

- **What is “sea-level corrected” surface pressure?**
- **What is a “constant pressure surface”?**
- **Weather map familiarization****
 - **The surface analysis – isobars, decoding station data**
 - **To understand weather we also need to depict the atmosphere aloft. The lowest “mandatory level” above the surface is the 850 hPa level. We'll look at the 850 hPa analysis – height contours, isotherms**

Tables/diagrams for decoding weather map data are given at the back of this file

** There's a lot of information on these weather maps, and it will take time (and repeated in-class discussions) to help you sort out that which is the most important.

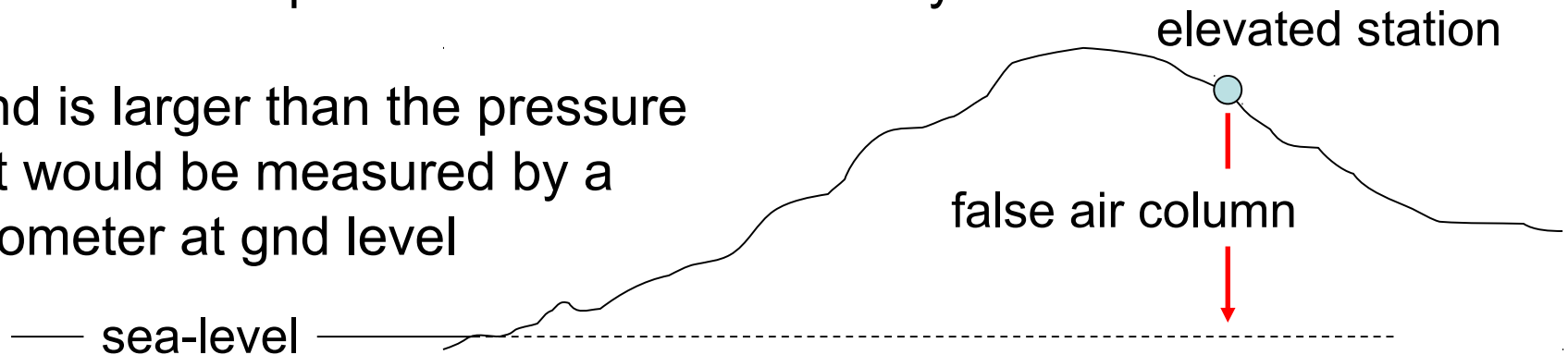
We are covering this material out of synch (it is Ch 4 material) to get going asap on practical weather discussions

Sea-level pressure versus “surface” or “station” pressure (p108)

- pressure varies rapidly with height (about 10 Pa m^{-1})
- horizontal pressure gradients control the wind, so we need to compare pressures at different places **at the same altitude** – by convention, this is taken to be sea-level
- what is done is to consider a fictitious column of air from ground-level down to sea-level, and to assign this a temperature; then the hydrostatic law (covered in Ch. 4) is used to compute an effective sea-level pressure (we’ll ignore the details)

- this is what is plotted on the surface analysis

- and is larger than the pressure that would be measured by a barometer at gnd level



On the slide to follow, an example of the “surface analysis,” notice:

- the closer the isobars are packed together, the more rapidly the (sea-level) pressure is varying (in space, horizontally)
- that (on this occasion) isobars were widely spaced over central B.C. Even though the terrain is mountainous – the sea-level correction has eliminated the effects of ground elevation
- that in central B.C. winds are weak
- that over Alberta and Saskatchewan the isobars are closely spaced around the High (or “anticyclone”) and the winds there are
 - strong
 - spiralling *clockwise* around the pressure centre

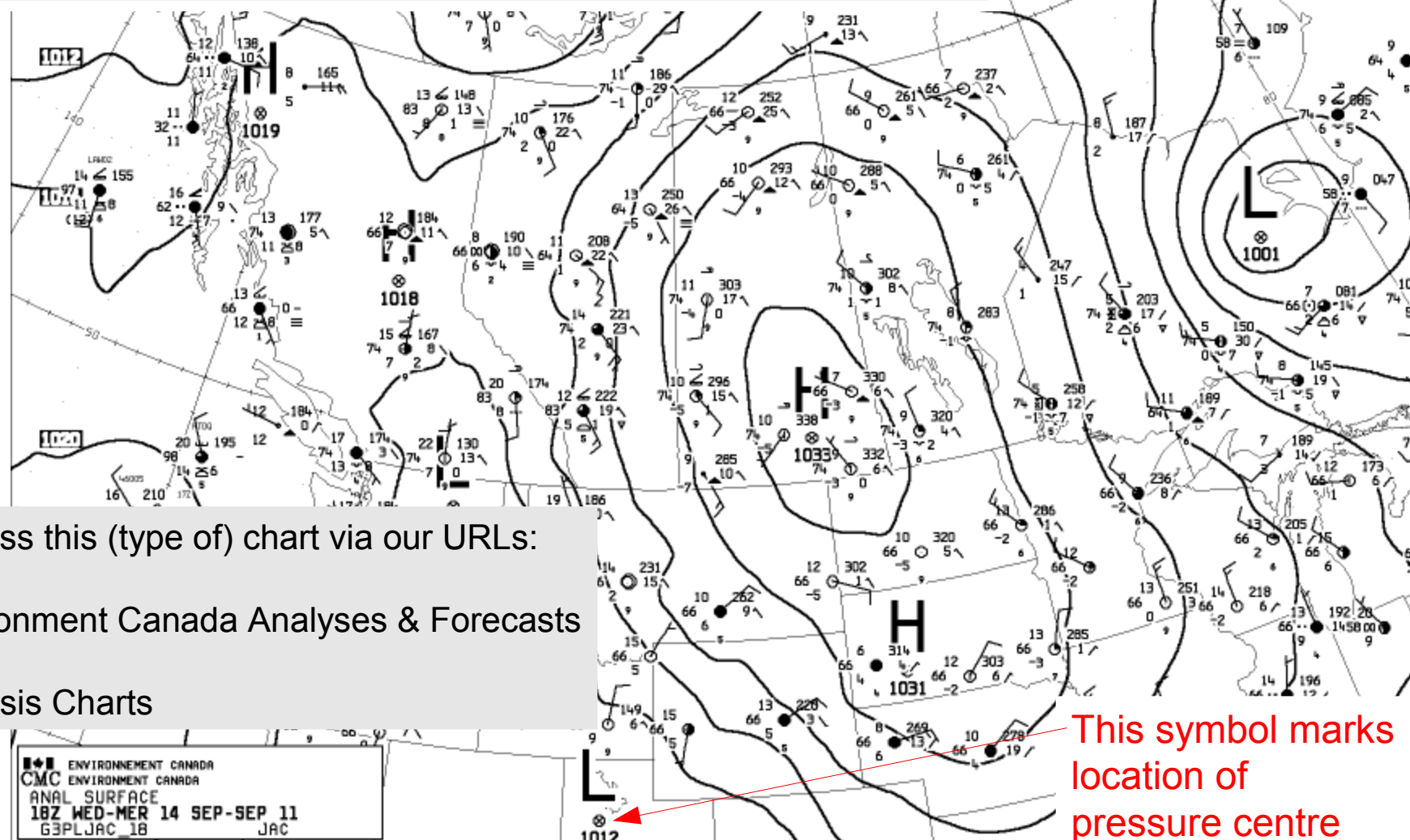
Please decode the temperature, dewpoint and pressure for Edmonton

Current Conditions



16 °C

Observed at:	Edmonton City Centre Airport		
Date:	2:00 PM MDT Wednesday 14 September 2011		
Condition:	Sunny	Temperature:	16.2°C
Pressure:	102.0 kPa	Dewpoint:	2.3°C
Tendency:	falling	Humidity:	39 %
Visibility:	15 km	Wind:	SSE 35 gust 48 km/h
Air Quality	2		
Health Index:			

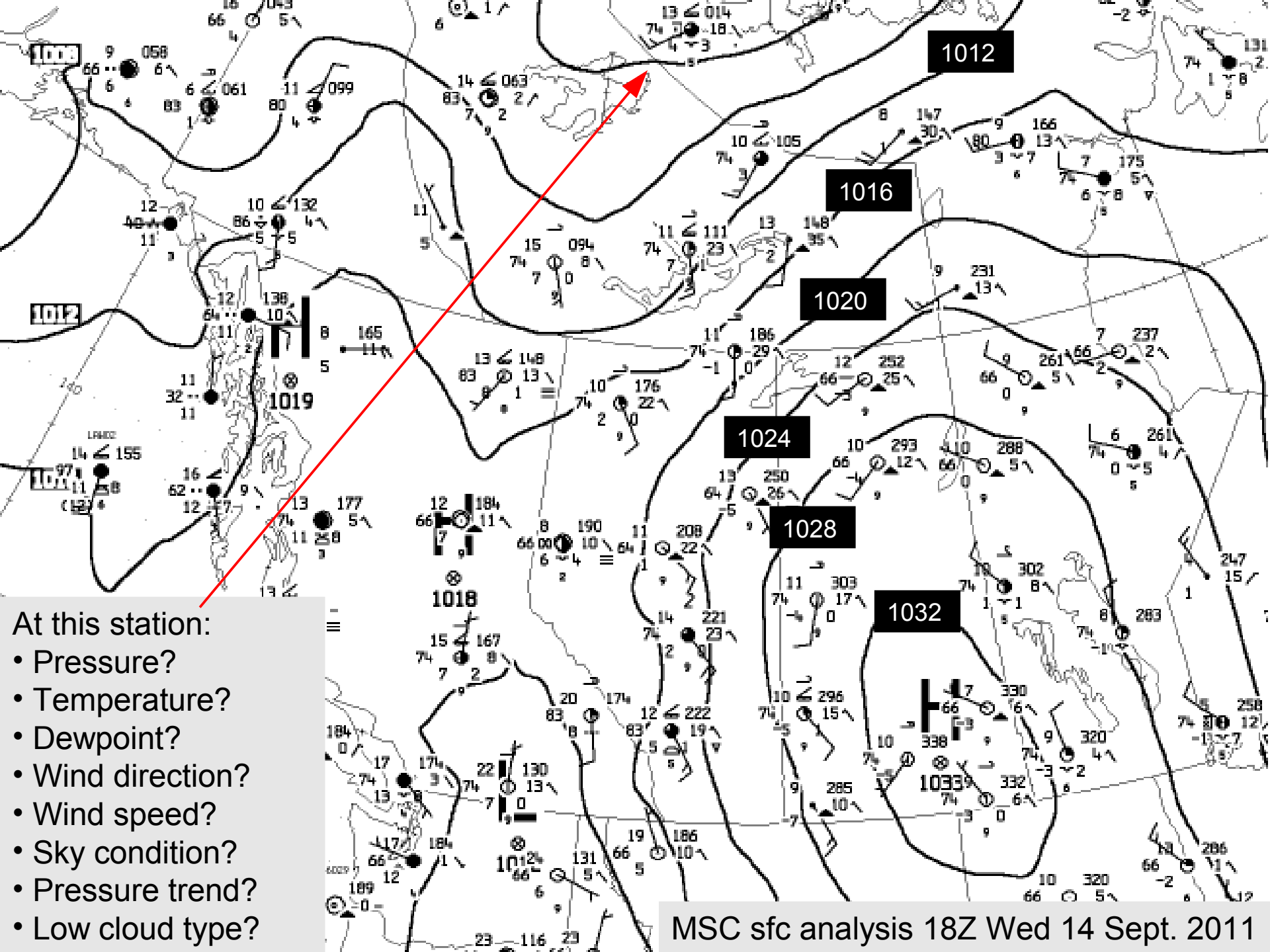


To access this (type of) chart via our URLs:

- Environment Canada Analyses & Forecasts
- Analysis Charts

This symbol marks location of pressure centre

ENVIRONNEMENT CANADA
CMC ENVIRONMENT CANADA
ANAL SURFACE
18Z WED-MER 14 SEP-SEP 11
G3PLJAC_18 JAC



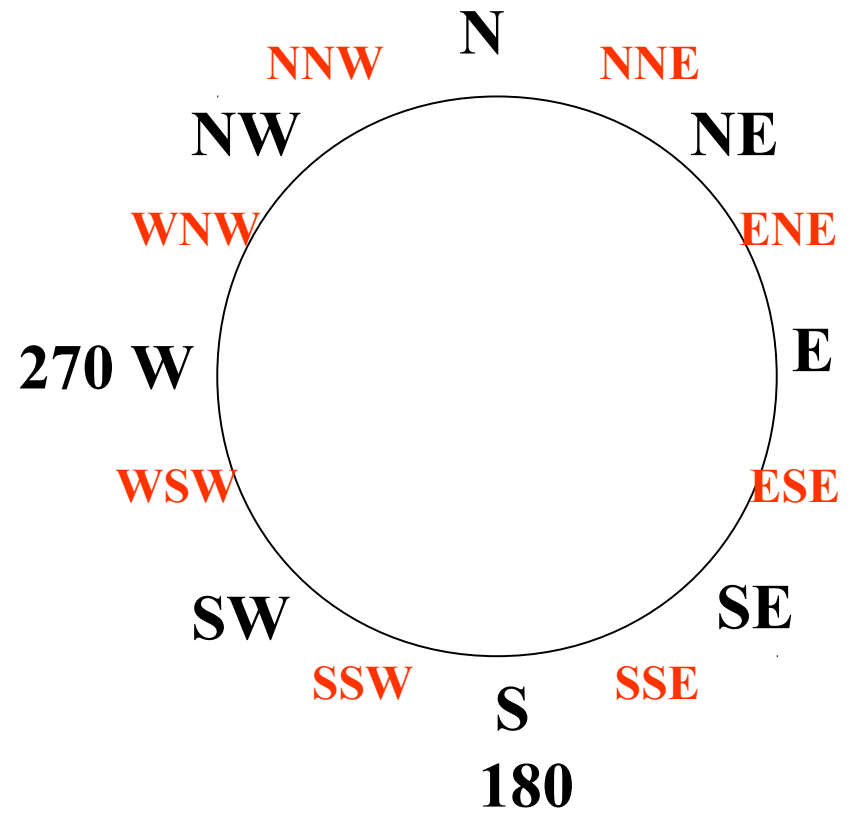
At this station:

- Pressure?
- Temperature?
- Dewpoint?
- Wind direction?
- Wind speed?
- Sky condition?
- Pressure trend?
- Low cloud type?

MSC sfc analysis 18Z Wed 14 Sept. 2011

Wind is named for the direction it blows FROM

The table below is taken from the Canadian Climate Normals, published on line (accessible through our web URLs)



Canadian Climate Normals 1971-2000

EDMONTON INT'L A *
ALBERTA

Latitude: 53°19'00.000" N Longitude: 113°35'00.000" W Elevation: 723.30 m

Climate ID: 3012205

WMO ID: 71123

TC ID: YEG

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Wind:													
Speed (km/h)	12.2	11.8	12.4	14	14.6	12.9	10.4	10	12	12.6	11.4	12.1	12.2
Most Frequent Direction	S	S	SE	SE	SE	W	W	W	S	S	S	S	S
Maximum Hourly Speed (km/h)	80	69	72	63	72	76	61	71	68	87	72	69	
Date (yyyy/dd)	1962/05	1964/07	1965/13	1982/29	1965/16	1984/01	1972/28	1965/13	1967/22	1965/01	1962/24	1967/11	
Direction of Maximum Hourly Speed	W	W	NW	W	NW	NW	NW	SW	W	NW	NW	W	NW

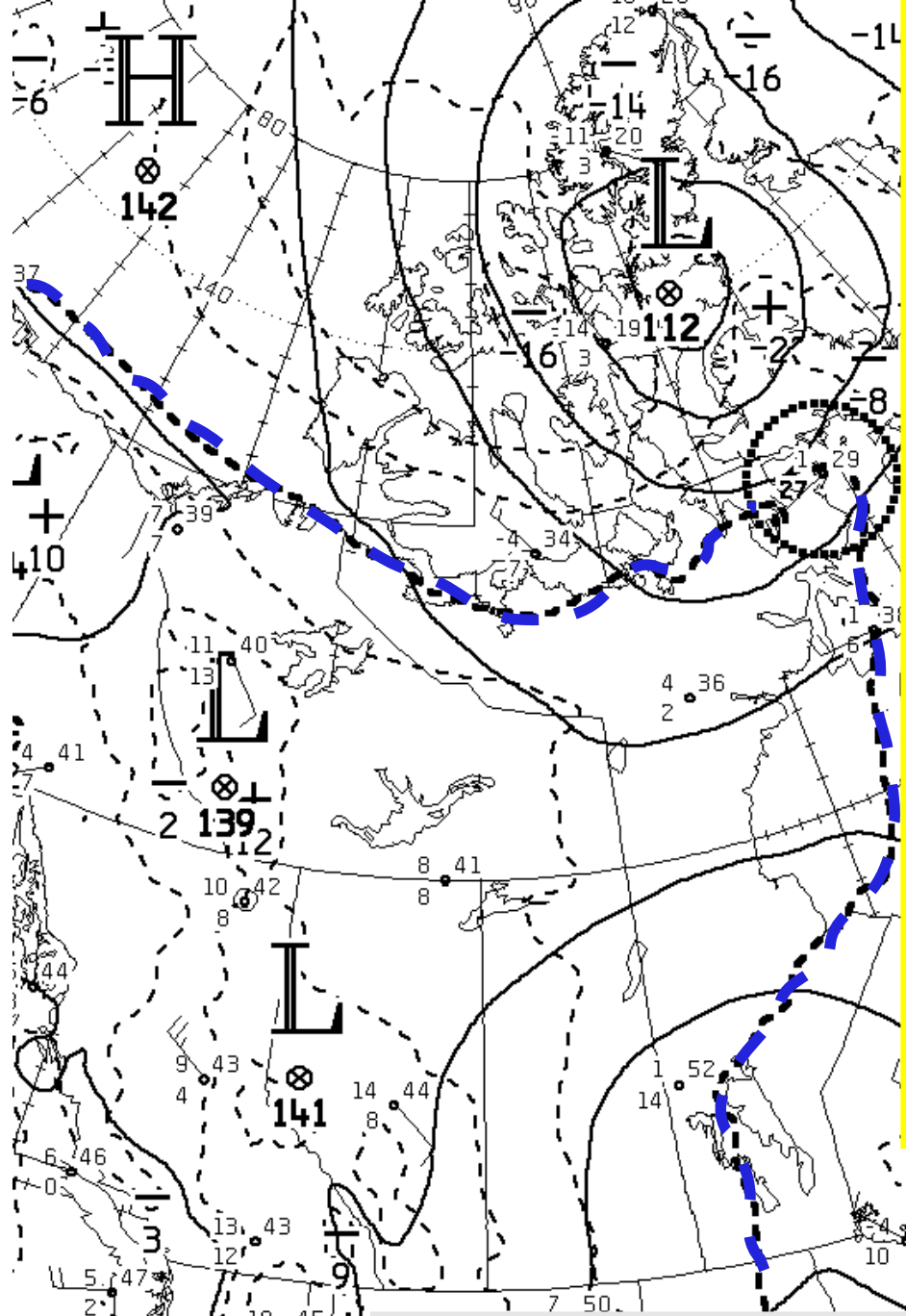
Height of the 850 hPa surface

Over any point on the earth's surface, the 850 hPa height is defined as the height above sea-level at which atmospheric pressure has dropped to 850 hPa. Lines of constant 850 hPa height are called "isolines" or "contours" of 850 hPa height, and labelled in decameters ("dam"), where 1 dam = 10 m



This example is timed just a few hours (6 hours) after the surface chart given above

- light SE wind over Edmonton, where the height of the 850 hPa sfc is 144 dam
- the low in the E. arctic is well defined by the tightly-packed height contours, implying strong winds
- dashed lines are isotherms, the bolded one is the freezing contour



SIGNIFICANT WEATHER DISCUSSION ISSUED BY THE PRAIRIE AND ARCTIC STORM PREDICTION CENTRE OF ENVIRONMENT CANADA AT 2:00 PM CDT WEDNESDAY SEPTEMBER 14 2011.

HIGH ARCTIC.. THE SNOWFALL WARNING WILL REMAIN EFFECT FOR THIS EVENING UNTIL THIS EVENING... BEHIND THE LOW, STRONG NWLY WINDS WILL DEVELOP PRODUCING GALES IN SOME AREAS AND LOCAL BLOWING SNOW.

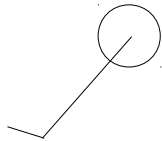
MSC 850 hPa analysis 00Z Thurs 15 Sept. 2011

Decoding – further elements later

Surface chart

Fractional sky coverage by cloud

T



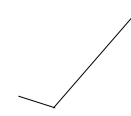
T_d

Sea-level crrect'd pressure**

**insert 10 or 9 on the left, and a decimal point before the final digit, to give sea-level corrected pressure in hPa

Upper chart

T



$T - T_d$

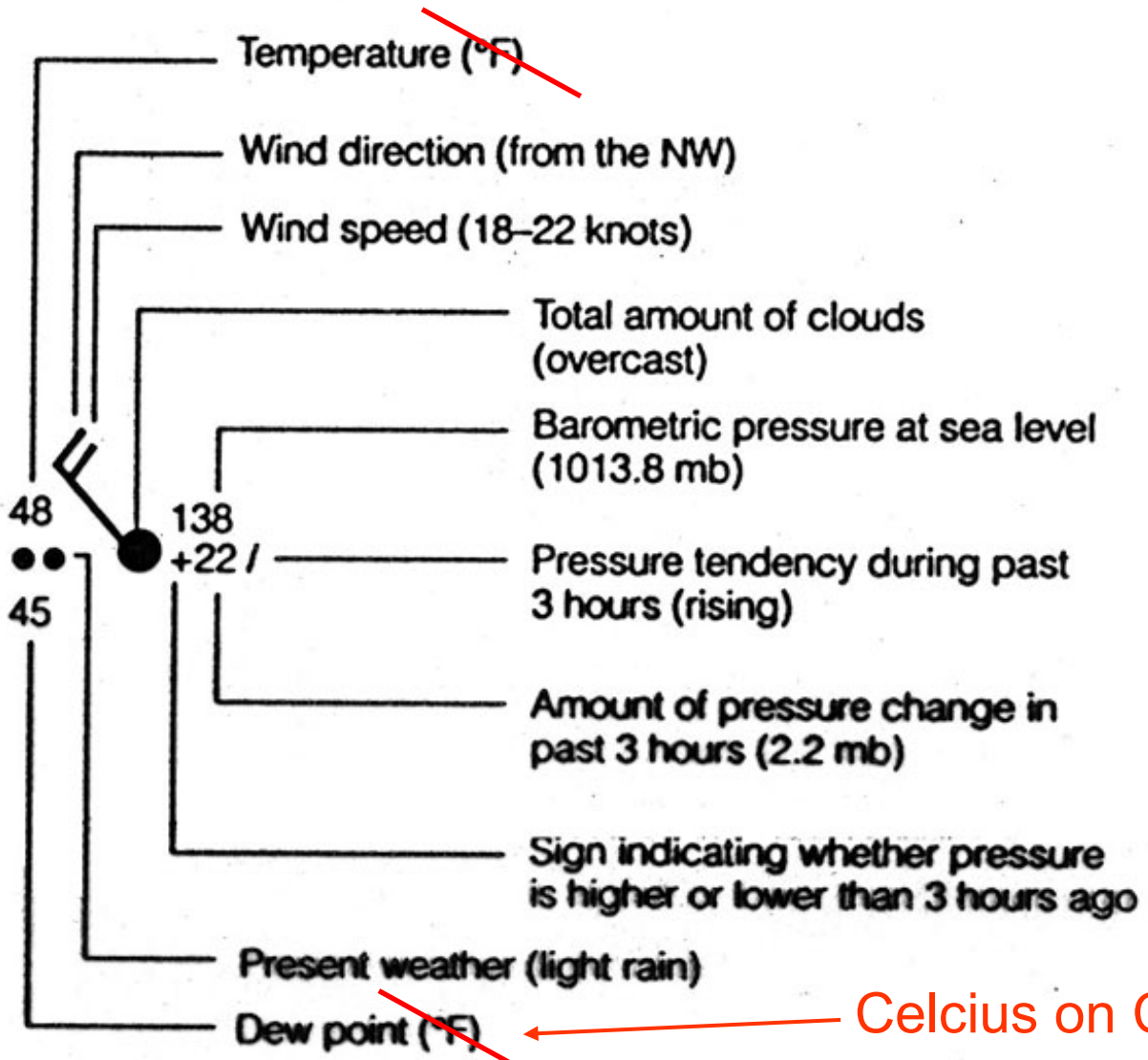
Height in dam (coded)**

** on the 850 hPa chart, place a 1 in front

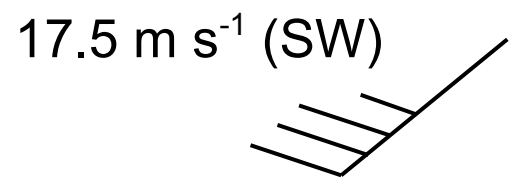
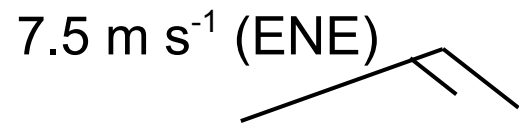
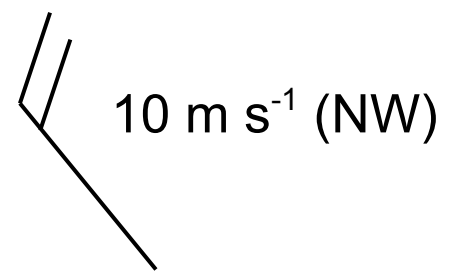
(see Appendix C or web URL for more detail)

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Simplified Surface-Station Model



Wind code in $m s^{-1}$








Celcius on Canadian maps

Low cloud type chart – from the NavCanada URL in our list

If a symbol is not given on one of the lecture slides, your familiarity with it is not examinable

Low Clouds : type CL

	Cu (Cumulus) with little vertical extent and seemingly flattened
	Cu of moderate or strong vertical extent, generally with protuberances in the form of domes or towers, either accompanied or not by other cumulus or by stratocumulus, all having their base at the same level.
	Cb (CumuloNimbus) the summits of which, at least partially, lack sharp outlines but are neither clearly fibrous (cirriform) nor in the form of an anvil; cumulus, stratocumulus, or stratus may also be present
	Sc (StratoCumulus) formed by the spreading out of cumulus; cumulus may also be present
	Sc not resulting from the spreading out of cumulus

(there are more symbols – list truncated here)