks presented in this section were drawn using 1 second position data from the GPS or from the Inertial Navigation System (INS) when the GPS satellite system was not available. INS data were corrected for system drift using VOR/DME data. For reference, the FIRE Hub Site was located at N 37° 06.0' latitude, W 95° 34.7' longitude, and the secondary site at Parsons (denoted by a "P" on the plots) was at N 37° 18', W 95° 07'.

Time-Altitude Plots

The plotted altitudes are Pressure Altitude corrected to geopotential height above Mean Sea Level using data from CLASS rawinsonde soundings.
The data legs established in these summaries represent straight-line or spiral descent flight segments. Altitudes are pressure altitudes given in hundreds of feet (e.g., 280 = 28,000 feet) MSL. The comments were derived from flight notes, which reflect observations and values taken from real-time displays of 2-D particle images, particle concentrations, and other parameters.
Southwest–Northeast legs over hub in low Ci. Supercooled water encountered. Multiple layers over hub.

<table>
<thead>
<tr>
<th>Leg#</th>
<th>Start</th>
<th>Stop</th>
<th>Alt.</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>152000</td>
<td>153200</td>
<td>310/290</td>
<td>Step descent to get into Ci. Ci is patchy. Southwest leg.</td>
</tr>
<tr>
<td>2</td>
<td>153600</td>
<td>153915</td>
<td>280</td>
<td>Thin Ci.</td>
</tr>
<tr>
<td>3</td>
<td>154435</td>
<td>155700</td>
<td>270</td>
<td>Thicker Ci SW of CFV.</td>
</tr>
<tr>
<td>4</td>
<td>160100</td>
<td>160630</td>
<td>260</td>
<td>Most images 3-400 μm, irregular. Some rosettes? Out of Ci at NE end.</td>
</tr>
<tr>
<td>5</td>
<td>161000</td>
<td>162350</td>
<td>250</td>
<td>Into SLW near SW end. T = -26° C.</td>
</tr>
<tr>
<td>6</td>
<td>162630</td>
<td>163200</td>
<td>240</td>
<td>Out of SLW NE of CFV.</td>
</tr>
<tr>
<td>7</td>
<td>163600</td>
<td>164800</td>
<td>240/230</td>
<td>Near bottom of Ci.</td>
</tr>
</tbody>
</table>
11/22/91 First Flight

East-west passes over hub followed by east-west legs through Ci band northwest of CFV. Multiple optical effects noted during climb. (Full moon).

<table>
<thead>
<tr>
<th>Leg#</th>
<th>Start</th>
<th>Stop</th>
<th>Alt.</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>012030</td>
<td>013340</td>
<td>310</td>
<td>Only occasional ice crystals. Westbound</td>
</tr>
<tr>
<td>2</td>
<td>013700</td>
<td>014115</td>
<td>300</td>
<td>A few crystals.</td>
</tr>
<tr>
<td>3</td>
<td>014400</td>
<td>015230</td>
<td>290</td>
<td>Ci is patchy.</td>
</tr>
<tr>
<td>4</td>
<td>015600</td>
<td>020050</td>
<td>280</td>
<td>No Ci.</td>
</tr>
<tr>
<td>5</td>
<td>020400</td>
<td>021200</td>
<td>270</td>
<td>Ci thin and patchy.</td>
</tr>
<tr>
<td>6</td>
<td>021500</td>
<td>021940</td>
<td>260</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>022400</td>
<td>023035</td>
<td>260</td>
<td>Ci getting denser.</td>
</tr>
<tr>
<td>8</td>
<td>023410</td>
<td>023845</td>
<td>270</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>024200</td>
<td>025000</td>
<td>280</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>025505</td>
<td>025710</td>
<td>280</td>
<td>800 μm columns, rosettes, 10-20/1. Halo around moon. Orthogonal to wind.</td>
</tr>
<tr>
<td>11</td>
<td>025810</td>
<td>030330</td>
<td>280/310</td>
<td>Ramp climb. Columns, rosettes.</td>
</tr>
<tr>
<td>12</td>
<td>030415</td>
<td>031310</td>
<td>310/350</td>
<td>Top of Ci between 340 and 350.</td>
</tr>
<tr>
<td>13</td>
<td>032600</td>
<td>032730</td>
<td>350/340</td>
<td>Descent into cloud top.</td>
</tr>
<tr>
<td>14</td>
<td>033245</td>
<td>033250</td>
<td>340</td>
<td>Cirrus seems to be dissipating. 5-10/1.</td>
</tr>
<tr>
<td>15</td>
<td>033640</td>
<td>034550</td>
<td>340</td>
<td>2-6/1, mostly null images.</td>
</tr>
<tr>
<td>16</td>
<td>034835</td>
<td>035430</td>
<td>330</td>
<td>2-300 μm crystals, T = -51° C.</td>
</tr>
</tbody>
</table>
11/22/91 Second Flight

Northeast-Southwest legs in Cirrus under ER-2, followed by orthogonl step pattern. Supercooled water in wave.

<table>
<thead>
<tr>
<th>Leg#</th>
<th>Start</th>
<th>Stop</th>
<th>Alt.</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>183040</td>
<td>183420</td>
<td>270</td>
<td>Near top of layer. No Ci over hub this level. NE heading.</td>
</tr>
<tr>
<td>2</td>
<td>18385</td>
<td>184550</td>
<td>270</td>
<td>Just over top of Ci.</td>
</tr>
<tr>
<td>3</td>
<td>184720</td>
<td>185115</td>
<td>270/260</td>
<td>Just in top at 260. 50-150 μm ice, 10-30/1</td>
</tr>
<tr>
<td>4</td>
<td>185340</td>
<td>190140</td>
<td>260/250</td>
<td>Ci getting patchy, moving northeast.</td>
</tr>
<tr>
<td>5</td>
<td>190310</td>
<td>191430</td>
<td>250</td>
<td>Close to top. Picked up SLW @ -32.7° C.</td>
</tr>
<tr>
<td>6</td>
<td>191650</td>
<td>192520</td>
<td>250</td>
<td>2D images irregular 2-400 μm, few/l. Near SW end, crystals to 7-800 μm, up to 100/l. Higher tops, too.</td>
</tr>
<tr>
<td>7</td>
<td>192730</td>
<td>193035</td>
<td>240</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>193230</td>
<td>194100</td>
<td>240</td>
<td>2D 400-800 μm, 40-60/l. Wave-like feature with supercooled LW near SW end.</td>
</tr>
<tr>
<td>9</td>
<td>194240</td>
<td>194630</td>
<td>230</td>
<td>SLW again with updraft. Halo in turnaround.</td>
</tr>
<tr>
<td>10</td>
<td>194900</td>
<td>195625</td>
<td>230</td>
<td>Wave motion again with SLW. Ci dissipating/moving.</td>
</tr>
<tr>
<td>11</td>
<td>195930</td>
<td>200420</td>
<td>240</td>
<td>Mostly on top.</td>
</tr>
<tr>
<td>12</td>
<td>200520</td>
<td>200930</td>
<td>240/230</td>
<td>Perpendicular leg to SE. Flying through Ci.</td>
</tr>
<tr>
<td>13</td>
<td>202005</td>
<td>202640</td>
<td>230</td>
<td>Reverse, orthogonal to wind. Some SLW, T= -28.5° C.</td>
</tr>
<tr>
<td>14</td>
<td>202930</td>
<td>203550</td>
<td>230/240</td>
<td>Ice to 1 mm, no SLW.</td>
</tr>
<tr>
<td>15</td>
<td>203740</td>
<td>204150</td>
<td>242/250</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>204305</td>
<td>204537</td>
<td>250/262</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>204710</td>
<td>205240</td>
<td>270</td>
<td>Passing through higher elements (Cirrocumulus?).</td>
</tr>
<tr>
<td>18</td>
<td>205300</td>
<td>205440</td>
<td>280</td>
<td>Repenetration of cloud tower.</td>
</tr>
</tbody>
</table>
11/25/91

Two segments: First, steps through evaporating deep deck of small ice. Second, steps through deck over Tulsa, coordinated with Sabreliner.

<table>
<thead>
<tr>
<th>Leg#</th>
<th>Start</th>
<th>Stop</th>
<th>Alt.</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>142030</td>
<td>143148</td>
<td>330</td>
<td>At Ci top. Hole over CFV. Westbound.</td>
</tr>
<tr>
<td>2</td>
<td>143500</td>
<td>143850</td>
<td>320</td>
<td>2D-C null images.</td>
</tr>
<tr>
<td>3</td>
<td>144335</td>
<td>145250</td>
<td>310</td>
<td>1-7/1, a little denser near CFV. Small crystals. Mid-level undercast.</td>
</tr>
<tr>
<td>4</td>
<td>145650</td>
<td>150035</td>
<td>300</td>
<td>Ci is visually thin.</td>
</tr>
<tr>
<td>5</td>
<td>150715</td>
<td>151455</td>
<td>290</td>
<td>Thin Ci. Glory on undercast. Now between layers?</td>
</tr>
<tr>
<td>6</td>
<td>151815</td>
<td>152210</td>
<td>280</td>
<td>Only a few ice crystals.</td>
</tr>
<tr>
<td>7</td>
<td>152620</td>
<td>153335</td>
<td>270</td>
<td>Larger (2-300 μm) crystals at start of leg. Smaller near CFV.</td>
</tr>
<tr>
<td>8</td>
<td>153710</td>
<td>154035</td>
<td>260</td>
<td>150-300 μm crystals.</td>
</tr>
<tr>
<td>9</td>
<td>154245</td>
<td>155010</td>
<td>250</td>
<td>150-350 μm ice.</td>
</tr>
<tr>
<td>10</td>
<td>155300</td>
<td>155620</td>
<td>240</td>
<td>No ice.</td>
</tr>
<tr>
<td>11</td>
<td>160010</td>
<td>160640</td>
<td>250</td>
<td>Few small crystals. Ci seems to be banding, getting patchy.</td>
</tr>
<tr>
<td>12</td>
<td>160930</td>
<td>161250</td>
<td>260</td>
<td>Very small crystals, none over hub.</td>
</tr>
<tr>
<td>13</td>
<td>161735</td>
<td>162350</td>
<td>270</td>
<td>No ice.</td>
</tr>
<tr>
<td>14</td>
<td>162640</td>
<td>162910</td>
<td>280</td>
<td>No ice.</td>
</tr>
<tr>
<td>15</td>
<td>163250</td>
<td>163930</td>
<td>290</td>
<td>No ice.</td>
</tr>
<tr>
<td>16</td>
<td>165810</td>
<td>170110</td>
<td>310/330</td>
<td>Climb in Ci over Tulsa. 20-30/1, small.</td>
</tr>
<tr>
<td>17</td>
<td>170130</td>
<td>170310</td>
<td>330</td>
<td>Northbound leg.</td>
</tr>
<tr>
<td>18</td>
<td>170510</td>
<td>170700</td>
<td>330</td>
<td>Southbound.</td>
</tr>
<tr>
<td>19</td>
<td>171320</td>
<td>171450</td>
<td>310</td>
<td>Small ice crystals.</td>
</tr>
<tr>
<td>20</td>
<td>172100</td>
<td>172330</td>
<td>310/290</td>
<td>Descent, southbound.</td>
</tr>
<tr>
<td>21</td>
<td>172730</td>
<td>172840</td>
<td>290</td>
<td>20-30/1, 200 μm crystals. Thinner Ci over TUL.</td>
</tr>
<tr>
<td>22</td>
<td>173030</td>
<td>173300</td>
<td>270</td>
<td>Southbound.</td>
</tr>
<tr>
<td>Leg#</td>
<td>Start</td>
<td>Stop</td>
<td>Alt.</td>
<td>Comments</td>
</tr>
<tr>
<td>------</td>
<td>--------</td>
<td>--------</td>
<td>------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>23</td>
<td>173600</td>
<td>173740</td>
<td>271</td>
<td>Northbound</td>
</tr>
<tr>
<td>24</td>
<td>174000</td>
<td>174305</td>
<td>270/250</td>
<td>Halo observed.</td>
</tr>
<tr>
<td>25</td>
<td>174500</td>
<td>174630</td>
<td>250</td>
<td>Northbound.</td>
</tr>
<tr>
<td>26</td>
<td>174710</td>
<td>175130</td>
<td>250/230</td>
<td>Descent and level leg. A few/1, 200 μm crystals.</td>
</tr>
<tr>
<td>27</td>
<td>175250</td>
<td>175700</td>
<td>230</td>
<td></td>
</tr>
</tbody>
</table>
11-26-91

East-west steps through layer; 20 nm legs. 1st leg eastbound.

<table>
<thead>
<tr>
<th>Leg#</th>
<th>Start</th>
<th>Stop</th>
<th>Alt.</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>165230</td>
<td>165615</td>
<td>330</td>
<td>At base of higher layer.</td>
</tr>
<tr>
<td>2</td>
<td>165940</td>
<td>170520</td>
<td>330</td>
<td>Counts on FSSP, no 2D images.</td>
</tr>
<tr>
<td>3</td>
<td>171022</td>
<td>171425</td>
<td>320</td>
<td>Small ice.</td>
</tr>
<tr>
<td>4</td>
<td>171810</td>
<td>172410</td>
<td>310</td>
<td>Low concentration; possible contrail penetration.</td>
</tr>
<tr>
<td>5</td>
<td>172921</td>
<td>173245</td>
<td>300</td>
<td>In cloud at the hub.</td>
</tr>
<tr>
<td>6</td>
<td>173630</td>
<td>174132</td>
<td>290</td>
<td>No Ci until hub.</td>
</tr>
<tr>
<td>7</td>
<td>174655</td>
<td>175020</td>
<td>290</td>
<td>Conc. to 16/1.</td>
</tr>
<tr>
<td>8</td>
<td>175520</td>
<td>175936</td>
<td>300</td>
<td>Conc. to 39/1, 300 µm. Ci to 10 east of hub</td>
</tr>
<tr>
<td>9</td>
<td>180440</td>
<td>180810</td>
<td>310</td>
<td>Conc. to 10/1, 200 µm.</td>
</tr>
<tr>
<td>10</td>
<td>181240</td>
<td>181733</td>
<td>320</td>
<td>Smaller ice, lower conc.</td>
</tr>
<tr>
<td>11</td>
<td>182330</td>
<td>182945</td>
<td>330</td>
<td>Some Ci wisps - Contrail penetration.</td>
</tr>
<tr>
<td>12</td>
<td>183346</td>
<td>183934</td>
<td>340</td>
<td>Some FSSP counts. 2D-C Quit. -59.0° C.</td>
</tr>
<tr>
<td>13</td>
<td>184429</td>
<td>184755</td>
<td>350/340</td>
<td>Top Ci at 34,400, at tropopause.</td>
</tr>
<tr>
<td>14</td>
<td>185055</td>
<td>185726</td>
<td>340</td>
<td>Contrail penetrations. Ci near hub.</td>
</tr>
<tr>
<td>15</td>
<td>190255</td>
<td>190600</td>
<td>330</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>191100</td>
<td>191532</td>
<td>320</td>
<td>Thicker Ci overhead.</td>
</tr>
<tr>
<td>17</td>
<td>192040</td>
<td>192330</td>
<td>310</td>
<td>Halo.</td>
</tr>
<tr>
<td>18</td>
<td>192530</td>
<td>192931</td>
<td>300</td>
<td>Good halo.</td>
</tr>
<tr>
<td>19</td>
<td>193420</td>
<td>193700</td>
<td>290</td>
<td>End of replicator film.</td>
</tr>
</tbody>
</table>
11/28/91

High Ci over hub, E-W legs. No 2D-C data. First leg eastbound.

<table>
<thead>
<tr>
<th>Leg#</th>
<th>Start</th>
<th>Stop</th>
<th>Alt.</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>165925</td>
<td>170230</td>
<td>330/350</td>
<td>Ci base at 34,000'</td>
</tr>
<tr>
<td>2</td>
<td>170800</td>
<td>171715</td>
<td>370/388</td>
<td>Ci top at 37,700'</td>
</tr>
<tr>
<td>3</td>
<td>172340</td>
<td>172630</td>
<td>377</td>
<td>About 100' below top. Out of Ci toward eastern end of leg.</td>
</tr>
<tr>
<td>4</td>
<td>173000</td>
<td>173730</td>
<td>370</td>
<td>Ci seems thin, patchy.</td>
</tr>
<tr>
<td>5</td>
<td>174200</td>
<td>174430</td>
<td>360</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>174730</td>
<td>175600</td>
<td>350</td>
<td>No solar optical effects seen so far.</td>
</tr>
<tr>
<td>7</td>
<td>180000</td>
<td>180300</td>
<td>350</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>180630</td>
<td>181330</td>
<td>350/340</td>
<td>Ci thinner near hub. May have penetrated contrail near start of leg.</td>
</tr>
<tr>
<td>9</td>
<td>181730</td>
<td>182030</td>
<td>330</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>182400</td>
<td>183130</td>
<td>320</td>
<td>Mostly out of cloud. Some higher CN counts.</td>
</tr>
<tr>
<td>11</td>
<td>183630</td>
<td>183910</td>
<td>330</td>
<td>Out of cloud.</td>
</tr>
<tr>
<td>12</td>
<td>184300</td>
<td>185210</td>
<td>330/310</td>
<td>Back into Ci 11 E CFV. New patch moving in.</td>
</tr>
<tr>
<td>14</td>
<td>190350</td>
<td>191600</td>
<td>330</td>
<td>Thickening Ci, no optical effects.</td>
</tr>
<tr>
<td>15</td>
<td>192045</td>
<td>192310</td>
<td>350</td>
<td>Light turbulence.</td>
</tr>
<tr>
<td>16</td>
<td>192700</td>
<td>193600</td>
<td>350/360</td>
<td>May be on top at 360.</td>
</tr>
<tr>
<td>17</td>
<td>200000</td>
<td>201120</td>
<td>430/355</td>
<td>Descent spiral near hub. Double tropopause.</td>
</tr>
<tr>
<td>18</td>
<td>201500</td>
<td>202030</td>
<td>355/350</td>
<td>Hazy, not in Ci?</td>
</tr>
<tr>
<td>19</td>
<td>202415</td>
<td>202635</td>
<td>330</td>
<td>In cloud, 3 miles east of CFV.</td>
</tr>
<tr>
<td>20</td>
<td>203000</td>
<td>203600</td>
<td>330/310</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>204100</td>
<td>204425</td>
<td>330</td>
<td>Thin Ci, near top 15 east of CFV.</td>
</tr>
<tr>
<td>22</td>
<td>205050</td>
<td>210000</td>
<td>330</td>
<td>Into Ci near hub, along with higher CN counts.</td>
</tr>
</tbody>
</table>
11/30/91

Step profile through sub-tropical jet cirrus. All legs southwest bound. Flight not over the hub.

<table>
<thead>
<tr>
<th>Leg#</th>
<th>Start</th>
<th>Stop</th>
<th>Alt.</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>154930</td>
<td>155200</td>
<td>350</td>
<td>At northwest edge of cloud; will move southeast.</td>
</tr>
<tr>
<td>2</td>
<td>155900</td>
<td>160330</td>
<td>360</td>
<td>2D conc. 10-20/1, sizes to 100 µm.</td>
</tr>
<tr>
<td>3</td>
<td>160730</td>
<td>161045</td>
<td>370</td>
<td>1-5/1.</td>
</tr>
<tr>
<td>4</td>
<td>161400</td>
<td>161630</td>
<td>380</td>
<td>Above cloud.</td>
</tr>
<tr>
<td>5</td>
<td>162700</td>
<td>163000</td>
<td>370</td>
<td>A few crystals at SW end of leg.</td>
</tr>
<tr>
<td>6</td>
<td>163340</td>
<td>163610</td>
<td>370</td>
<td>Up to 10/1.</td>
</tr>
<tr>
<td>7</td>
<td>163930</td>
<td>164315</td>
<td>360/350</td>
<td>52/1, to 250 µm at start; fewer at SW end. Possible fall streaks.</td>
</tr>
<tr>
<td>8</td>
<td>164640</td>
<td>165400</td>
<td>347/390</td>
<td>Climb through layer - base 34,300, top 37,000.</td>
</tr>
</tbody>
</table>
12/05/91 - 1st

East - West Legs from 5 miles east CFV to CFV

<table>
<thead>
<tr>
<th>Leg#</th>
<th>Start</th>
<th>Stop</th>
<th>Alt.</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>063000</td>
<td>063145</td>
<td>280</td>
<td>No cloud.</td>
</tr>
<tr>
<td>2</td>
<td>063520</td>
<td>063727</td>
<td>290</td>
<td>100-300 μm, no habit.</td>
</tr>
<tr>
<td>3</td>
<td>064048</td>
<td>064240</td>
<td>300</td>
<td>5-60/1, up to 400 μm.</td>
</tr>
<tr>
<td>4</td>
<td>064616</td>
<td>064834</td>
<td>310</td>
<td>Variable conc., strong speed shear in vertical.</td>
</tr>
<tr>
<td>5</td>
<td>065311</td>
<td>065517</td>
<td>320</td>
<td>Small patch, 100-200 μm.</td>
</tr>
<tr>
<td>6</td>
<td>065927</td>
<td>070119</td>
<td>330</td>
<td>Low conc., 50-100 μm.</td>
</tr>
<tr>
<td>7</td>
<td>070519</td>
<td>070723</td>
<td>340</td>
<td>No cloud.</td>
</tr>
<tr>
<td>8</td>
<td>071240</td>
<td>071440</td>
<td>350</td>
<td>Occasional 1-3/1, 100-200 μm.</td>
</tr>
<tr>
<td>9</td>
<td>071827</td>
<td>072042</td>
<td>360</td>
<td>15-25/1, 100-300 μm.</td>
</tr>
<tr>
<td>10</td>
<td>072433</td>
<td>072714</td>
<td>370</td>
<td>10-30/1, 50-300 μm. Some columns.</td>
</tr>
<tr>
<td>11</td>
<td>073055</td>
<td>073335</td>
<td>380</td>
<td>2-5/1, 50-150 μm.</td>
</tr>
<tr>
<td>12</td>
<td>073855</td>
<td>074142</td>
<td>390</td>
<td>3-6/1, &lt; 100 μm.</td>
</tr>
<tr>
<td>13</td>
<td>074800</td>
<td>075020</td>
<td>400</td>
<td>No 2D, some FSSP. -64° C.</td>
</tr>
<tr>
<td>14(Spiral)</td>
<td>075040</td>
<td>080430</td>
<td>400/275</td>
<td>Top layer 400-377, bottom 311-278. Higher O₃ 335-305.</td>
</tr>
<tr>
<td>15</td>
<td>081040</td>
<td>081243</td>
<td>290</td>
<td>60-197/l.</td>
</tr>
<tr>
<td>16</td>
<td>081717</td>
<td>081935</td>
<td>300</td>
<td>Only in cloud last 20 sec. Up 130/1, 200 μm.</td>
</tr>
<tr>
<td>17</td>
<td>082423</td>
<td>082745</td>
<td>290</td>
<td>Conc. to 130/1, to 200 μm. Saw lidar.</td>
</tr>
</tbody>
</table>
12/05/91 - Second Flight

Shuttle between CFV and PAR. Leg 1 westbound to CFV. Leg 2 northeast bound CFV-PAR.

<table>
<thead>
<tr>
<th>Leg#</th>
<th>Start</th>
<th>Stop</th>
<th>Alt.</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>181500</td>
<td>182330</td>
<td>350</td>
<td>Small ice, low concentrations, some higher CNC.</td>
</tr>
<tr>
<td>2</td>
<td>182545</td>
<td>182950</td>
<td>350</td>
<td>3-15/1, 50-100 μm.</td>
</tr>
<tr>
<td>3</td>
<td>183345</td>
<td>184740</td>
<td>360/370</td>
<td>Small ice, 1-6/1 (higher near CFV).</td>
</tr>
<tr>
<td>4</td>
<td>185300</td>
<td>185630</td>
<td>380/390</td>
<td>FSSP counts, none on 2D-C.</td>
</tr>
<tr>
<td>5</td>
<td>190200</td>
<td>191400</td>
<td>400/410</td>
<td>FSSP; No 2D-C.</td>
</tr>
<tr>
<td>6</td>
<td>191830</td>
<td>192245</td>
<td>395</td>
<td>FSSP; No 2D-C.</td>
</tr>
<tr>
<td>7</td>
<td>192900</td>
<td>194100</td>
<td>370</td>
<td>2D to 8/1, extremely small.</td>
</tr>
<tr>
<td>8</td>
<td>194450</td>
<td>194925</td>
<td>350</td>
<td>Up to 9/1, 50-150 μm size.</td>
</tr>
<tr>
<td>9</td>
<td>195300</td>
<td>200600</td>
<td>330</td>
<td>Near base of Ci over PAR. Higher Conc. mid-leg. Larger particles over hub-columns, rosette, plates.</td>
</tr>
</tbody>
</table>
12/7/91

East-West legs from Texarkana.

<table>
<thead>
<tr>
<th>Leg#</th>
<th>Start</th>
<th>Stop</th>
<th>Alt.</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>201545</td>
<td>202800</td>
<td>330</td>
<td>Ci 9-50/l, thinner at east end. Near top of layer, higher layer above.</td>
</tr>
<tr>
<td>2</td>
<td>203200</td>
<td>204840</td>
<td>290</td>
<td>In &amp; Out of Ci, band oriented SW-NE.</td>
</tr>
<tr>
<td>3</td>
<td>205100</td>
<td>210445</td>
<td>290</td>
<td>Ci to 600 μm, one patch to 84/l.</td>
</tr>
<tr>
<td>4</td>
<td>210750</td>
<td>212605</td>
<td>310</td>
<td>Near top, low conc. High CN near end of leg.</td>
</tr>
</tbody>
</table>
Part 3 - Data Leg Summaries

The following pages depict summaries of each data leg flown during the IFO. There are four types of data included on each page: leg averages, time series, particle spectra, and particle images.

Leg Averages

These are mean values for the entire leg. "Pressure Altitude" is the equivalent aircraft altitude in a standard atmosphere, which may differ from true MSL altitude by up to 300 m.

Time Series

Plots of parameter values versus time are shown for these variables: temperature, static pressure, condensation nuclei concentrations, ozone concentrations, particle concentrations and mean diameters derived from the PMS 2D-C probe, and particle concentrations and mean diameters derived from the PMS 1D-C probe. In each of these plots, the solid line refers to the variable on the left and the dashed line to the variable on the right. Plotted values are 4 Hz data, although the plotting routine has done some smoothing to the longer series.

Particle Spectra

These size spectra are derived from the PMS FSSP, 2D-C, 1D-C and 1D-P probes and are averaged for the entire leg (clear + cloudy air). They are useful more for spectral shape than absolute concentration information.

Particle Images

Each two-bar plot of particle images represents one buffer full of data from the PMS 2D-C probe, and the DeltaT is the time it took to fill the buffer. A single pixel has a dimension of 33 μm. These images were selected to be representative of particles encountered during the leg.
Averages:
Temperature: -35.0 °C
Dew Point: -36.8 °C
Wind Direction: 218.8°
Wind Velocity: 41.33 m/sec
Pressure: 304.04 mb
Pressure Altitude: 9077.0 m
Aircraft Heading: 227.7°
Averages:
Temperature: -31.1 °C
Dew Point: --Not Available
Wind Direction: 221.3 °
Wind Velocity: 39.72 m/sec
Pressure: 328.41 mb
Pressure Altitude: 8552.7 m
Aircraft Heading: 34.2 °
11/14/91 15:44:35-15:57:00 Leg #3

Averages:
Temperature: -28.7 °C
Dew Point: -28.9 °C
Wind Direction: 221.0°
Wind Velocity: 38.84 m/sec
Pressure: 343.38 mb
Pressure Altitude: 8247.9 m
Aircraft Heading: 220.8°
Averages:
Temperature: -26.5 °C
Dew Point: -26.9 °C
Wind Direction: 230.6°
Wind Velocity: 35.31 m/sec
Pressure: 359.86 mb
Pressure Altitude: 7924.7 m
Aircraft Heading: 49.5°
Averages:
Temperature: -24.8 °C
Dew Point: --Not Available
Wind Direction: 228.4 °
Wind Velocity: 34.02 m/sec
Pressure: 374.93 mb
Pressure Altitude: 7639.5 m
Aircraft Heading: 231.0 °
Averages:
Temperature: -23.4 °C
Dew Point: --Not Available
Wind Direction: 233.8 °
Wind Velocity: 31.93 m/sec
Pressure: 391.50 mb
Pressure Altitude: 7336.4 m
Aircraft Heading: 53.8 °
Averages:
Temperature: -21.3 °C
Dew Point: -21.7 °C
Wind Direction: 232.7°
Wind Velocity: 32.97 m/sec
Pressure: 403.64 mb
Pressure Altitude: 7121.9 m
Aircraft Heading: 232.0°
Averages:
Temperature: -20.7 °C
Dew Point: -21.1 °C
Wind Direction: 230.5 °
Wind Velocity: 33.15 m/sec
Pressure: 409.12 mb
Pressure Altitude: 70253 m
Aircraft Heading: 231.5 °
Averages:
Temperature: -45.5 °C
Dew Point: Not Available
Wind Direction: 270.8 °
Wind Velocity: 28.09 m/sec
Pressure: 286.90 mb
Pressure Altitude: 9460.7 m
Aircraft Heading: 275.3 °

11/22/91
1:28:29.9506 1:31:39.7648 DeltaT: 3: 9.8142 TAS1 = 111.5 TAS2 = 122.0
Averages:
Temperature: -42.9 °C
Dew Point: -43.1 °C
Wind Direction: 273.1 °
Wind Velocity: 25.63 m/sec
Pressure: 300.73 mb
Pressure Altitude: 9147.0 m
Aircraft Heading: 97.9 °
Averages:
Temperature: -40.2 °C
Dew Point: -41.4 °C
Wind Direction: 266.0°
Wind Velocity: 25.75 m/sec
Pressure: 314.66 mb
Pressure Altitude: 8842.5 m
Aircraft Heading: 274.0°
11/22/91A 01:56:00-02:00:50 Leg #4

Averages:
Temperature: -37.7 °C
Dew Point: -39.0 °C
Wind Direction: 264.6 °
Wind Velocity: 24.29 m/sec
Pressure: 329.22 mb
Pressure Altitude: 8536.0 m
Aircraft Heading: 100.5 °
Averages:
Temperature: -35.6 °C
Dew Point: -36.4 °C
Wind Direction: 256.5 °
Wind Velocity: 25.87 m/sec
Pressure: 343.66 mb
Pressure Altitude: 8242.4 m
Aircraft Heading: 272.9 °
11/22/91A 02:15:00-02:19:40 Leg #6

Averages:
Temperature: -32.8 °C
Dew Point: -34.5 °C
Wind Direction: 260.9 °
Wind Velocity: 24.52 m/sec
Pressure: 359.20 mb
Pressure Altitude: 7937.5 m
Aircraft Heading: 100.4 °
Averages:
Temperature: -33.0 °C
Dew Point: -34.2 °C
Wind Direction: 256.3 °
Wind Velocity: 26.37 m/sec
Pressure: 359.22 mb
Pressure Altitude: 7937.2 m
Aircraft Heading: 270.3 °

11/22/91 2:27:51.9171 2:27:54.0396 DeltaT: 0: 2.1225 TAS1 = 128.4 TAS2 = 128.0

1 mm
Averages:
Temperature: -35.3 °C
Dew Point: -36.6 °C
Wind Direction: 260.4°
Wind Velocity: 24.49 m/sec
Pressure: 344.12 mb
Pressure Altitude: 8233.3 m
Aircraft Heading: 98.5°
Averages:
Temperature: -37.6 °C
Dew Point: -39.8 °C
Wind Direction: 260.9 °
Wind Velocity: 27.21 m/sec
Pressure: 329.66 mb
Pressure Altitude: 8526.8 m
Aircraft Heading: 272.6 °
Averages:
Temperature: -37.9 °C
Dew Point: Not Available
Wind Direction: 254.8°
Wind Velocity: 28.60 m/sec
Pressure: 329.70 mb
Pressure Altitude: 8525.9 m
Aircraft Heading: 325.2°
Averages:
Temperature: -42.5 °C
Dew Point: Not Available
Wind Direction: 260.8 °
Wind Velocity: 28.99 m/sec
Pressure: 303.79 mb
Pressure Altitude: 9085.2 m
Aircraft Heading: 258.2 °
Averages:
Temperature: -52.1 °C
Dew Point: Not Available
Wind Direction: 268.5 °
Wind Velocity: 32.50 m/sec
Pressure: 253.64 mb
Pressure Altitude: 10278.7 m
Aircraft Heading: 92.8 °
Averages:
Temperature: -53.9 °C
Dew Point: Not Available
Wind Direction: 265.6 °
Wind Velocity: 37.16 m/sec
Pressure: 244.76 mb
Pressure Altitude: 10499.7 m
Aircraft Heading: 261.4 °
Averages:
Temperature: -53.3 °C
Dew Point: Not Available
Wind Direction: 269.6 °
Wind Velocity: 34.32 m/sec
Pressure: 249.81 mb
Pressure Altitude: 10366.9 m
Aircraft Heading: 63.4 °
Averages:
Temperature: -53.4 °C
Dew Point: Not Available
Wind Direction: 264.6°
Wind Velocity: 36.10 m/sec
Pressure: 249.62 mb
Pressure Altitude: 10371.9 m
Aircraft Heading: 261.6°
**11/22/91A  03:48:35-03:54:30  Leg # 16**

**Averages:**
- Temperature: -50.9 °C
- Dew Point: Not Available
- Wind Direction: 266.3 °
- Wind Velocity: 32.56 m/sec
- Pressure: 261.62 mb
- Pressure Altitude: 10067.1 m
- Aircraft Heading: 80.4 °
Averages:
Temperature: -34.5 °C
Dew Point: Not Available
Wind Direction: 253.0°
Wind Velocity: 24.84 m/sec
Pressure: 356.61 mb
Pressure Altitude: 8083.8 m
Aircraft Heading: 182.4°
11/22/91 18:30:40-18:34:20 Leg # 1

Averages:
Temperature: -37.2 °C
Dew Point: -51.6 °C
Wind Direction: 224.3°
Wind Velocity: 41.17 m/sec
Pressure: 344.36 mb
Pressure Altitude: 8228.4 m
Aircraft Heading: 51.1°
11/22/91 18:38:50-18:45:50 Leg #2

**Averages:**
- Temperature: -37.1 °C
- Dew Point: Not Available
- Wind Direction: 221.8°
- Wind Velocity: 45.19 m/sec
- Pressure: 344.42 mb
- Pressure Altitude: 82272 m
- Aircraft Heading: 223.3°

No 2-DC DATA
11/22/91  18:47:20-18:48:00  Leg # 3a

Averages:
Temperature: -36.9 °C
Dew Point: -43.2 °C
Wind Direction: 220.9°
Wind Velocity: 43.79 m/sec
Pressure: 344.98 mb
Pressure Altitude: 8216.1 m
Aircraft Heading: 43.0°

No Cloud
Averages:
Temperature: -34.8 °C
Dew Point: Not Available
Wind Direction: 217.8 °
Wind Velocity: 39.91 m/sec
Pressure: 359.85 mb
Pressure Altitude: 7924.9 m
Aircraft Heading: 40.8 °
Averages:
Temperature: -34.8 °C
Dew Point: -37.3 °C
Wind Direction: 217.6 °
Wind Velocity: 42.24 m/sec
Pressure: 359.40 mb
Pressure Altitude: 7933.6 m
Aircraft Heading: 220.6 °
Averages:
Temperature: -32.5 °C
Dew Point: -39.1 °C
Wind Direction: 217.5°
Wind Velocity: 38.76 m/sec
Pressure: 375.62 mb
Pressure Altitude: 7626.7 m
Aircraft Heading: 222.1°
Averages:
Temperature: -32.9 °C
Dew Point: -33.7 °C
Wind Direction: 218.4 °
Wind Velocity: 37.44 m/sec
Pressure: 375.38 mb
Pressure Altitude: 76312 m
Aircraft Heading: 42.7 °
Averages:
Temperature: -32.9 °C
Dew Point: Not Available
Wind Direction: 218.8 °
Wind Velocity: 39.50 m/sec
Pressure: 375.36 mb
Pressure Altitude: 7631.5 m
Aircraft Heading: 221.1 °
Averages:
Temperature: -30.3 °C
Dew Point: Not Available
Wind Direction: 220.0 °
Wind Velocity: 35.62 m/sec
Pressure: 391.90 mb
Pressure Altitude: 7329.3 m
Aircraft Heading: 31.8
11/22/91 19:32:30-19:41:00 Leg #8

Averages:
Temperature: -30.6 °C
Dew Point: Not Available
Wind Direction: 217.3 °
Wind Velocity: 36.27 m/sec
Pressure: 392.50 mb
Pressure Altitude: 7318.4 m
Aircraft Heading: 220.5 °
Averages:
Temperature: -28.4 °C
Dew Point: Not Available
Wind Direction: 221.4 °
Wind Velocity: 35.94 m/sec
Pressure: 410.02 mb
Pressure Altitude: 7009.6 m
Aircraft Heading: 38.1
Averages:
Temperature: -29.1 °C
Dew Point: Not Available
Wind Direction: 221.9°
Wind Velocity: 36.35 m/sec
Pressure: 409.68 mb
Pressure Altitude: 7015.6 m
Aircraft Heading: 221.8°
Averages:
Temperature: -31.4 °C
Dew Point: -39.4 °C
Wind Direction: 220.6 °
Wind Velocity: 37.47 m/sec
Pressure: 392.18 mb
Pressure Altitude: 7324.2 m
Aircraft Heading: 44.2 °
11/22/91 20:05:20-20:06:10 Leg # 12a

Averages:
Temperature: -30.9 °C
Dew Point: -32.7 °C
Wind Direction: 213.1 °
Wind Velocity: 35.61 m/sec
Pressure: 391.75 mb
Pressure Altitude: 7332.0 m
Aircraft Heading: 146.7 °

TAS1 = 93.9  TAS2 = 113.2

1 mm
Averages:
Temperature: -28.3 °C
Dew Point: Not Available
Wind Direction: 218.0°
Wind Velocity: 3333 m/sec
Pressure: 409.35 mb
Pressure Altitude: 70214 m
Aircraft Heading: 147.3°
Averages:
Temperature: -28.8 °C
Dew Point: Not Available
Wind Direction: 221.7°
Wind Velocity: 35.44 m/sec
Pressure: 410.10 mb
Pressure Altitude: 70084 m
Aircraft Heading: 326.4°
Averages:
Temperature:
Dew Point:
Wind Direction:
Wind Velocity:
Pressure:
Pressure Altitude:
Aircraft Heading:
Averages:
Temperature: -33.5 °C
Dew Point: Not Available
Wind Direction: 215.3 °
Wind Velocity: 36.77 m/sec
Pressure: 375.47 mb
Pressure Altitude: 7629.5 m
Aircraft Heading: 324.6 °
Leg # 16

Averages:
Temperature:
Dew Point:
Wind Direction:
Wind Velocity:
Pressure:
Pressure Altitude:
Aircraft Heading:

\[ \begin{array}{|c|c|}
\hline
\text{Air T Rise CD} & -33.70 \\
\text{TIME (SEC) 11/22/91} & 120 \\
\text{11/22/91 20:43:57.7497 20:43:58.3855 Delta} & 0.6358 \\
\text{TAS1} & 96.3 \\
\text{TAS2} & 96.3 \\
\hline
\end{array} \]
Averages:
Temperature: -38.8 °C
Dew Point: -41.5 °C
Wind Direction: 216.9°
Wind Velocity: 40.92 m/sec
Pressure: 344.05 mb
Pressure Altitude: 8234.7 m
Aircraft Heading: 268.9°
Averages:
Temperature: -41.2°C
Dew Point: -43.5°C
Wind Direction: 216.5°
Wind Velocity: 41.71 m/sec
Pressure: 330.92 mb
Pressure Altitude: 8501.2 m
Aircraft Heading: 110.6°
Averages:
Temperature: -54.6 °C
Dew Point: -55.4 °C
Wind Direction: 271.3°
Wind Velocity: 46.92 m/sec
Pressure: 261.65 mb
Pressure Altitude: 10066.5 m
Aircraft Heading: 276.7°
Averages:
Temperature: -51.8 °C
Dew Point: -52.7 °C
Wind Direction: 270.3 °
Wind Velocity: 43.23 m/sec
Pressure: 274.17 mb
Pressure Altitude: 9760.4 m
Aircraft Heading: 97.8 °

No 2-DC DATA
Averages:
Temperature: -49.6 °C
Dew Point: -50.0 °C
Wind Direction: 269.1 °
Wind Velocity: 42.47 m/sec
Pressure: 287.31 mb
Pressure Altitude: 9451.2 m
Aircraft Heading: 275.9 °
Averages:
Temperature: -47.2 °C
Dew Point: -48.0 °C
Wind Direction: 274.6 °
Wind Velocity: 40.38 m/sec
Pressure: 300.66 mb
Pressure Altitude: 9148.4 m
Aircraft Heading: 102.8 °
**Averages:**

- Temperature: -44.9 °C
- Dew Point: -46.2 °C
- Wind Direction: 276.5 °
- Wind Velocity: 40.50 m/sec
- Pressure: 314.82 mb
- Pressure Altitude: 8839.2 m
- Aircraft Heading: 279.0 °
Averages:
Temperature: -43.0 °C
Dew Point: -43.2 °C
Wind Direction: 280.5 °
Wind Velocity: 37.45 m/sec
Pressure: 328.72 mb
Pressure Altitude: 8546.1 m
Aircraft Heading: 99.6 °
Averages:
Temperature: -41.5 °C
Dew Point: -41.5 °C
Wind Direction: 280.8°
Wind Velocity: 35.95 m/sec
Pressure: 344.00 mb
Pressure Altitude: 8235.5 m
Aircraft Heading: 280.3°
Averages:
Temperature: -39.1 °C
Dew Point: -39.5 °C
Wind Direction: 280.3 °
Wind Velocity: 32.91 m/sec
Pressure: 359.20 mb
Pressure Altitude: 7937.4 m
Aircraft Heading: 101.1 °
Averages:
Temperature: -36.6 °C
Dew Point: -38.5 °C
Wind Direction: 283.5 °
Wind Velocity: 30.68 m/sec
Pressure: 376.18 mb
Pressure Altitude: 7616.2 m
Aircraft Heading: 280.7 °
11/25/91  15:53:00-15:56:20  Leg # 10

Averages:
Temperature: -34.3 ° C
Dew Point: -40.4 ° C
Wind Direction: 288.7 °
Wind Velocity: 28.92 m/sec
Pressure: 391.49 mb
Pressure Altitude: 7336.7 m
Aircraft Heading: 97.5 °

No Cloud
Averages:
Temperature: -36.9 °C
Dew Point: Not Available
Wind Direction: 286.6 °
Wind Velocity: 29.37 m/sec
Pressure: 375.63 mb
Pressure Altitude: 7626.4 m
Aircraft Heading: 281.9 °
Averages:
Temperature: -39.1 °C
Dew Point: -39.7 °C
Wind Direction: 281.3 °
Wind Velocity: 30.90 m/sec
Pressure: 359.55 mb
Pressure Altitude: 7930.7 m
Aircraft Heading: 98.1 °
Averages:
Temperature: -41.4 °C
Dew Point: -43.1 °C
Wind Direction: 278.9 °
Wind Velocity: 34.21 m/sec
Pressure: 343.41 mb
Pressure Altitude: 8247.3 m
Aircraft Heading: 279.7 °

No Cloud
Averages:
Temperature: -42.7 °C
Dew Point: -45.4 °C
Wind Direction: 278.1 °
Wind Velocity: 38.04 m/sec
Pressure: 329.30 mb
Pressure Altitude: 8534.3 m
Aircraft Heading: 100.8 °

No Cloud
11/25/91 16:32:50-16:39:30 Leg # 15

**Averages:**
- Temperature: -45.1 °C
- Dew Point: -47.5 °C
- Wind Direction: 272.6°
- Wind Velocity: 41.48 m/sec
- Pressure: 314.70 mb
- Pressure Altitude: 8841.6 m
- Aircraft Heading: 276.7°

**No Cloud**
Averages:
Temperature: -51.8 °C
Dew Point: Not Available
Wind Direction: 261.6 °
Wind Velocity: 42.03 m/sec
Pressure: 273.04 mb
Pressure Altitude: 9789.9 m
Aircraft Heading: 226.5 °

11/25/91 16:58:10-17:01:10 Leg # 16
Averages:
Temperature: -53.8 °C
Dew Point: Not Available
Wind Direction: 263.8 °
Wind Velocity: 44.25 m/sec
Pressure: 262.26 mb
Pressure Altitude: 10051.2 m
Aircraft Heading: 70.8 °
11/25/91 17:05:10-17:07:00 Leg # 18

Averages:
Temperature: -53.9 °C
Dew Point: Not Available
Wind Direction: 261.7 °
Wind Velocity: 44.92 m/sec
Pressure: 262.29 mb
Pressure Altitude: 10050.4 m
Aircraft Heading: 212.2 °
Averages:
Temperature: -49.4 °C
Dew Point: -50.8 °C
Wind Direction: 260.7°
Wind Velocity: 38.04 m/sec
Pressure: 287.81 mb
Pressure Altitude: 9439.6 m
Aircraft Heading: 203.4°
Averages:
Temperature: -47.2 °C
Dew Point: -48.6 °C
Wind Direction: 263.9 °
Wind Velocity: 36.51 m/sec
Pressure: 301.18 mb
Pressure Altitude: 9140.2 m
Aircraft Heading: 208.0 °
11/25/91  17:27:30-17:28:40  Leg # 21

Averages:
Temperature: -44.9 °C
Dew Point: -45.6 °C
Wind Direction: 269.3 °
Wind Velocity: 35.73 m/sec
Pressure: 313.94 mb
Pressure Altitude: 8858.1 m
Aircraft Heading: 222.1 °
Averages:
Temperature: -39.8 °C
Dew Point: -40.0 °C
Wind Direction: 268.9°
Wind Velocity: 31.63 m/sec
Pressure: 343.48 mb
Pressure Altitude: 8246.0 m
Aircraft Heading: 209.3°
Averages:
Temperature: -40.0 °C
Dew Point: -40.0 °C
Wind Direction: 270.7°
Wind Velocity: 31.93 m/sec
Pressure: 342.34 mb
Pressure Altitude: 8268.8 m
Aircraft Heading: 352.0°
Averages:
Temperature: -39.9 °C
Dew Point: -40.0 °C
Wind Direction: 269.5 °
Wind Velocity: 32.44 m/sec
Pressure: 343.62 mb
Pressure Altitude: 8243.2 m
Aircraft Heading: 222.1 °
Averages:
Temperature: -36.0 °C
Dew Point: -37.8 °C
Wind Direction: 279.5 °
Wind Velocity: 25.49 m/sec
Pressure: 374.75 mb
Pressure Altitude: 7642.9 m
Aircraft Heading: 218.4 °
Averages:
Temperature: -36.0 °C
Dew Point: -37.9 °C
Wind Direction: 281.5 °
Wind Velocity: 25.91 m/sec
Pressure: 375.02 mb
Pressure Altitude: 7637.8 m
Aircraft Heading: 349.3 °
Averages:
Temperature: -33.3 °C
Dew Point: -34.9 °C
Wind Direction: 284.3 °
Wind Velocity: 24.68 m/sec
Pressure: 394.71 mb
Pressure Altitude: 7281.0 m
Aircraft Heading: 150.0 °
Averages:
Temperature: -31.3 °C
Dew Point: -31.9 °C
Wind Direction: 283.7 °
Wind Velocity: 23.95 m/sec
Pressure: 409.70 mb
Pressure Altitude: 70153 m
Aircraft Heading: 212.5 °
Averages:
Temperature: -31.3 °C
Dew Point: -31.7 °C
Wind Direction: 285.3 °
Wind Velocity: 24.87 m/sec
Pressure: 409.69 mb
Pressure Altitude: 7015.5 m
Aircraft Heading: 263.0 °
Averages:
Temperature: °C
Dew Point: °C
Wind Direction: °
Wind Velocity: m/sec
Pressure: mb
Pressure Altitude: m
Aircraft Heading: °
Averages:
Temperature: -57.1 °C
Dew Point: Not Available
Wind Direction: 283.1 °
Wind Velocity: 16.19 m/sec
Pressure: 262.48 mb
Pressure Altitude: 10045.7 m
Aircraft Heading: 96.9 °
Averages:
Temperature: -57.1 °C
Dew Point: Not Available
Wind Direction: 280.8°
Wind Velocity: 17.73 m/sec
Pressure: 262.39 mb
Pressure Altitude: 10048.1 m
Aircraft Heading: 278.2°
Averages:
Temperature: -54.3 °C
Dew Point: Not Available
Wind Direction: 280.1 °
Wind Velocity: 15.44 m/sec
Pressure: 274.99 mb
Pressure Altitude: 9740.7 m
Aircraft Heading: 96.9 °
Averages:
Temperature: -51.5 °C
Dew Point: Not Available
Wind Direction: 276.1 °
Wind Velocity: 16.04 m/sec
Pressure: 288.17 mb
Pressure Altitude: 9431.2 m
Aircraft Heading: 277.2 °
Averages:
Temperature: -49.0 °C
Dew Point: Not Available
Wind Direction: 271.2 °
Wind Velocity: 1438 m/sec
Pressure: 301.00 mb
Pressure Altitude: 9140.9 m
Aircraft Heading: 98.0 °

11/26/91 17:29:21-17:32:45 Leg #5

PMS SIZE PLOT
- FSSP
- ONE DC
- TWO DC
- ONE DP

11/26/91 17:29.21.6578 17:30.02.8957 DeltaT: 0:41.2379 TAS1 = 119.8 TAS2 = 120.4
Averages:
Temperature: -46.3 °C
Dew Point: Not Available
Wind Direction: 261.9 °
Wind Velocity: 16.02 m/sec
Pressure: 314.93 mb
Pressure Altitude: 8836.7 m
Aircraft Heading: 275.5 °
Averages:
Temperature: -46.2 °C
Dew Point: Not Available
Wind Direction: 261.6 °
Wind Velocity: 15.76 m/sec
Pressure: 315.17 mb
Pressure Altitude: 8831.6 m
Aircraft Heading: 99.5 °
Averages:
Temperature: -49.0 °C
Dew Point: Not Available
Wind Direction: 261.5 °
Wind Velocity: 17.96 m/sec
Pressure: 301.21 mb
Pressure Altitude: 91362 m
Aircraft Heading: 275.2 °
Averages:
Temperature: -51.5 °C
Dew Point: -52.8 °C
Wind Direction: 266.0 °
Wind Velocity: 18.26 m/sec
Pressure: 287.97 mb
Pressure Altitude: 9436.0 m
Aircraft Heading: 99.6 °
Averages:
Temperature: -54.2 °C
Dew Point: -54.6 °C
Wind Direction: 268.0 °
Wind Velocity: 19.92 m/sec
Pressure: 274.79 mb
Pressure Altitude: 9745.6 m
Aircraft Heading: 276.1 °
Averages:
Temperature: -56.9 °C
Dew Point: -57.0 °C
Wind Direction: 276.1 °
Wind Velocity: 18.75 m/sec
Pressure: 262.00 mb
Pressure Altitude: 10057.8 m
Aircraft Heading: 96.6 °
Averages:
Temperature: -59.5 °C
Dew Point: -59.6 °C
Wind Direction: 271.1 °
Wind Velocity: 19.56 m/sec
Pressure: 249.93 mb
Pressure Altitude: 10363.9 m
Aircraft Heading: 276.5 °

No 2-DC DATA
Averages:
Temperature: -59.8 °C
Dew Point: Not Available
Wind Direction: 266.5 °
Wind Velocity: 17.89 m/sec
Pressure: 244.28 mb
Pressure Altitude: 10511.8 m
Aircraft Heading: 98.7 °

No 2-DC DATA
Averages:
Temperature: -52.9 °C
Dew Point: Not Available
Wind Direction: 266.2 °
Wind Velocity: 18.78 m/sec
Pressure: 250.41 mb
Pressure Altitude: 10351.6 m
Aircraft Heading: 273.8 °

No 2-DC DATA
Averages:
Temperature: -56.7 °C  
Dew Point: Not Available  
Wind Direction: 267.6°  
Wind Velocity: 1835 m/sec  
Pressure: 262.19 mb  
Pressure Altitude: 10052.9 m  
Aircraft Heading: 99.6°  

No 2-DC DATA
Averages:
Temperature: -54.1 °C
Dew Point: Not Available
Wind Direction: 265.7 °
Wind Velocity: 20.93 m/sec
Pressure: 274.43 mb
Pressure Altitude: 97543 m
Aircraft Heading: 275.4 °

No 2-DC DATA
11/26/91 19:20:40-19:23:30 Leg # 17

**Averages:**

- Temperature: -51.2 °C
- Dew Point: Not Available
- Wind Direction: 264.5 °
- Wind Velocity: 20.41 m/sec
- Pressure: 287.58 mb
- Pressure Altitude: 9444.9 m
- Aircraft Heading: 99.6 °

**No 2-DC DATA**
Averages:
Temperature: -48.7 °C
Dew Point: Not Available
Wind Direction: 259.9 °
Wind Velocity: 22.15 m/sec
Pressure: 301.48 mb
Pressure Altitude: 91303 m
Aircraft Heading: 274.0 °

No 2-DC DATA
11/26/91  19:34:20-19:37:00  Leg # 19

Averages:
Temperature: -45.9 °C
Dew Point: Not Available
Wind Direction: 256.3 °
Wind Velocity: 21.03 m/sec
Pressure: 314.52 mb
Pressure Altitude: 88453 m
Aircraft Heading: 102.8 °

No 2-DC DATA
Averages:
Temperature: -51.6 °C
Dew Point: Not Available
Wind Direction: 254.1°
Wind Velocity: 39.23 m/sec
Pressure: 246.11 mb
Pressure Altitude: 10464.8 m
Aircraft Heading: 75.1°

No 2-DC DATA
Averages:
Temperature: -58.5 °C
Dew Point: Not Available
Wind Direction: 261.4°
Wind Velocity: 43.46 m/sec
Pressure: 211.10 mb
Pressure Altitude: 11440.1 m
Aircraft Heading: 259.5°

No 2-DC DATA
**Averages:**

Temperature: -59.7 °C  
Dew Point: Not Available  
Wind Direction: 263.8 °  
Wind Velocity: 40.67 m/sec  
Pressure: 210.41 mb  
Pressure Altitude: 11457.8 m  
Aircraft Heading: 71.2 °  

No 2-DC DATA
Averages:
Temperature: -58.6 °C
Dew Point: Not Available
Wind Direction: 259.0 °
Wind Velocity: 42.29 m/sec
Pressure: 216.64 mb
Pressure Altitude: 11275.1 m
Aircraft Heading: 257.8 °

No 2-DC DATA
Averages:
Temperature: -55.7 °C
Dew Point: Not Available
Wind Direction: 257.6 °
Wind Velocity: 39.54 m/sec
Pressure: 227.37 mb
Pressure Altitude: 10969.7 m
Aircraft Heading: 80.7 °

No 2-DC DATA
Averages:
Temperature: -53.2 °C
Dew Point: -53.2 °C
Wind Direction: 259.2°
Wind Velocity: 40.19 m/sec
Pressure: 238.42 mb
Pressure Altitude: 10667.0 m
Aircraft Heading: 260.2°

No 2-DC DATA
11/28/91 18:00:00-18:03:00 Leg #7

Averages:
Temperature: -53.1 °C
Dew Point: -53.3 °C
Wind Direction: 260.0 °
Wind Velocity: 40.42 m/sec
Pressure: 238.37 mb
Pressure Altitude: 10668.5 m
Aircraft Heading: 74.5 °

No 2-DC DATA
Averages:
Temperature: -53.1 °C
Dew Point: -53.3 °C
Wind Direction: 260.0 °
Wind Velocity: 42.92 m/sec
Pressure: 238.35 mb
Pressure Altitude: 10669.1 m
Aircraft Heading: 254.8 °

No 2-DC DATA
Averages:
Temperature: -50.7 °C
Dew Point: -50.9 °C
Wind Direction: 259.6 °
Wind Velocity: 41.63 m/sec
Pressure: 249.72 mb
Pressure Altitude: 10369.2 m
Aircraft Heading: 257.3 °
Averages:
Temperature: -47.9 °C
Dew Point: -49.0 °C
Wind Direction: 260.3°
Wind Velocity: 39.79 m/sec
Pressure: 262.36 mb
Pressure Altitude: 10048.8 m
Aircraft Heading: 75.6°

No 2-DC DATA
11/28/91  18:24:00-18:31:30  Leg # 10

**Averages:**
- Temperature: -45.5 °C
- Dew Point: -45.9 °C
- Wind Direction: 259.5°
- Wind Velocity: 40.36 m/sec
- Pressure: 273.96 mb
- Pressure Altitude: 9765.5 m
- Aircraft Heading: 257.7°

No 2-DC DATA
Averages:
Temperature: -47.8 °C
Dew Point: -50.3 °C
Wind Direction: 256.0 °
Wind Velocity: 36.89 m/sec
Pressure: 262.08 mb
Pressure Altitude: 10055.8 m
Aircraft Heading: 77.1 °

No 2-DC DATA
Averages:
Temperature: -47.8 ° C
Dew Point: -51.2 ° C
Wind Direction: 257.2 °
Wind Velocity: 38.22 m/sec
Pressure: 261.9 mb
Pressure Altitude: 10060.9 m
Aircraft Heading: 255.7 °

No 2-DC DATA
Averages:
Temperature: -42.8 °C
Dew Point: Not Available
Wind Direction: 256.0 °
Wind Velocity: 38.60 m/sec
Pressure: 287.26 mb
Pressure Altitude: 9452.2 m
Aircraft Heading: 256.7 °

No 2-DC DATA
Averages:
Temperature: °C
Dew Point: °C
Wind Direction: °
Wind Velocity: m/sec
Pressure: mb
Pressure Altitude: m
Aircraft Heading: °

No 2-DC DATA
11/28/91  19:03:50-19:16:00  Leg # 14

Averages:
Temperature: -47.6 °C
Dew Point: -48.2 °C
Wind Direction: 256.2°
Wind Velocity: 38.47 m/sec
Pressure: 262.0 mb
Pressure Altitude: 10057.52 m
Aircraft Heading: 255.8°

No 2-DC DATA
11/28/91 19:20:45-19:23:10 Leg #15

Averages:
Temperature: -53.1 °C
Dew Point: Not Available
Wind Direction: 254.0°
Wind Velocity: 40.99 m/sec
Pressure: 238.25 mb
Pressure Altitude: 10671.7 m
Aircraft Heading: 73.7°

No 2-DC DATA
Averages:
Temperature: -52.8 °C
Dew Point: Not Available
Wind Direction: 256.1 °
Wind Velocity: 44.10 m/sec
Pressure: 238.45 mb
Pressure Altitude: 10666.4 m
Aircraft Heading: 256.1 °

No 2-DC DATA
11/28/91 19:31:26-19:36:00 Leg # 16b

**Averages:**
- Temperature: -55.7°C
- Dew Point: Not Available
- Wind Direction: 256.0°
- Wind Velocity: 44.39 m/sec
- Pressure: 227.41 mb
- Pressure Altitude: 10968.6 m
- Aircraft Heading: 256.3°

No 2-DC DATA
Averages:
Temperature: -58.9 °C
Dew Point: Not Available
Wind Direction: 257.3 °
Wind Velocity: 43.48 m/sec
Pressure: 197.03 mb
Pressure Altitude: 11901.3 m
Aircraft Heading: 211.3 °

No 2-DC DATA
11/28/91  20:15:00-20:17:46  Leg # 18a

**Averages:**
- Temperature: -53.9 °C
- Dew Point: Not Available
- Wind Direction: 251.1 °
- Wind Velocity: 42.43 m/sec
- Pressure: 233.30 mb
- Pressure Altitude: 10805.8 m
- Aircraft Heading: 238.2 °

No 2-DC DATA
Averages:
Temperature: -52.7 °C
Dew Point: Not Available
Wind Direction: 251.5 °
Wind Velocity: 41.05 m/sec
Pressure: 238.41 mb
Pressure Altitude: 10667.4 m
Aircraft Heading: 255.2 °

No 2-DC DATA
Averages:
Temperature: -47.2 °C
Dew Point: -47.8 °C
Wind Direction: 252.2°
Wind Velocity: 36.33 m/sec
Pressure: 262.15 mb
Pressure Altitude: 10054.1 m
Aircraft Heading: 69.8°

No 2-DC DATA
Averages:
Temperature: -47.2 °C
Dew Point: -47.6 °C
Wind Direction: 252.1 °
Wind Velocity: 38.15 m/sec
Pressure: 262.43 mb
Pressure Altitude: 10047.1 m
Aircraft Heading: 250.3 °

No 2-DC DATA
Averages:
Temperature: -42.5 °C
Dew Point: Not Available
Wind Direction: 253.9 °
Wind Velocity: 38.71 m/sec
Pressure: 287.28 mb
Pressure Altitude: 9452.0 m
Aircraft Heading: 255.4 °

No 2-DC DATA
Averages:
- Temperature: -47.3 °C
- Dew Point: -49.5 °C
- Wind Direction: 252.0°
- Wind Velocity: 38.11 m/sec
- Pressure: 261.79 mb
- Pressure Altitude: 10063.1 m
- Aircraft Heading: 76.7°

No 2-DC DATA
Averages:
Temperature: -47.0 °C
Dew Point: -48.8 °C
Wind Direction: 252.0°
Wind Velocity: 40.35 m/sec
Pressure: 262.65 mb
Pressure Altitude: 10041.6 m
Aircraft Heading: 254.7°

No 2-DC DATA
Averages:
Temperature: -49.7 °C
Dew Point: -50.9 °C
Wind Direction: 236.5 °
Wind Velocity: 71.42 m/sec
Pressure: 238.30 mb
Pressure Altitude: 10670.3 m
Aircraft Heading: 226.1 °
Averages:
Temperature: -51.8 °C
Dew Point: -52.3 °C
Wind Direction: 235.6°
Wind Velocity: 70.60 m/sec
Pressure: 227.78 mb
Pressure Altitude: 10958.2 m
Aircraft Heading: 234.9°
Averages:
Temperature: -54.6 °C
Dew Point: -54.4 °C
Wind Direction: 237.9 °
Wind Velocity: 74.65 m/sec
Pressure: 216.21 mb
Pressure Altitude: 11287.5 m
Aircraft Heading: 236.6 °
Averages:
Temperature: -57.2 °C
Dew Point: Not Available
Wind Direction: 239.3°
Wind Velocity: 78.47 m/sec
Pressure: 206.83 mb
Pressure Altitude: 11565.0 m
Aircraft Heading: 240.5°

No Cloud
11/30/91  16:27:00-16:30:00  Leg # 5

Averages:
Temperature: -52.8 °C
Dew Point: -53.6 °C
Wind Direction: 237.1 °
Wind Velocity: 73.18 m/sec
Pressure: 225.29 mb
Pressure Altitude: 11033.7 m
Aircraft Heading: 236.4 °
Averages:
Temperature: -54.5 °C
Dew Point: Not Available
Wind Direction: 238.1 °
Wind Velocity: 75.73 m/sec
Pressure: 216.75 mb
Pressure Altitude: 11271.8 m
Aircraft Heading: 243.7 °
Averages:
Temperature: -52.1 °C
Dew Point: Not Available
Wind Direction: 236.5°
Wind Velocity: 72.93 m/sec
Pressure: 227.35 mb
Pressure Altitude: 10970.2 m
Aircraft Heading: 241.3°
11/30/91 16:42:17-16:43:15 Leg # 7b

Averages:
Temperature: -50.5 °C
Dew Point: Not Available
Wind Direction: 236.9 °
Wind Velocity: 69.16 m/sec
Pressure: 221.7 mb
Pressure Altitude: 10677.0 m
Aircraft Heading: 221.7 °
11/30/91  16:46:40-16:54:00  Leg # 8

Averages:
Temperature: °C
Dew Point: Not Available
Wind Direction: °
Wind Velocity: m/sec
Pressure: mb
Pressure Altitude: m
Aircraft Heading: °
Averages:
Temperature: -35.8 °C
Dew Point: -45.6 °C
Wind Direction: 273.6 °
Wind Velocity: 38.92 m/sec
Pressure: 329.16 mb
Pressure Altitude: 8777.1 m
Aircraft Heading: 269.9 °

No Cloud
Averages:
Temperature: -37.7 °C
Dew Point: -46.8 °C
Wind Direction: 275.4 °
Wind Velocity: 38.78 m/sec
Pressure: 315.09 mb
Pressure Altitude: 9073.4 m
Aircraft Heading: 274.6 °
Averages:
Temperature: -40.4 °C
Dew Point: -43.0 °C
Wind Direction: 274.2°
Wind Velocity: 41.87 m/sec
Pressure: 301.24 mb
Pressure Altitude: 9375.7 m
Aircraft Heading: 281.0°
Averages:
Temperature: -41.4 °C
Dew Point: -41.2 °C
Wind Direction: 270.0 °
Wind Velocity: 47.28 m/sec
Pressure: 287.88 mb
Pressure Altitude: 9678.0 m
Aircraft Heading: 271.4 °
Averages:
Temperature: -43.9 °C
Dew Point: Not Available
Wind Direction: 271.0°
Wind Velocity: 47.82 m/sec
Pressure: 274.56 mb
Pressure Altitude: 9991.1 m
Aircraft Heading: 277.4°
Averages:
Temperature: -46.4 °C
Dew Point: -48.4 °C
Wind Direction: 273.0 °
Wind Velocity: 48.94 m/sec
Pressure: 262.32 mb
Pressure Altitude: 10289.8 m
Aircraft Heading: 271.9 °
Averages:
Temperature: -48.0 °C
Dew Point: -53.7 °C
Wind Direction: 272.8°
Wind Velocity: 51.12 m/sec
Pressure: 250.29 mb
Pressure Altitude: 10594.6 m
Aircraft Heading: 273.9°

No 2-DC DATA
Averages:
Temperature: -50.8 °C
Dew Point: -54.2 °C
Wind Direction: 273.4 °
Wind Velocity: 52.14 m/sec
Pressure: 238.68 mb
Pressure Altitude: 10990.1 m
Aircraft Heading: 272.6 °
Averages:
Temperature: -53.3 °C
Dew Point: -55.1 °C
Wind Direction: 274.7°
Wind Velocity: 52.93 m/sec
Pressure: 227.79 mb
Pressure Altitude: 11198.1 m
Aircraft Heading: 2733°
Averages:
Temperature: -56.2 °C
Dew Point: -57.6 °C
Wind Direction: 275.4°
Wind Velocity: 52.66 m/sec
Pressure: 216.85 mb
Pressure Altitude: 11508.6 m
Aircraft Heading: 275.4°
Averages:
Temperature: -58.9 °C
Dew Point: -44.3 °C
Wind Direction: 275.3°
Wind Velocity: 54.62 m/sec
Pressure: 206.76 mb
Pressure Altitude: 11808.5 m
Aircraft Heading: 275.7°
Averages:
Temperature: -61.5 °C
Dew Point: -63.5 °C
Wind Direction: 276.4°
Wind Velocity: 55.01 m/sec
Pressure: 197.32 mb
Pressure Altitude: 12097.1 m
Aircraft Heading: 275.4°
Averages:
Temperature: -63.8 °C
Dew Point: -65.0 °C
Wind Direction: 277.5°
Wind Velocity: 54.06 m/sec
Pressure: 187.65 mb
Pressure Altitude: 12406.3 m
Aircraft Heading: 277.7°
12/05/91 07:50:40-08:04:30 Leg # 14

Averages:
Temperature: °C
Dew Point: °C
Wind Direction: °
Wind Velocity: m/sec
Pressure: mb
Pressure Altitude: m
Aircraft Heading: °
12/05/91  08:10:40-08:12:43  Leg # 15

Averages:
Temperature: -37.8 °C
Dew Point: -38.3 °C
Wind Direction: 272.8 °
Wind Velocity: 41.98 m/sec
Pressure: 315.40 mb
Pressure Altitude: 9069.9 m
Aircraft Heading: 272.4 °
Averages:
Temperature: -40.0 °C
Dew Point: -40.9 °C
Wind Direction: 272.2 °
Wind Velocity: 44.30 m/sec
Pressure: 301.08 mb
Pressure Altitude: 9379.0 m
Aircraft Heading: 270.0 °
12/05/91  08:24:23-08:27:45  Leg #17

Averages:
Temperature: -37.6 °C
Dew Point: -38.3 °C
Wind Direction: 272.2°
Wind Velocity: 43.19 m/sec
Pressure: 314.36 mb
Pressure Altitude: 9084.2 m
Aircraft Heading: 273.0°
12/05/91 18:15:00-18:23:30 Leg # 1

Averages:

- Temperature: -50.1 °C
- Dew Point: Not Available
- Wind Direction: 280.1 °
- Wind Velocity: 62.23 m/sec
- Pressure: 242.20 mb
- Pressure Altitude: 10808.0 m
- Aircraft Heading: 274.1 °

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12/05/91 18:21:02.6631 18:21:03.9138 Δt: 0: 1.2507 TAS1 = 145.7  TAS2 = 145.9

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1 mm

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12/05/91 18:21:02.6631 18:21:03.9138 Δt: 0: 1.2507 TAS1 = 145.7  TAS2 = 145.9
Averages:
Temperature: -51.0 °C
Dew Point: -52.0 °C
Wind Direction: 280.9°
Wind Velocity: 61.28 m/sec
Pressure: 238.62 mb
Pressure Altitude: 10901.6 m
Aircraft Heading: 45.1°
Averages:
Temperature: -53.7 °C
Dew Point: -55.2 °C
Wind Direction: 279.7°
Wind Velocity: 63.46 m/sec
Pressure: 227.66 mb
Pressure Altitude: 11201.5 m
Aircraft Heading: 263.1°
12/05/91 18:39:31-18:47:40 Leg #3b

Averages:
Temperature: -56.0 °C
Dew Point: -57.0 °C
Wind Direction: 279.7°
Wind Velocity: 63.00 m/sec
Pressure: 217.13 mb
Pressure Altitude: 11500.8 m
Aircraft Heading: 258.2°

12/05/91 18:38:02.7989 18:38:03.4296 DeltaT: 0.6307 TAS1 = 133.6 TAS2 = 133.6
Averages:
Temperature: -59.0 °C
Dew Point: -60.1 °C
Wind Direction: 279.2°
Wind Velocity: 61.58 m/sec
Pressure: 207.17 mb
Pressure Altitude: 11794.8 m
Aircraft Heading: 43.6°
Averages:
Temperature: -61.5 °C
Dew Point: Not Available
Wind Direction: 270.0°
Wind Velocity: 61.88 m/sec
Pressure: 190.61 mb
Pressure Altitude: 12088.1 m
Aircraft Heading: 44.9°
Averages:
Temperature: -63.5 °C
Dew Point: Not Available
Wind Direction: 278.7°
Wind Velocity: 64.37 m/sec
Pressure: 188.16 mb
Pressure Altitude: 12389.4 m
Aircraft Heading: 250.8°

No 2-DC DATA
Averages:
Temperature: -64.4 °C
Dew Point: Not Available
Wind Direction: 280.8 °
Wind Velocity: 60.01 m/sec
Pressure: 179.02 mb
Pressure Altitude: 12669.2 m
Aircraft Heading: 256.7 °
Averages:
Temperature: -62.5 °C
Dew Point: Not Available
Wind Direction: 281.0 °
Wind Velocity: 62.51 m/sec
Pressure: 192.98 mb
Pressure Altitude: 12234.4 m
Aircraft Heading: 43.3 °
12/05/91  19:29:00-19:41:00  Leg #7

Averages:
Temperature: -56.2 °C
Dew Point: -57.4 °C
Wind Direction: 277.3 °
Wind Velocity: 64.86 m/sec
Pressure: 192.98 mb
Pressure Altitude: 11505.4 m
Aircraft Heading: 256.0 °
Averages:
Temperature: -50.8 °C
Dew Point: -52.2 °C
Wind Direction: 279.4°
Wind Velocity: 61.63 m/sec
Pressure: 238.98 mb
Pressure Altitude: 10892.0 m
Aircraft Heading: 43.3°
Averages:
Temperature: -46.2 °C
Dew Point: -47.4 °C
Wind Direction: 281.3 °
Wind Velocity: 56.39 m/sec
Pressure: 262.61 mb
Pressure Altitude: 10882.4 m
Aircraft Heading: 259.3 °
Averages:
Temperature: -45.1 °C
Dew Point: Not Available
Wind Direction: 228.5 °
Wind Velocity: 26.01 m/sec
Pressure: 262.70 mb
Pressure Altitude: 10040.2 m
Aircraft Heading: 104.0 °
Averages:
Temperature: °C
Dew Point: °C
Wind Direction: °
Wind Velocity: m/sec
Pressure: mb
Pressure Altitude: m
Aircraft Heading: °
12/07/91
20:32:00-20:48:40
Leg #2

**Averages:**
- Temperature: -35.0 °C
- Dew Point: Not Available
- Wind Direction: 237.6 °
- Wind Velocity: 25.31 m/sec
- Pressure: 316.0 mb
- Pressure Altitude: 8814.0 m
- Aircraft Heading: 269.1 °
Averages:
Temperature: -34.8 °C
Dew Point: -34.4 °C
Wind Direction: 238.0°
Wind Velocity: 24.04 m/sec
Pressure: 315.50 mb
Pressure Altitude: 8824.6 m
Aircraft Heading: 104.3°
Averages:
Temperature: -39.7 °C
Dew Point: Not Available
Wind Direction: 229.7 °
Wind Velocity: 20.39 m/sec
Pressure: 288.4 mb
Pressure Altitude: 9425.1 m
Aircraft Heading: 267.7 °