AMS Meeting - 2/26/10

Speaker: Mark Ratzer, NWS Chicago/Romeoville
Special Event: Tour of KLOT National Weather Service office, Chicago/Romeoville

7:00pm - Mark Ratzer: “Winter Weather Forecasting”
Three main forecasting objectives:
- -Precip type
- -Locating areas of heavy snow
- -Snowfall amounts

Precip Type
-“Where is rain/snow line?”
-Use partial thicknesses to forecast precip type
- -Thickness of a layer related to temperature

-0 C thickness lines:
- 1000-850 mb layer: 1300 m
- 850-700 mb layer: 1540 m

-Look for overlapping patterns
- -Cold under warm air
- -Where does precip form? Where does it fall?

-Surface wet bulb temperature
- -Difficult to get snow if wet bulb is above freezing

Top-Down Method to Determine Precipitation Type
-Formation and growth of ice particles in clouds
-Environments affecting hydrometeors (precipitation)
Formation:
- -Cloud droplets from on cloud condensation nuclei (CCN)
- -Can exist as supercooled liquid below 0 C
- -Ice nuclei (IN) needed to form ice crystals
  - -Most often clay and soil particles
  - -Activation temperatures between -9 C & -15 C
  - -Ice crystals cannot form without IN; drizzle results instead

Temps required for snow:
- -20 C – 100%
- -12 C – 70%
- -10 C – 60%
- -4 C – No ice

Ice crystals growth through:
- Deposition (-15 C good for this type of growth)
- Accretion
- Aggregation
- Feeder seeder mechanism

Determining precip type:
- Determine if ice exists

Look at warm layer – how much melting?
Look at surface layer – how will precip be affected?

Critical regions:

Cooler mid levels (ice producing layer)
Elevated warm air (melting)
Surface arctic air mass (refreezing)

Problems:

Surface temps
Convection – increases depth of cloud, can remove warm layer or moist layer, can develop precip at cooler temps aloft
Advection – will change airmass
Model forecast soundings – resolution problems
Drizzle vs. rain

Determining Path of Heaviest Snow:

Related to various features associated with upper level wave, midlevel vorticity axis and path of the low
Generally 2 to the left of the vortmax track

Methods for Predicting Snowfall Amts:

Garcia:
-Uses isentropic surfaces and mixing ratios to determine max 12 hr snowfall
Cook:
-Looks at warm air advection at 200mb
Magic chart:
-Find where vertical displacement of 700mb height coincides with 850mb temps of -3 & -5
LEMO method:
-Function of 500mb vorticity & speed
-Best for open, non-occluded systems

SLR (Snow-to-liquid Ratio):

Fluffiest snow: Light winds and sfc temps around 15 F
Climatological average for Chicago area: 13:1.

Some important influences:

Instability – mesoscale effects can affect snowfall amts. Increases vertical motions.
CU: Convectively unstable
CSI: Conditional Symmetric Instability
-"Slantwise" convection
WSS: Weak Symmetric Stability
Frontogenetical forcing:
-Develops thermally direct circulation

-Gradient changes rapidly
-Can lead to destabilization
Lake Effect:
-Can destabilize due to sfc warming/moderation

8:30 – Tour of NWS