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

Activity
Flow Vis Background 2016
01
Daniel, Ryan
Hall, Joseph
Lloyd, Michael
Vandersluis, Schuyler
02
Castillo, Sierra
Gresh, Katie
Leng, David
03
Bateman, Daniel
Chen, Jeremiah
Noel, Mark
Savath, Jason
04
Beckemeier, Matthew
Fan, Tianzhu
Mora, Stephanie
Valadez, Yadira
05
Cymanski, Zachary
Gardi, Marco
Julian, James
Lien, Harrison

06
Harrison, Sean
Miller, Hunter
Walker, Ryan
Waterhouse, Michael
07
Goldenberg, Branden
Marcoux, Preston
Rosenberry, Alexander
Yarnell, Katherine
08
Baker, Daniel
Gurule, Marcus
Petrides, Theo
Sibel, Brett
09
Ge, Tiangen
Luber, Daniel
Thompson, Alexander
10
Brunsgaard, Peter
Parsons, Jeremy
Scrimgeour, Maxfield
Straccia, Joseph

Admin:

- Scott Kittelman had a family emergency, so the ATOC experiments won't be available after all.
- *5 minutes, chat with your group*. Schedule a meal together in the next 2 days. Team first plans due Weds at noon in D2L; just let me know what you all are planning, especially which resources from the list you'll want.
- Cloud first image due Thursday Oct. 6. Great if you can ID your cloud. At least be able to state stable vs unstable atmosphere during critique.
- Upload requests:
  - Mac users, in submitted filenames: letters and numbers only, NO SYMBOLS or punctuation please.
  - Don't forget UNCOMPRESSED edited final image, not jpg.
  - Don't forget raw camera file in native camera format, even if jpg.
  - Please no zips, many steps to put in workflow. You can upload as many files as you need to.

Skew-T continued:

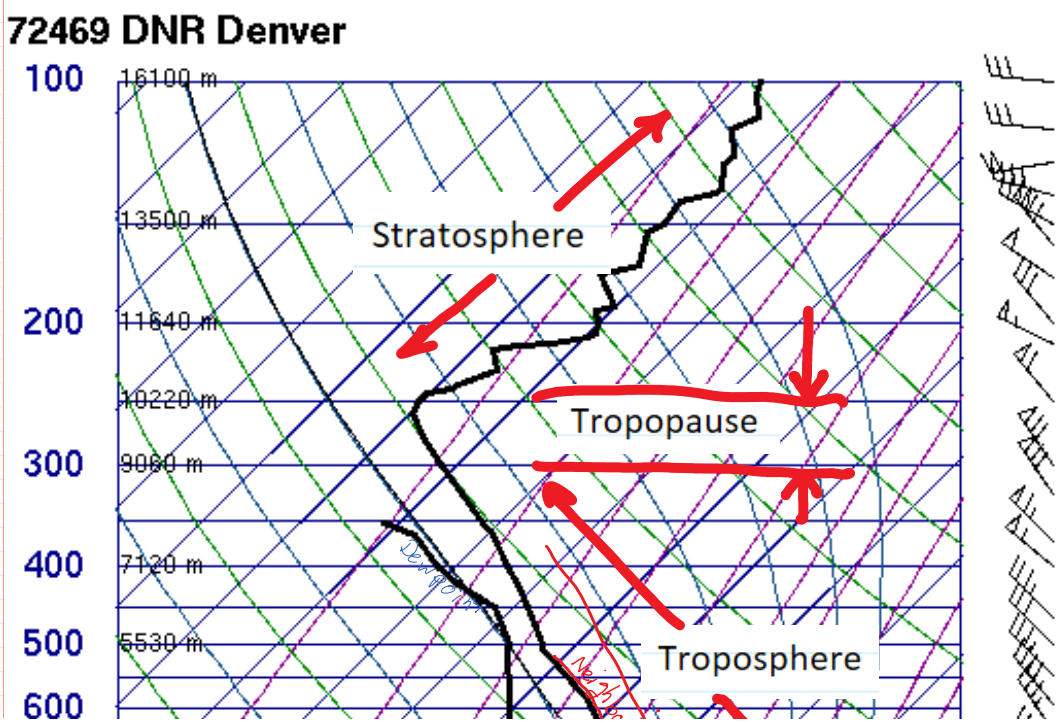
Tells stability, and thus cloud type: **STABLE=flat clouds, stratus types**. **UNSTABLE = puffy clouds, cumulus varieties**
Also predicts cloud elevations; low, middle (alto), high (cirro)

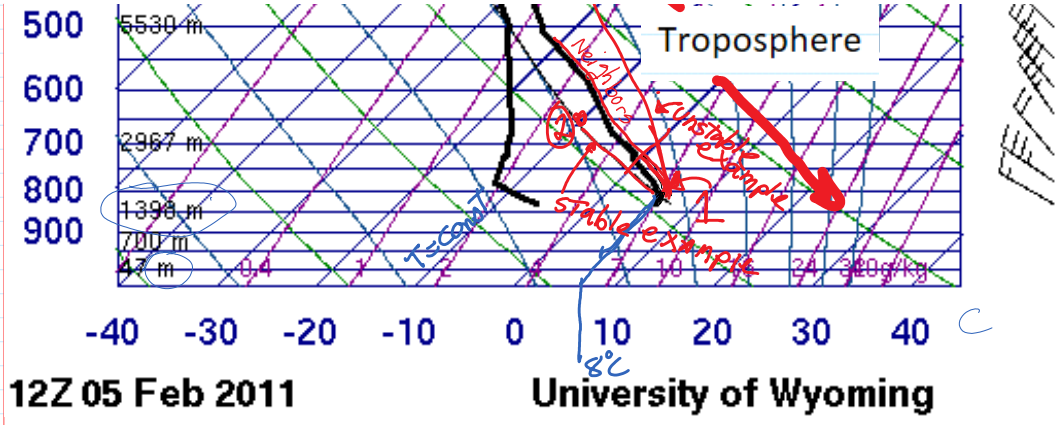
NO VERTICAL GRID?

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#





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

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: Zulu world clock, =Greenwich

mean time GMT
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)

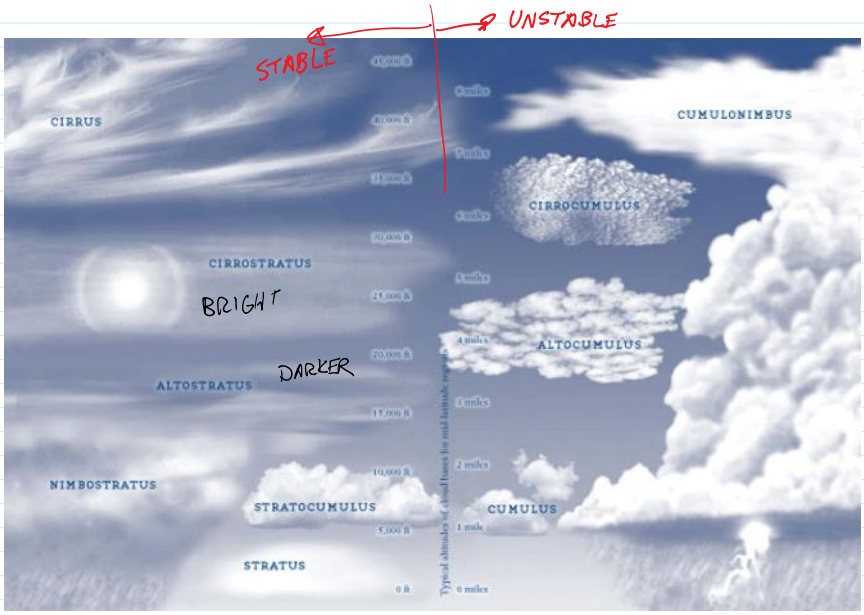
1. Choose correct date. 12z Feb X is the 6 am sounding, 00z X+1 is the 6 pm sounding for date X
2. Choose plot, not text
3. Will open in next browser tab

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: (2km)
   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

http://cloudappreciationsociety.org/collecting/ Classification guide, one of many