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