CODOS Snowpack Profile

Location: CM4P
Aspect: NNE
Boot Pen: 12 cm

Prior Obs: Light spindrift on SSE and AFT

Air T: °C
Sky:
Precip: N/D
Wind:
Notes: Aspect = 20°

Prior Obs:

- Light spindrift on SSE and AFT
- Snow surface, 4.20 m above ground:
  - 100 mm
  - 1.75 m
  - 1.60 m

Total W.E. = 550 mm
P = 382 kg/m³

<table>
<thead>
<tr>
<th>K</th>
<th>P</th>
<th>1F</th>
<th>4F</th>
<th>F</th>
<th>H</th>
<th>D8</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>160</td>
<td>150</td>
<td>140</td>
<td>130</td>
<td>120</td>
<td>110</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>81</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Light grey crust, late WTE, soft, loose.</td>
</tr>
<tr>
<td>125</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Wind = 2 cm/hr, 30° SSW, Light, flake snow.</td>
</tr>
<tr>
<td>110</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very fine ice crystals ≤ 0.5 mm.</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Small rounded @ 3-17</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Small crystals @ 1-4 mm</td>
</tr>
<tr>
<td>75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Chains, cutted, 3-7 mm</td>
</tr>
<tr>
<td>63</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Refaceted poly, 3-10 mm</td>
</tr>
</tbody>
</table>

Time: 1830 MDT

Survey: CM4P

Chains: Y-7, R-10
### Center for Snow and Avalanche Studies

#### Snowpack Profile

- **Time:** 11:00 MDT
- **Location:** GMRP
- **Air T:** 0 °C
- **Sky:** 0
- **Precip:** 0
- **Wind:** 15°
- **Boot Pen:** 5 cm
- **Total Snowpack SWE:** 44 mm H₂O

#### Snowpack Profile Details

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>120</td>
<td>Snow surface, small</td>
</tr>
<tr>
<td>150</td>
<td>Snow surface, small</td>
</tr>
<tr>
<td>180</td>
<td>Snow surface, small</td>
</tr>
<tr>
<td>190</td>
<td>Snow surface, small</td>
</tr>
<tr>
<td>200</td>
<td>Snow surface, small</td>
</tr>
</tbody>
</table>

#### Potential Slab

<table>
<thead>
<tr>
<th>Ref</th>
<th>H₂O Hor + Hor = ρₜ</th>
<th>Sin / H₂O Hor x ρ x 98 = Tₛlab</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>mm + m =</td>
<td>X X X 98 =</td>
</tr>
<tr>
<td>B</td>
<td>mm + m =</td>
<td>X X X 98 =</td>
</tr>
</tbody>
</table>

#### Weak Layer & Bed Surface

- **Notes:**
  - 1.5 μm: 7 = 1.78: s = 1.49: y = 1.64: s = 1.68: 6 = 1.41
  - 1000; no settlement cases

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**V. 11/20/03**
### Snowpack Profile

**Date:** 5/6/10  
**Observer:** CL, DJ, MB, AB, AP

**Location:** 6445P  
**Elev.:** 30  
**Aspect:** 8 cm  
**Boot Pen:** 2.3°  
**Sky:** 0  
**Precip.:** 0  
**Wind:** Med  
**Total Snowpack SWE:** __ mm H2O  
**Notes:** H57 = 1.35 m^3

### T° K P 1F 4F H E ρ θ DOD Notes

<table>
<thead>
<tr>
<th>T°</th>
<th>K</th>
<th>P</th>
<th>1F</th>
<th>4F</th>
<th>H</th>
<th>E</th>
<th>ρ</th>
<th>θ</th>
<th>DOD</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>120</td>
<td>110</td>
<td>100</td>
<td>90</td>
<td>80</td>
<td>70</td>
<td>60</td>
<td>50</td>
<td>40</td>
<td>30</td>
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</tbody>
</table>

### Potential Slab

<table>
<thead>
<tr>
<th>Ref</th>
<th>H2O_{Nor} + H_{Nor} = ρ_{a}</th>
<th>Sinθ x H_{Nor} x ρ x 9.8 = T_{Slab}</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>mm x m = x x x 9.8 =</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>mm x m = x x 9.8 =</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

<table>
<thead>
<tr>
<th>Ref</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1.90</td>
</tr>
<tr>
<td>B</td>
<td>1.58</td>
</tr>
</tbody>
</table>

**Potential Slab Quality:**

- 1: 1.90
- 2: 1.58
- 3: 1.34
- 4: 1.39
- 5: 1.50

**Bed Surface Notes:**

- Wetted cornice edge
- Wetted and rounded
- Wetted and icy

**V. 11/2003**
Observers: CL+AT

Center for Snow and Avalanche Studies

Snowpack Profile

Date: 4/2/11

Elev. 10,450 ft

Aspect: NE

Boot Pen: 0 cm

Air T: ____°C

Sky: __

Precip: Ni

Wind: Lt

Prior Pit: # 1

Total Snowpack SWE: ______mm H2O

Notes: 

T° K P 1F 4F F H E ρ ϑ DOD Notes

Potential Slab

Weak Layer & Bed Surface

Ref H2O hor / H hor = ρA Sin ϑ x H hor x ρ x 9.8 = τSlab F E TWL S C RB Shear Quality

A mm / m = x x x 9.8 =

B mm / m = x x x 9.8 =

Notes: 

Notes:

V. 11/20/03
Observations:

Data:

Snowpack Profile:

Temperature: [T°C]
Pressure: [P kPa]
Albedo: [Al]
Air Temperature: [T °C]
Air Pressure: [P kPa]
Wind Speed: [W m/s]
Wind Direction: [D °]
Wind Gust: [G m/s]
Cloud Cover: [C %]
Sunlight: [S %]
Mean Wind Speed: [M m/s]
Mean Wind Direction: [D °]

Notes:

Potential Slab:

<table>
<thead>
<tr>
<th>Ref</th>
<th>H2O (mm) x H2O (mm) = DPa</th>
<th>Sin A x H2O (mm) x DPa x 9.8 = τs (kPa)</th>
<th>TWA (°C)</th>
<th>F</th>
<th>E</th>
<th>TWA (°C)</th>
<th>S</th>
<th>C</th>
<th>RB</th>
<th>Shear Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
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</tbody>
</table>

Notes:

Shear Quality:

Potential Slab:

Potential slab:

Weak Layer & Bed Surface:

Bed surface:

Notes:

Shear Quality:

V. 11/20/03
## Snowpack Profile

- **Observers:** CL + ST
- **Center for Snow and Avalanche Studies**
- **Time:** 1340
- **Location:** Grand Marais County Line
- **Elev:** 153
- **Aspect:**
- **Boot Pen:** 10 cm
- **Wind:** HP
- **Prior Pit:** # 1
- **Date:** 5/19/11
- **Temperature:** -3 °C
- **Precip:** 0.05 in
- **Notes:** Horrible road conditions, deep drifts
- **Total SWE:** mm H2O
- **Notes:** Horrible pit conditions

### Potential Slab

<table>
<thead>
<tr>
<th>Ref</th>
<th>( H_0 x )</th>
<th>( H_0 x )</th>
<th>( \rho )</th>
<th>( \theta )</th>
<th>DOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>( mm / )</td>
<td>( mm / )</td>
<td>( m )</td>
<td>( m )</td>
<td>25</td>
</tr>
<tr>
<td>B</td>
<td>( mm / )</td>
<td>( mm / )</td>
<td>( m )</td>
<td>( m )</td>
<td>71</td>
</tr>
</tbody>
</table>

### Weak Layer & Bed Surface

<table>
<thead>
<tr>
<th>Ref</th>
<th>Shear Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

- New, clean
- Wet, clean, 50% frozen, 50% dry
- Wet, very greasy, pats

---

**Potential Slab**

\( H_0 \) x \( H_0 \) = \( \rho_0 \)

\( \sin \theta \) x \( H_0 \) x \( \rho \) x 9.8 = \( \tau_{slab} \)

**Weak Layer & Bed Surface**

<table>
<thead>
<tr>
<th>F</th>
<th>E</th>
<th>TWL</th>
<th>S</th>
<th>C</th>
<th>RB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Center for Snow and Avalanche Studies

Profile # 5455

Date: 6/13/11

Elev. 10,630' Aspect: 65°

Boot Pen: 2 cm L: 3

Wind: Mod

Notes: H5 = 1.53 m

Air T: +7 °C

Sky: D

Precip: 0.71

Total Snowpack SWE: 7.85 mm H2O

Notes: HS = 4.93 kJ/m3

Potential Slab

<table>
<thead>
<tr>
<th>Ref</th>
<th>%h2Oev / %h2o</th>
<th>S</th>
<th>E</th>
<th>F</th>
<th>TWL</th>
<th>S</th>
<th>C</th>
<th>RB</th>
<th>Shear Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>mm / m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>mg / m</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: H1 = 1.40; 2 = 1.65; 3 = 1.05; 4 = 1.13

5 = 1.28; 6 = 1.20

V. 11/20/03
Center for Snow and Avalanche Studies

Snowpack Profile

Profile #:  

Observers: CL + FA  

Time: 12:31  

Location:  

Air T: °C  

Elev: 7,230  

Aspect: NWE  

Boot Pen: 7 cm  

Date: 3/16/12  

Sky:  

Precip:  

Wind:  

Prior Pit #:  

Notes: 

Prior SWE: 1.47 m  

Total Snowpack SWE: 509 mm H2O

Notes:  

T° P 1F 45 F H E ρ ϴ DOD Notes

Potential Slab

<table>
<thead>
<tr>
<th>Ref</th>
<th>H2Over + Hnew = p0</th>
<th>Sinθ x Hnew x ρ x 9.8 = Fsub</th>
<th>F</th>
<th>E</th>
<th>Tm</th>
<th>S</th>
<th>C</th>
<th>RB</th>
<th>Shear Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>max * m =</td>
<td>x x x 98 =</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>max * m =</td>
<td>x x x 98 =</td>
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</tbody>
</table>

Notes:

| 1.47 | 1.61 | 1.23 | 1.34 | 1.40 |  

V. 11/2003
CODOS Snowpack Profile

Observers: CLAAT
Location: G.M. DF
Elev. 10,430
Aspect: NNE
Boot Pen: 20 cm
Air Temp: 3 °C
Sky: Cloudy
Precip.: Nil
Wind: 45
Notes: HSL = 1.55 m
SWE = 47.44 mm = 18.66 in
S = 306 kg/m^2; mean snow T = -2.8 °C

Depth at each level:

- 0.8
- 1.0
- 1.4
- 1.6
- 1.8
- 2.0
- 2.5
- 3.0
- 3.5
- 4.0
- 4.5
- 5.0
- 5.5
- 6.0

Thick layer, graupel, clean
Thick faceted
Necking mixed with clear ice
Fine sintering, rounds
E D2 in clear, thin band
Sintering, rounds, few ice lenses
Some cups, mild chaining
Large facets, friable
Slightly friable, chains, cups
Rounding and necking
CODOS Snowpack Profile

Observers: GC
Location: GMSP
Elev. 10,631' Aspect: NNE
Boot Pen: 15 cm
Aspect: W
Time: 10:30 MDT
Date: 4/11/13

Prior Obs: 3/8/13
Air T: -4°C
Sky: ☀
Precip: S
Wind: LA
Notes: H47 = 1.53m

SWE = 512 mm; mean SNOT = -6°C

Stakes: 1: 1.53; 2: 1.77; 3: 1.40; 4: 1.50; 5: 1.57; 6: 1.40

<table>
<thead>
<tr>
<th>K</th>
<th>P</th>
<th>1F</th>
<th>4F</th>
<th>F</th>
<th>H</th>
<th>D#</th>
<th>0</th>
<th>Notes</th>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td>Fresh grumacel</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very fine particles &amp; DFs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Debris throughout</td>
</tr>
<tr>
<td>150</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lamisc &amp; poly, frozen</td>
</tr>
<tr>
<td>135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>85</td>
<td></td>
<td>Poly, frozen &amp; lamisc</td>
</tr>
<tr>
<td>120</td>
<td>103</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>85</td>
<td>72</td>
<td>Large, wetted rounds</td>
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<td>110</td>
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<td></td>
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<td></td>
<td></td>
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<td>Small wetted rounds</td>
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<tr>
<td>100</td>
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<td></td>
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<td>Wetted rounds, tough</td>
</tr>
<tr>
<td>90</td>
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<td>Wetted depth near chains</td>
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<td>80</td>
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<td></td>
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<td></td>
<td></td>
<td>rounding, disaggregating</td>
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<td>70</td>
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<td>Deep taint or DI 2</td>
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<td>60</td>
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<td>10</td>
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<td>0</td>
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</tr>
</tbody>
</table>

Surf: -3.1
-3.2
-1.8
-1.1
-0.5
-0.1
0.0
0.0
0.0
0.0
0.0
0.0
-0.1
### CODOS Snowpack Profile

**Observers:** [Name]

**Location:** [Location]

**Elev.:** 10,120 ft

**Aspect:** NNE

**Boot Pen:** cm

**Time:** 14:30 MDT

**Prior Obs:** 4/11/13

**Air T:** +9 °C

**Sky:** ☁

**Precip:** Nil

**Wind:** Lt

**Notes:** HS = 1.3

**SWE = 501 mm; b = 362 kg/m³**

---

**K**

<table>
<thead>
<tr>
<th>P</th>
<th>1F</th>
<th>4F</th>
<th>F</th>
<th>H</th>
<th>D#</th>
<th>θ</th>
<th>Notes</th>
</tr>
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<tbody>
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</tr>
</tbody>
</table>

---

**Surf 0.0**

- 0.0
- 0.0
- 0.0
- 0.0
- 0.0

---

**0.0**

- 0.0
- 0.0
- 0.0
- 0.0
- 0.0

---

**85 DZ**

- 0 → 0
- 0 → 0
- 0 → 0
- 0 → 0
- 0 → 0

---

**Very wet, rounded clusters**

- Very wet, loose, rounded old chains

---

**Wetted sintered rounds**

- Wetted sintered rounds
- Wetted sintered rounds
- Wetted sintered rounds
- Wetted sintered rounds
- Wetted sintered rounds

---

**Clean slush, loose, poly parts**

- Very dirty, loose poly parts
- Very wet, laminae, poly

---

**SWE**

- 28
- 65
- 98
- 122

---

**91**

- 71
- 53
- 63
- 64

---

**53**

- 47