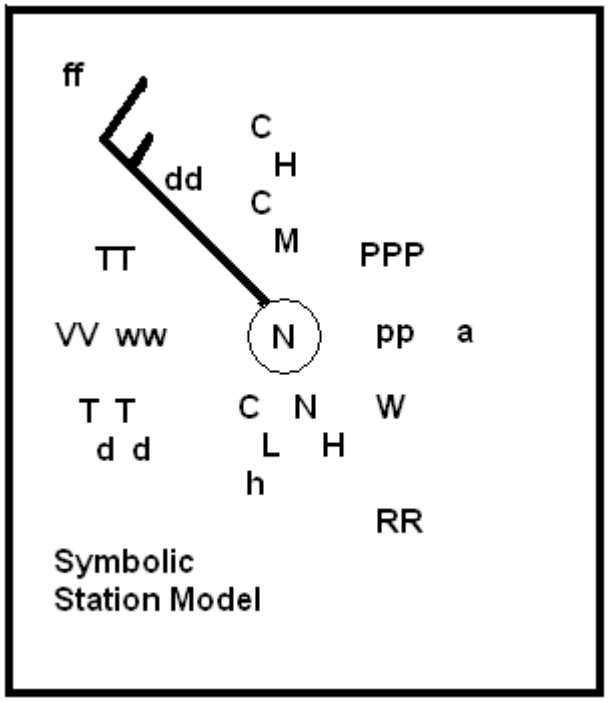
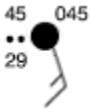
**Station Model**



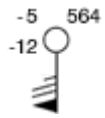

| | | |
|---|---|---|
| TT | Air Temperature | Nearest whole degree C/F |
| TdTd | Dew Point | Nearest whole degree C/F |
| N | Cloud Amount | Tenths |
| ff dd | Wind Speed and Direction | Degrees / Knots |
| VV | Visibility | Statute miles |
| ww | Weather /Obstruction to Vision | Coded |
| PPP | Sea Level Pressure | Millibars and tenths |
| pp | Pressure Tendency | Symbol |
| a | Pressure Change | Millibars and tenths |
| W | Past Weather | Most significant |
| RR | Precipitation Amount | Millimeters past 6 hours |
| C | Cloud Type L,M, H | Symbol |
| Nh | Amount of L,M Cloud | Coded |

## Weather Map Symbols

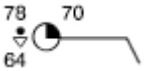
**Surface Station Model**

| | | | |
|---|---|---|---|
| **Temp (F)**<br>**Weather**<br>**Dewpoint (F)** |  | **Pressure (mb)**<br>**Sky Cover**<br>**Wind (kts)** | Data at Surface Station<br>**Temp 45 °F,**<br>**dewpoint 29 °F,**<br>**overcast, wind** from **SE at 15 knots,**<br>**weather light rain,**<br>**pressure 1004.5 mb** |

**Upper Air Station Model**

| | | | |
|---|---|---|---|
| **Temp (C)**<br><br>**Dewpoint (C)** |  | **Height (m)**<br><br>**Wind (kts)** | Data at Pressure Level - 500 mb<br>**Temp -5 °C, dewpoint -12 °C,**<br>**wind** from **S at 75 knots,**<br>**height of level 5640 m** |

**Forecast Station Model**

| | | | |
|---|---|---|---|
| **Temp (F)**<br>**Weather**<br>**Dewpoint (F)** |  | **PoP (%)**<br>**Sky Cover**<br>**Wind (kts)** | Forecast at Valid Time<br>**Temp 78 °F, dewpoint 64 °F,**<br>**scattered clouds, wind** from **E at 10 knots,**<br>**probability of precipitation 70%**<br>**with rain showers** |

| Sky Cover | Wind<br>**Shaft is direction wind is coming** from | Fronts and Radar | Selected Weather Symbols |
|---|---|---|---|
| **clear** | **Calm** | **cold front** | Rain (see note below) |
| **1/8** | **1-2 knots (1-2 mph)** | **warm front** | Rain Shower |
| **scattered** | **3-7 knots (3-8 mph)** | **stationary front** | Thunderstorm |
| **3/8** | **8-12 knots (9-14 mph)** | **occluded front** | Drizzle |
| **4/8** | **13-17 knots (15-20 mph)** | **trough** | Snow (see note below) |
| **5/8** | **18-22 knots (21-25 mph)** | **squall line** | Snow Shower |
| **broken** | **23-27 knots (26-31 mph)** | **dryline** | **Freezing Rain** |
| **7/8** | **48-52 knots (55-60 mph)** | | **Freezing Drizzle** |
| **overcast** | **73-77 knots (84-89 mph)** | | **Fog** |
| **obscured** | **103-107 knots (119-123 mph)** | | **Haze** |
| NOTE: **Multiple rain or snow symbols indicate intensity, i.e. light (2 symbols), moderate (3 symbols), heavy (4 symbols)** | | | **Smoke** |
| | | | **Dust or Sand** |
| | | | **Blowing Snow** |

**Online exercise @ University of Wisconsin**
**http://profhorn.meteor.wisc.edu/wxwise/station_model/sago.html**

**Synoptic Decode (Vancouver International Airport)**

**SCN07 CWAO 071200**
**AAXX 07124**
**71892 11362 80506 10055 20050 30034 40039 52014 60011**
**76166 885// 333 10056 20030 44007 55000 70250 90987=**

| | |
|---|---|
| **SMCN07 CWAO 071200** | **Bulletin Header** |
| **AAXX** | **Synoptic Land station** |
| **07124** | **Day/Time/Winds reported** |
| | |
| **71892** | **Station Ident. Region/Number** |
| **11362** | **Precip/Manned/Lowest Cloud** |
| **80506** | **Cloud cover/wind dir/speed** |
| **10055** | **Air Temp Group/Sign/Temp** |
| **20050** | **Dew Point Group/Sign/Temp** |
| **30034** | **Stn Pres Group/Pressure** |
| **40039** | **Sea Level Pres Group/Pressure** |
| **52014** | **Pres Tend Group/code/Change** |
| **60011** | **Precip Group 6hr/Precip/Dur** |
| **76166** | **Weather/Present/Past** |
| **885//** | **Cloud/Amount/low/mid/high** |
| | |
| **333** | **Regional Climate Section** |
| **10056** | **Max Temp Group/Sign/Temp** |
| **20030** | **Min Temp Group/Sign/Temp** |
| **44007** | **Snow cover group/State/Depth** |
| **55000** | **Sunshine Group/Hours** |
| **70250** | **Precipitation Group/Amt 24hrs** |
| **90987=** | **Precip Group/Start/Stop/Dur** |

# Climate Messages

## Daily Messages

| | |
|---|---|
| **CSCN02 CYBL 080258 YBL 5.4/1.3/2.0/6** | **02:58:53 Jan 08 2009** |
| **CSCN02 CYCD 080256 YCD 7.0/1.2/0.8/18** | **02:59:03 Jan 08 2009** |
| **CSCN02 CYZV 081200 CYZV 71811 333 55047** | **11:56:38 Jan 08 2009** |
| **CSCN02 CWLW 081200 WLW 7.0/2.1/1.0/28** | **12:02:39 Jan 08 2009** |
| **CSCN02 CYGE 081409 YGE -2.5/-6.4/5.8/45 SUNSHINE 0.0** | **14:11:58 Jan 08 2009** |
| **CSCN02 CWQQ 081500 VAC WFM 8.0/5.0/6.2** | **14:42:15 Jan 08 2009** |
| **CSCN02 CWAN 081500 VAE WCV 8.5/7.5/66.0/0** | **14:42:15 Jan 08 2009** |
| **CSCN02 CWAN 081500 VAE WCV 8.5/7.5/66.0/0** | **14:42:31 Jan 08 2009** |
| **CSCN02 CWQQ 081500 VAC WFM 8.0/5.0/6.2** | **14:42:31 Jan 08 2009** |
| **CSCN02 CYCD 081455 YCD 7.0/1.5/1.8/18** | **14:56:06 Jan 08 2009** |
| **CSCN02 CYPW 081500 YPW 9.0/5.5/5.0/0/ SUNSHINE 0.0** | **15:00:47 Jan 08 2009** |
| **CSCN02 CWAQ 081500 VAJ WNJ 2.5/0.5/0.0/TRACE** | **15:03:12 Jan 08 2009** |
| **CSCN02 CYCQ 081500 YCQ -23.0/-24.8/2.1 22** | **15:03:22 Jan 08 2009** |
| **CSCN02 CWKS 081503 WKS -27.5/-36.0/0.0 34** | **15:04:22 Jan 08 2009** |
| **CSCN02 CWSW 081503 WSW 3.7/0.8/10.2/10** | **15:05:07 Jan 08 2009** |
| **CSCN02 CYBD 081504 CYBD 4.1/0.1/11.0/4.0/ SUN 0.0** | **15:07:27 Jan 08 2009** |

## Monthly Climate messages

## CSCN05 CYQQ 061614

## CLIMATE MESSAGE FOR DECEMBER 2008

**71893 A 1.0 B 9.3 C -9.0 D 81.4 E 138.0 F 1 G 18 H 59.5 J 527.3 K 1017.7 L 6.1 M 1012.4**

# TAF Data

**http://www.flightplanning.navcanada.ca/cgi-bin/Fore-obs/metar.cgi**

## VANCOUVER/VANCOUVER INTL/BC

**METAR CYVR 072100Z 07006KT 15SM FEW011 FEW025 BKN060 OVC140 07/07A2966 RMK SF2SC1SC3AC2 SLP044=**

**METAR CYVR 072000Z 10003KT 15SM FEW010 FEW025 BKN061 OVC120 06/06 A2967 RMK SF2SC1SC4AC2 SLP048=**

**METAR CYVR 071900Z 10005KT 15SM FEW009 SCT030 BKN052 OVC090 06/06 A2967 RMK SF2SC2SC3AC2 VIS LWR NE SLP046=**

**TAF CYVR 072038Z 0721/0824 10003KT P6SM SCT030 BKN060 OVC120**
**TEMPO 0800/0802 5SM -SHRA BR SCT006 OVC015**
**FM080200 10012KT 6SM -RA BR SCT006 OVC012 TEMPO 0802/0808 3SM -RA BR OVC006**
**FM080800 10008KT P6SM SCT020 OVC040 TEMPO 0809/0818 P6SM -SHRA BKN020**
**FM081800 10010KT P6SM FEW020 BKN040**
**BECMG 0819/0821 27015KT**
**FM082200 27018G30KT P6SM SCT060**
**RMK NXT FCST BY 080000Z=**

**Port Hardy CYZT 71109**

**US CN06 CWAO 091200**

| | |
|---|---|
| **TTAA 59121 71109 99027 02248 13006 00235 01856 13509 92858** | **SFC 2,-3** |
| **02534 18014 85525 04930 22535 70046 10503 25553 50558 23742** | **850 -5,-8** |
| **28058 40716 36158 28078 30909 523// 28095 25025 595// 29121** | **700 -11,-11** |
| **20163 665// 29607 15342 567// 28554 10597 603// 26565 88208** | **500 -24,-28** |
| **663// 29623 77221 29637=** | **250 -60, //** |

Height Contours

| | |
|---|---|
| 250 mb-- 1,000 meters (33,000 feet) | (1008 x 328 = 330624 ft) |
| 500 mb-- 5,500 meters (18,000 feet) | (570 x 328 = 186960 ft) |
| 700 mb-- 3,100 meters (10,000 feet) | (294 x 328 = 96432 ft) |
| 850 mb-- 1,500 meters (5,000 feet) | (150 x 328 = 4920 ft) |
| 1000 mb-- near surface | |

# Forecast Upper Winds

**http://www.flightplanning.navcanada.ca/cgi-bin/Fore-obs/fd.cgi**

| **STN YKA - KAMLOOPS. BC** | **for use** | **3000** | **6000** | **9000** | **12000** | **18000** |
|---|---|---|---|---|---|---|
| FDCN01 CWAO FCST BASED ON 071200 DATA **VALID 071800** | **17-21** | 9900 | 2425+01 | 2736-04 | 2950-10 | 2871-23 |
| FDCN02 CWAO FCST BASED ON 071200 DATA **VALID 080000** | **21-06** | 9900 | 2426+00 | 2735-04 | 2738-10 | 2761-23 |
| FDCN03 CWAO FCST BASED ON 071200 DATA **VALID 081200** | **06-17** | 9900 | 2421-01 | 2819-07 | 3012-14 | 2422-28 |

## Pericles Server Vancouver

**FDCN02 CWAO 071530**
**FCST BASED ON 071200 DATA VALID 080000 FOR USE 21-06**

| | 3000 | 6000 | 9000 | 12000 | 18000 |
|---|---|---|---|---|---|
| YVR | 2518 | 2733+00 | 2635-04 | 2542-10 | 2577-19 |
| YYF | 9900 | 2421+01 | 2650-05 | 2750-08 | 2780-19 |
| YXC | | 2320-01 | 2730-05 | 2836-10 | 2870-21 |
| YYC | | 2726+02 | 2845-04 | 3037-11 | 2962-24 |
| YQL | | 2745+01 | 3041-03 | 3037-10 | 2962-22 |
| YEA | | 3015-04 | 3038-07 | 2944-12 | 3053-26 |
| YZP | 0111 | 2615-05 | 2530-08 | 2533-15 | 2546-28 |
| YZT | 2215 | 2428-01 | 2530-07 | 2536-14 | 2543-27 |
| YPU | | 2430-01 | 2646-06 | 2645-12 | 2639-28 |
| YXS | | 2422-04 | 2640-09 | 2643-14 | 2549-28 |
| YYD | | 2408-07 | 2523-12 | 2535-16 | 2540-28 |
| YDL | | 2107-21 | 2617-21 | 2729-24 | 2750-33 |
| YKA | 9900 | 2426+00 | 2735-04 | 2738-10 | 2761-23 |
| YJA | | 2007-05 | 2536-07 | 2741-13 | 2749-27 |
| YEG | | 2210-07 | 2829-09 | 2835-15 | 2950-27 |
| YXE | | 3214-10 | 3116-15 | 3040-18 | 3055-28 |

# Upper Air Data

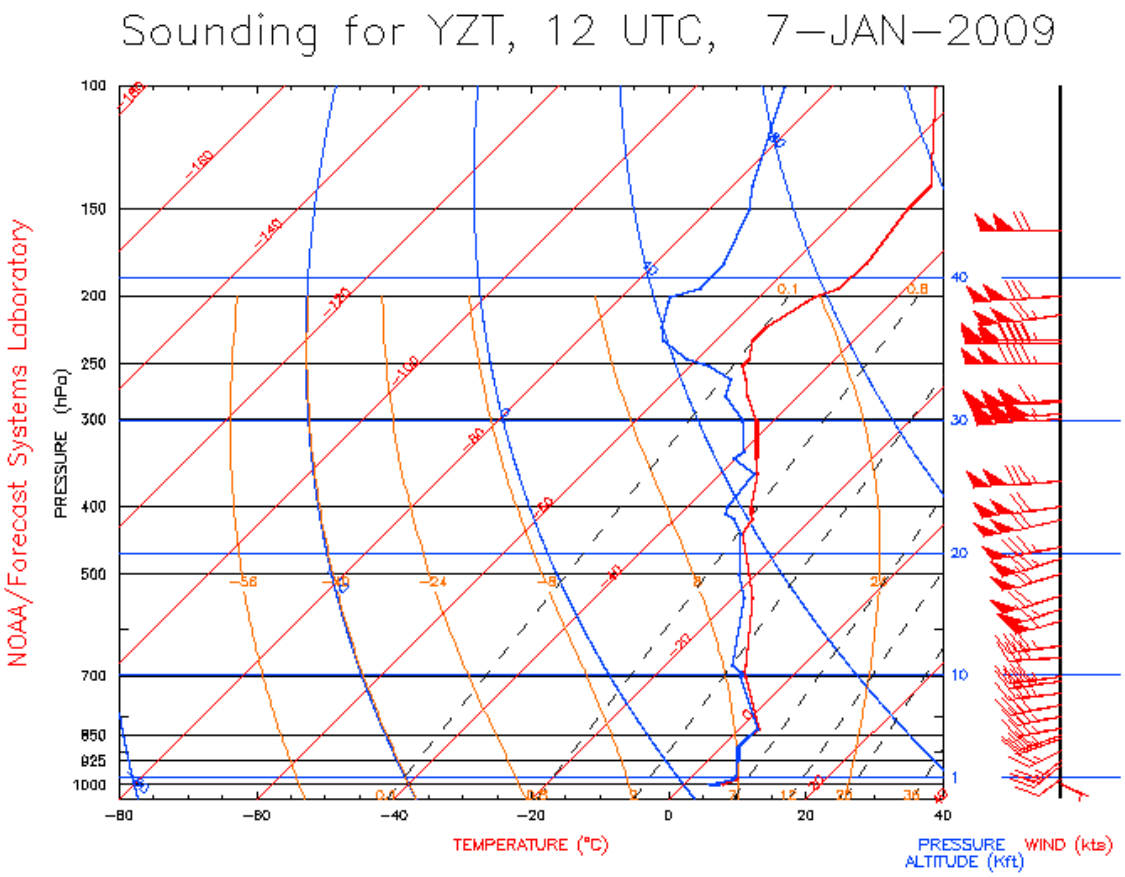
## http://raob.fsl.noaa.gov/temp/raob_soundings15710.tmp

```
YZTMANYZT
71109 TTAA  57122 71109 99998 05605 12006 00503 ///// /////
92637 04601 22524 85324 02601 24535 70874 06507 26044 50544
20915 25071 40705 30536 26121 30905 42520 26654 25025 52356
27144 20169 51971 26628 15357 51173 ///// 10614 64972 /////
88231 54563 27143 77283 ///// 26665
YZTSGLYZT
71109 TTBB  5712/ 71109 00998 05605 11996 05620 22984 07006
33972 06400 44881 02602 55833 03002 66689 07506 77674 08320
88541 17110 99438 27704 11416 28528 22409 29537 33359 34305
44340 37132 55333 37918 66301 42320 77278 47132 88262 50122
99251 52350 11245 52559 22221 54765 33203 52570 44195 49770
55179 49171 66139 51176
PPBB  57120 71109 90012 12006 22510 22523 90345 23527 24536
25537 90678 25537 25540 26044 909// 26044 91124 26540 26044
25055 91569 24564 25070 25075 92025 25585 25620 26637 93015
26657 26665 27142 937// 26123 943// 27118
```

**Skewt Plot**

**Date:** ***07-JAN-2009-12UTC***

**WMO Station: 71109**



# http://www.rwic.und.edu/metresources/raob.html

### Decoding Rawinsonde Observational Data

## How to decode standard upper-air observations:

### Part A -- Symbolic Form

| | |
|---|---|
| TTAA YYGGI IIiii | message identification |
| 99PoPo ToToTaoDoDo dododofofo | surface data |
| 00hhh TTTaDD dddff | 1000 mb data |
| 92hhh TTTaDD dddff | 925 mb data |
| 85hhh TTTaDD dddff | 850 mb data |
| 70hhh TTTaDD dddff | 700 mb data |
| 50hhh TTTaDD dddff | 500 mb data |
| 40hhh TTTaDD dddff | 400 mb data |
| 30hhh TTTaDD dddff | 300 mb data |
| 25hhh TTTaDD dddff | 250 mb data |
| 20hhh TTTaDD dddff | 200 mb data |
| 15hhh TTTaDD dddff | 150 mb data |
| 10hhh TTTaDD dddff | 100 mb data |
| 88PtPtPt TtTtTatDtDt dtdtdtftft | tropopause data |
| 77 PmPmPm dmdmdmfmfm vbvbvava<br>66 | maximum wind data |
| 51515 101AdfAdf | Regional additional data |

### Part B -- Symbolic Form

| | |
|---|---|
| TTBB YYGG/ IIiii | message identification |
| 00PoPoPo ToToTaoDoDo | surface data |
| 11PPP TTTaDD<br>22PPP TTTaDD<br>.....<br>99PPP TTTaDD<br>11PPP TTTaDD<br>..... | significant levels with respect to temperature and/or humidity changes |
| PPBB YYGGa IIiii | message identification |
| 9tnu1u2u3 dddff dddff dddff<br>.....<br>9rnu1u2u3 dddff dddff dddff | winds at fixed regional and significant levels |

EXAMPLE OF A TTAA (MANDATORY LEVEL LAND STATION) RAWINDSONDE FOLLOWS:

```
YZTMANYZT
71109 TTAA 57122 71109 99998 05605 12006 00503 ///// /////
92637 04601 22524 85324 02601 24535 70874 06507 26044 50544
20915 25071 40705 30536 26121 30905 42520 26654 25025 52356
27144 20169 51971 26628 15357 51173 ///// 10614 64972 /////
88231 54563 27143 77283 ///// 26665

   EACH GROUPING DECODED, FOLLOWS:

      71109 the block/station number
      TTAA  mandatory levels follow
       57122 57-50=07      7nd day of month
             12            12Z
             2             last reported
                           wind lvl=200 mb
       99998  99           surface information
             998           station pressure
       05605  056          5.6 (degrees c) sfc temp.
             05            0.5(degrees c) dp. dep.
       12006  12           120 degrees wind direction
             006           006  wind speed (kts)
       00503  00           1000 mb information
             503           1000 mb height 503(m)
       /////               no data
       85324  85           850 mb info.
             324           850 mb ht. (1324m)
       02601  026          2.6 (degrees c) temp.
             01            0.1(degrees c) dp. dep.
       24535  24           245 degrees wnd. dir.
             35            35 kt wnd. spd.
       70874  70           700 mb info.
             874           700 mb ht. (2874m)
       06507  065          -6.5(degrees c) temp.
             07            0.7(degrees c) dp. Dep
       26044  25           260 degrees wnd. dir.
             044           44 kt wnd. spd.
       50544  50           500 mb info.
                           500 mb ht. (5554m)
       20915  209          -20.9(degrees c) temp.
             15            1.5(degrees c) dp. dep.
       25071  25           250 degrees wnd. dir.
             71            71 kt wnd. spd.
       25025  25           250 mb info.
             025           250 mb ht. (10250m)
       52356  523          -52.3(degrees c) temp.
             56            6.0(degrees c) dp. dep.
```

## Parts A and B -- Symbol Definition

**Note:** lowercase "o" indicates surface data. lowercase "t" indicates tropopause data. lowercase "m" indicates data from the level of maximum wind TTAA/TTBB Type of report which procedes. AA is only mandatory levels, while BB is significant levels with respect to temperature and/or humidity. YY Day of the month (GMT) of the observation plus 50. Example: 55 = 5th day of the month. GG Time of observation to the nearest hour (GMT). Id Indicator of the last standard isobaric surface for which

the wind group is included. The number '1' is used for 100 mb and above. IIiii Block and station number. PPP Pressure in millibars. TT Observed temperature of the air in whole degrees (not rounded to nearest degree) in degrees Celsius. Ta Approximate tenths value and sign of the air temperature. If Ta is even (0,2,4,6,8), the temp TT is positive; the temp is negative if Ta is odd (1,3,5,7,9). DD Depression of the dew point temp. When the depression is 5.0 degrees C or less, the units and tenths digits of the depression are reported. When the depression is more than 5.0 degrees C, the tens and units digits of the depression are reported, plus 50, with 51-55 not used. Thus, DD = 10 is a depression of 1.0 degrees c and DD = 60 is a depression of 10.0 degrees c. ddd Wind direction reported to the nearest five degrees. (Examples: 320 = 320 degrees, 060 = 60 degrees). NOTE: IF THE WIND DIRECTION APPEARS TO BE GIVEN TO THE NEAREST DEGREE, (e.g., 321) THE DIRECTION WOULD BE DECODED TO THE NEAREST FIVE DEGREES (320 degrees in this case) BUT THE SPEED WOULD BE INCRESASE BY THE UNITS DIGIT MULTIPLIED BY 100 KTS. SEE "ff" IMMEDIATELY BELOW. ff Wind speed in knots, or knots plus 100. hhh Geopotential altitude of the standard isobaric surface in meters to 700 mb and in dekameters at 500 mb and above. To convert the height value to meters: 850 mb: a leading 1 is necessary 700 mb: a leading 2 or 3 is necessary 500-300 mb: a following 0 is necessary 250-100 mb: a leading 1 and a trailing 0 is necessary 88 Tropopause data. (The tropopause is defined as the lowest level where the lapse rate dereases to 2 degrees C/km or less for at least 2 km.) 77 Maximum wind data (for winds exceeding 60 kts above 500 mb). 66 When the maximum wind occurs within the sounding, 77 is used; when the max wind occurs at the termination of the sounding, 66 is used. 4 Vertical wind shear indicator. vbvb Vector difference below maximum wind. The absolute value of the vector difference between the max wind and the wind blowing at 3000 ft below the level of the max wind, to the nearest whole knot. vava Same as 'vbvb' group except for 3000' above the level of the maximum wind. 51515 Regionally developed codes follow. 101AdfAdf 101 is regional additional data indicator, while AdfAdf is the additional data two number code. 9 Indicator for wind height groups. 11-99 Indicators for significant levels with respect to temp/humidity. In general, a significant level is defined as a level at which temp and/or RH data are sufficiently important, or unusual. When the plotted report is compared with the actual sounding trace, the relative humidity is within 10 percent and the temp is within 2 degrees C of the actual sounding.

## Upper wind (PPPB) codes

a Indicator specifying type of wind measuring equipment used (0- pressure and wind instruments; 1,2- theodolite; 3- radar; 4- same as 0, but the equipment failed during the ascent.) tn Tens digit of the altitude, expressed in increments of 10,000' MSL applying to the data groups which follow. Example: "4" means winds between 40.000' and 50,000' MSL follow. u1,u2,u3 Units digit of the altitude, expressed in increments of 1,000 feet, which applies to the first, second, and third data groups following.

# Isopleths

**All the important meteorological isopleths encountered in operational meteorology.**

**Isobar- A line of constant pressure.**

- **ONLY** on surface charts.
- Lines connecting points of equal pressure in millibars.
- Highs 1010 mb + Lows -1010 mb.
- Represents pressure at zero geopotential meters (compensating for elevation).

**Constant Pressure Surface Charts-**

- Most model analysis is shown using a pressure surface.
- Commonly these are **1000 mb, 850 mb, 700 mb, 500 mb, and 300 mb surfaces.**
- **All locations have the same pressure, however, heights will vary (contouring).**
- Below is a listing of pressure surfaces and their approximate height above zero geopotential meters.

**250 mb-- 1,000 meters (33,000 feet) (1008 x 328 = 330624 ft)**
**500 mb-- 5,500 meters (18,000 feet) (570 x 328 = 186960 ft)**
**700 mb-- 3,100 meters (10,000 feet) (294 x 328 = 96432 ft)**
**850 mb-- 1,500 meters (5,000 feet) (150 x 328 = 4920 ft)**
**1000 mb-- near surface**

**Isohypse - (Height Contours)- Lines of equal geopotential height.**

- **The geopotential** height is the distance above the earth's surface if it was a perfect and flat sphere.
- Isohypse are shown on a constant pressure surface so **when looking at a 850 mb chart, all isohypses no matter their value are located at 850 mb thus showing height contours.**

- Thickness lines- **Same as an isohypse except they represent the distance from one pressure level to a selected pressure level (usually 1000 to 500 mb thickness).** They are used to forecast snow, cold air advection, and warm air advection. This image is an example of thickness lines (dashed lines). Colder air (since it is denser) will have a smaller thickness than warm air.

**Isotherm- A line of equal temperature.**

- Analysis charts will show isotherms with either a **2,4,5 or 10 degree increment.**
- Commonly used at pressure surfaces below 500 millibars and on surface charts.
- Used to find regions of **warm/cold air advection, short waves, fronts, temperature gradient boundaries, and instability zones.** (See 850 mb model isotherms)

**Isallobar / Height change contours**

- Lines of equal pressure change.
- Used to forecast formation of low and high pressure systems.
- Lows tends to propagate in regions of the greatest pressure falls (height falls).

- Heights and pressures falls due to the evacuation of mass in the upper levels of the atmosphere and the chilling of air within a vertical atmospheric column.

**Isotachs- Lines of equal wind speed.**

- Mostly contoured on upper level charts. (250 mb jet stream level).
- Important for locating the jet stream and jet streaks within a jet stream.

**Streamlines- Lines of equal wind direction.**

- Not a pure isopleth by definition.
- Used to show areas of convergence, divergence and pressure circulation.

**Isodrosotherms- Line of equal dewpoint.**

- Most often contoured on the low level atmospheric charts.
- Isodrosotherms can be used to locate frontal boundaries, regions of moist air or dry air advection, and mesoscale precipitation boundaries.

**Isodop- Contour of constant doppler velocity values.**

- Used to assess motion.

**Isohyet- Contour of constant rainfall. (rarely used)**

- Used to assess flooding potential, soil moisture, mesoscale wet/dry boundaries, and rainfall coverage as well as intensity.