Today: More Clouds
Skew T, stable vs unstable, relative humidity

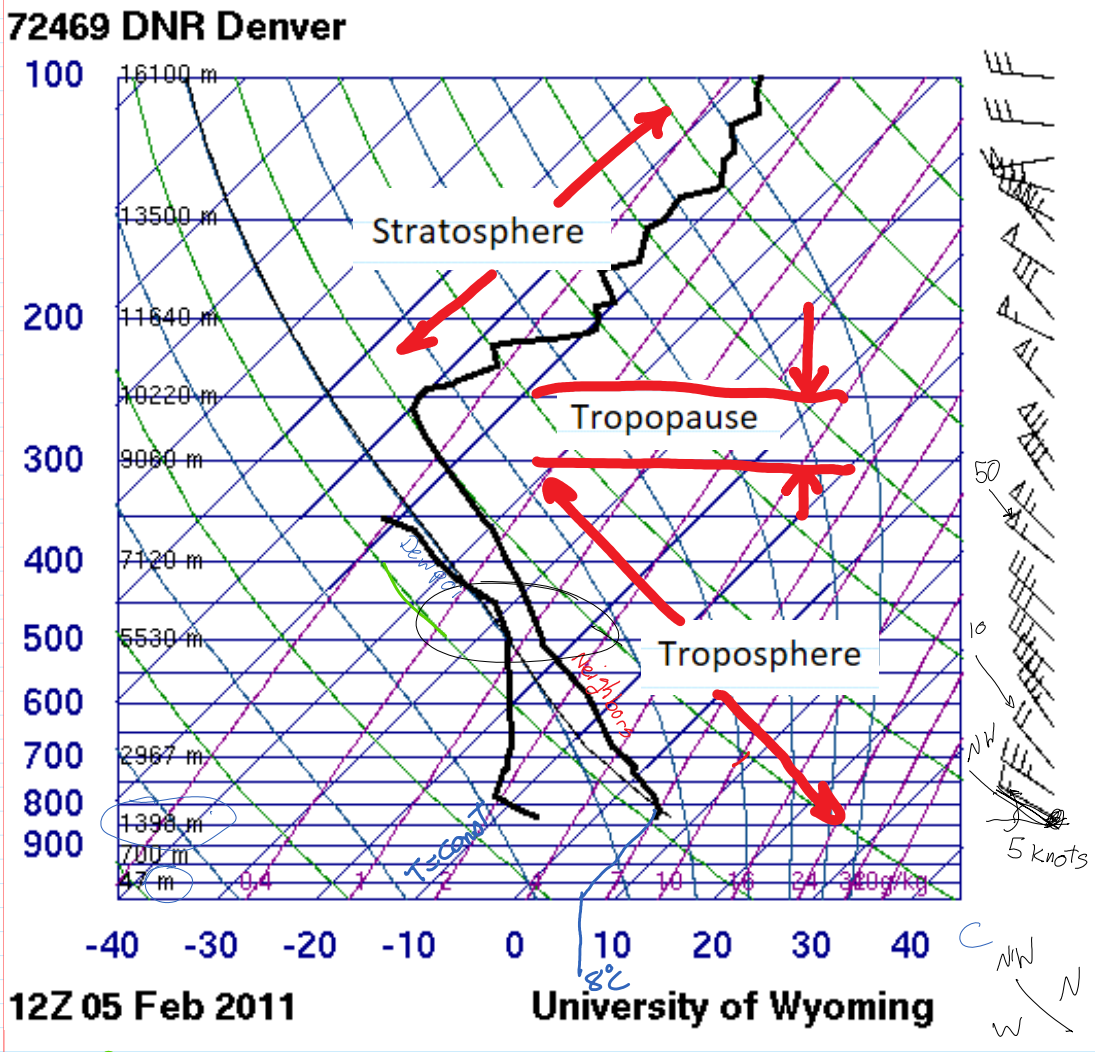
Skew-T continued:
Tells stability, and thus cloud type: **STABLE=flat clouds, stratus types**. **UNSTABLE = puffy clouds, cumulus varieties**
Also predicts cloud elevations; low, middle (alto), high (cirro)

NO VERTICAL GRID?

So many lines! How many kinds?

Horizontal blue	Constant pressure isobar
Angled blue	Constant temperature; isotherm. Angle ↗ SKEW T
Angle/curve green	Dry adiabat. A dry parcel will follow this temperature line if cooled adiabatically
Angle/curve blue	Moist, saturated adiabatic lapse rate
Purple	Lines of constant mixing ratio; absolute humidity for saturation.
Heavy black	Right line is temperature profile. Left line is dew point
Light black	Adiabat starting at the top of the boundary layer

Basics: http://www.theweatherprediction.com/thermo/skewt/
Skew T Mastery: https://www.meted.ucar.edu/loginForm.php?urlPath=mesoprim/skewt#



SLAT	39.75
SLON	-104.87
SELV	1625.
SHOW	-9999
LIFT	3.41
LFTV	3.41
SWET	-9999
KINX	-9999
CTOT	-9999
VTOT	-9999
TOTL	-9999
CAPE	0.00
CAPV	0.00
CINS	0.00
CINV	0.00
EQLV	-9999
EQTV	-9999
LFCT	-9999
LFCV	-9999
BRCH	0.00
BRCV	0.00
LCLT	260.8
LCLP	642.2
MLTH	296.0
MLMR	2.36
THCK	5483.
PWAT	5.93

= STABLE if CAPE > 0 unstable

1. Starting parcel
2. Raise it, cool it adiabatically (move up along the adiabat), perturb the system
3. Check it, is my parcel warmer or cooler than the actual neighboring parcels?

1. Starting parcel
2. Raise it, cool it adiabatically (move up along the adiabat), perturb the system
   Check it, is my parcel warmer or cooler than the actual neighboring parcels?
   i. Cooler; more dense, wants to sink again, go back to origin STABLE
   ii. Warmer; less dense, wants to keep going up! UNSTABLE

Can start at any point on the actual temperature line. Go parallel to the adiabats. Choose dry adiabat (green) if below likely cloud level or wet (blue, saturated) if in a cloud.

Stable clouds = flat STRATUS type
Unstable clouds = puffy CUMULUS family

Atmosphere is all **stable if CAPE = 0** Convective Available Potential Energy
Has unstable layers if CAPE > 0. Thunderstorms if CAPE > 500 or so.

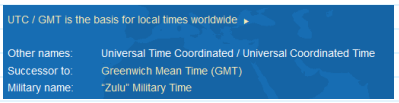
What was the surface weather on a given day?
https://www.wunderground.com/history/airport/KBDU/2016/9/30/DailyHistory.html?req_city=Boulder&req_state=CO&req_statename=&reqdb.zip=80301&reqdb.magic=1&reqdb.wmo=99999

RH

Dew point: Temperature a parcel would have to be cooled to in order to get condensation (dew)
Relative humidity: for a given absolute water vapor concentration, RH is high for low temperatures (close to dew point) and low for high temperatures. So T and RH time plots move opposite.

Other info on Skew-T: wind indicators, lifting condensation level.

Skew-T download tips: Skew-T Times:



12Z, Feb 14 = ~6 am Feb 14 here. Sunrise.
00Z, Feb 1**5** = ~6 **p**m Feb 14 here. Sunset.

Where are clouds? Where temperature is close to dew point, i.e. where the two heavy black lines come together.
Also, kink towards more steep in T line suggests clouds at that level.
Condensation = warming (opposite of evaporation = cooling on your skin)

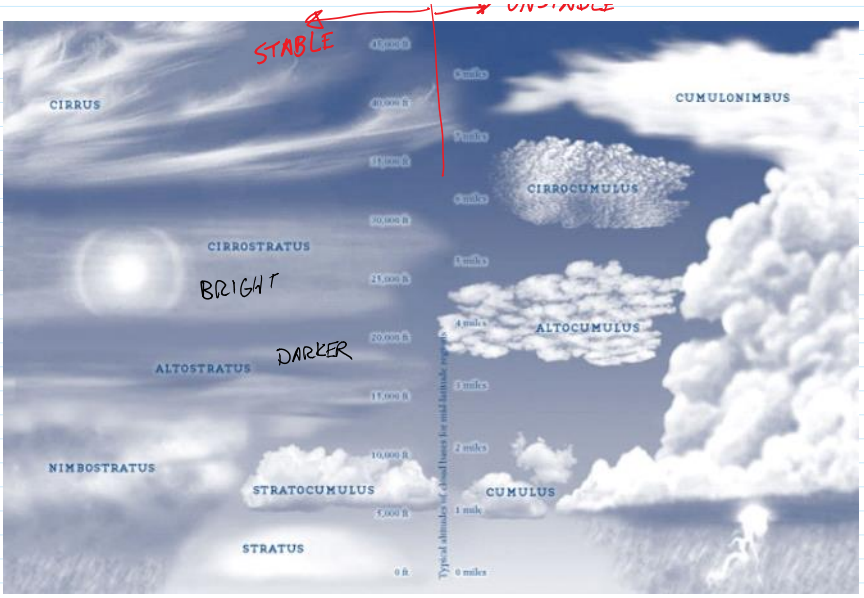
Can also get local cloud height from ATOC CU Boulder observation:
http://skywatch.colorado.edu/ or Flowvis.org>Links>Weather

1. Choose correct date. 12z Feb X is the 6 am sounding, 00z X+1 is the 6 pm sounding for date X
2. Choose plot, not text
3. Will open in next browser tab

http://weather.uwyo.edu/upperair/sounding.html

Clouds = droplets or ice MOVING UPWARDS

Lift mechanisms:
1. Instability
2. Orographics: terrain, mountains
3. Synoptic scale weather systems. Both at warm and cold fronts; cold air pushes under in a cold front, warm air overruns in a warm front.
4. Convergence: shoreline temperature differences



Clouds classified by

A. Structure: stratus = flat layers, cumulus = clumps
B. Base height: (2 km)
   a. low: up to 6500 ft (above ground, not from sea level) and vertically developed (includes cumulonimbus)
   b. middle: 6500 to 23,000 ft (2 - 7 km)
   c. high: 16,000 to 45,000 OVERLAP (4.9 - 14 km)
   Cirrostratus: bright, no observable thickness, thin, uniform veil
   Altostratus: darker, may have noticeable thicker regions

Classification guide, one of many