

1/2008 VERSION

Chapter 13- Weather Forecasting and Analysis

Understanding Weather and Climate
Aguado and Burt

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Forecasting Methods

- Climatological
- Persistence
- Analog Approach
- Numerical Weather Prediction

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Types of Forecasts

- Quantitative - amounts
- Qualitative – categorical values
- Probability – chance of event

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Forecast Procedures for Numerical Models

- Analysis Phase
 - Taking observations and providing an initial state to the model.
- Prediction Phase
 - Solve basic equations to predict future states of the atmosphere.
- Post-Processing Phase
 - Production of a series of maps, model output statistics (MOS), etc.

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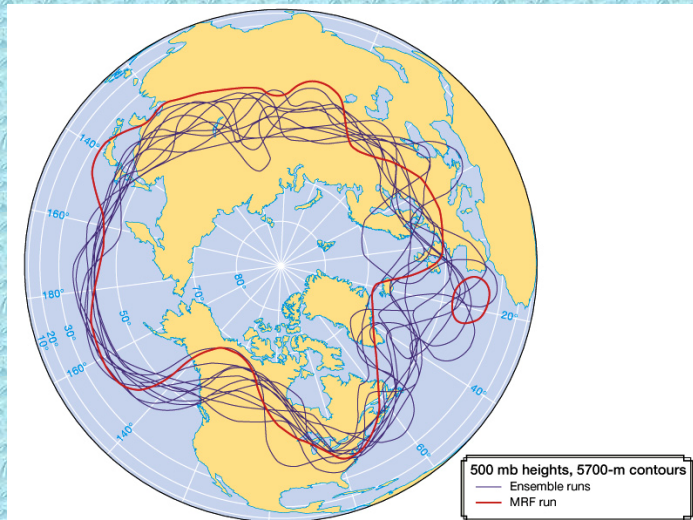
Forecasts

- Nowcast (what is happening right now)
- Short-term (72 hours or less)
- Medium-range (3-7 days)
- Long-range (week to months/seasonal outlooks/yearly outlooks)

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Ensemble Forecast



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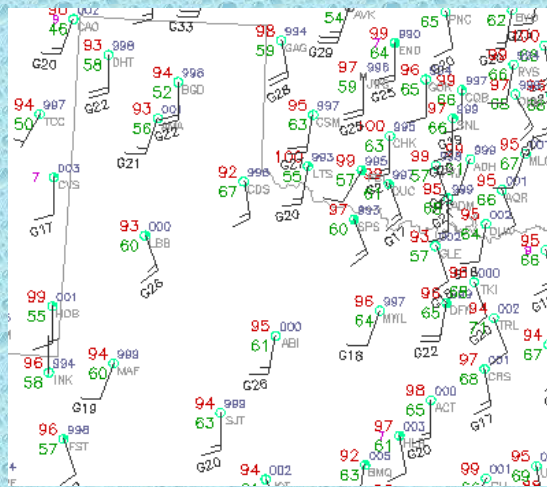
What to Use to Make a Forecast

- Model guidance and current conditions
 - Surface
 - Upper Air
 - 850, 700, 500, 300 and 200 mb maps
 - Thermodynamic structure
- Satellite images
- Radar images

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Station Data



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Weather Stations

- Automated Surface Observing System (ASOS)

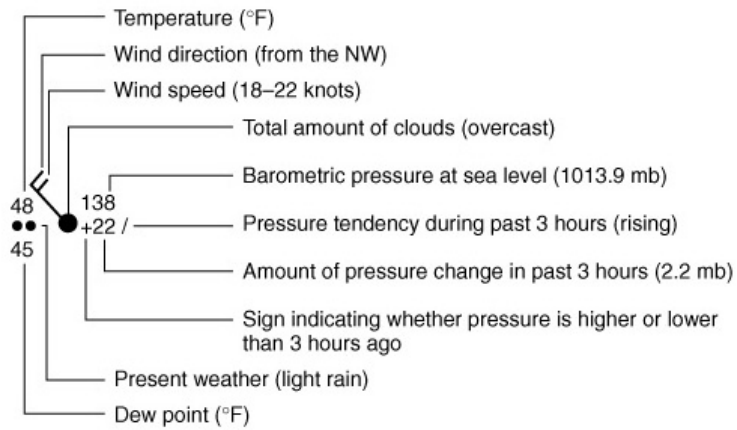


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Station Data

Simplified surface station model



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Wind entries

	Miles (statute) per hour	Knots	Kilometers per hour
	Calm	Calm	Calm
	1-2	1-2	1-3
	3-8	3-7	4-13
	9-14	8-12	14-19
	15-20	13-17	20-32
	21-25	18-22	33-40
	26-31	23-27	41-50
	32-37	28-32	51-60
	38-43	33-37	61-69
	44-49	38-42	70-79
	50-54	43-47	80-87
	55-60	48-52	88-96
	61-66	53-57	97-106
	67-71	58-62	107-114
	72-77	63-67	115-124
	78-83	68-72	125-134
	84-89	73-77	135-143
	90-95	83-87	148-156
	96-101	93-97	160-168
	102-107	103-107	170-178
	108-113	113-117	180-188
	114-119	123-127	190-200

Pressure tendency

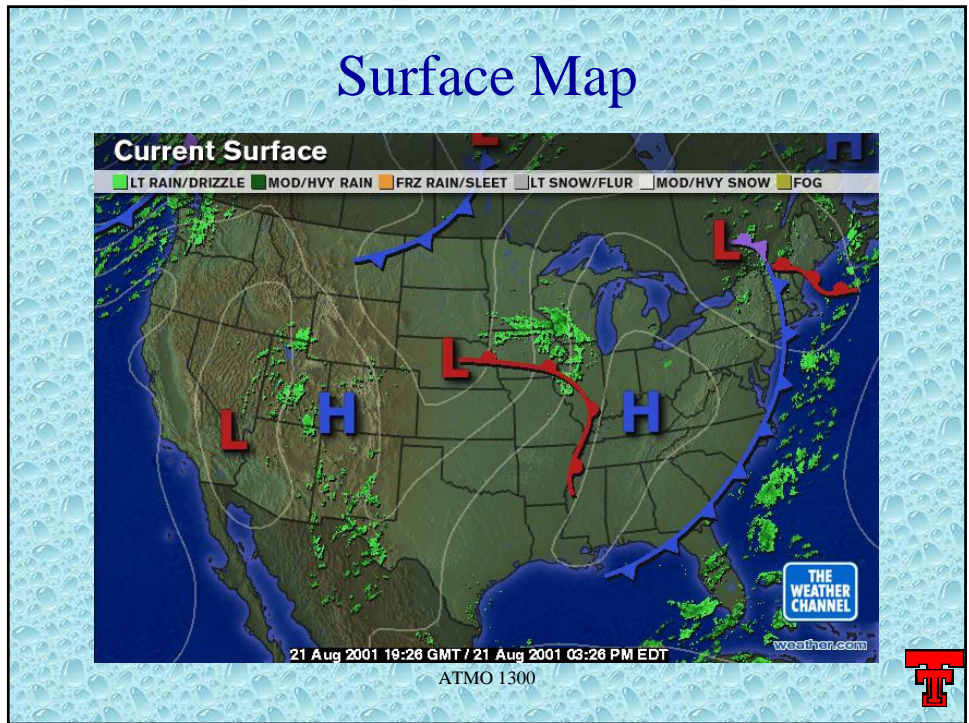
- Rising, then falling
- Rising then steady; or rising, then rising more slowly
- Rising steadily or unsteadily
- Falling or steady, then rising; or rising, then rising more quickly
- Steady, same as 3 hours ago
- Falling, then rising, same or lower than 3 hours ago
- Falling, then steady; or falling, then falling more slowly
- Falling steadily, or unsteadily
- Steady or rising, then falling; or falling, then falling more quickly

} Barometer now higher than 3 hours ago

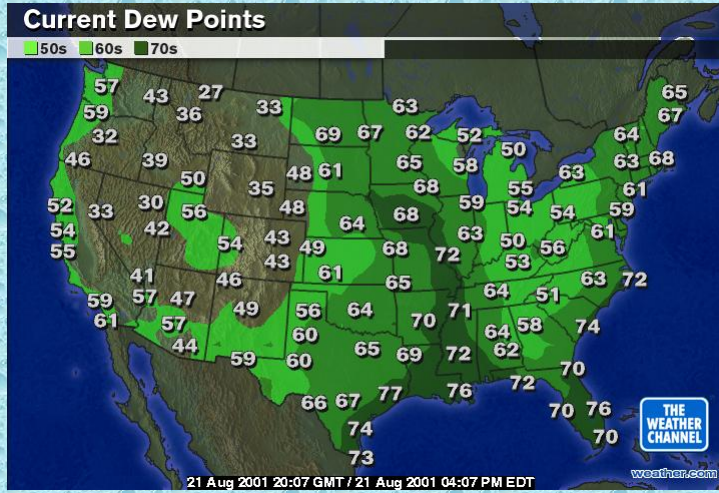
} Barometer now lower than 3 hours ago

Common weather symbols

- Light rain
- Freezing rain
- Moderate rain
- Freezing drizzle
- Heavy rain
- Rain shower
- Light snow
- Snow shower
- Moderate snow
- Fog
- Heavy snow
- Haze
- Light drizzle
- Smoke
- Ice pellets (sleet)
- Thunderstorm
- Hurricane



Contouring of Station Data



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Upper Air Data

- Radiosondes
 - Provide vertical profiles of pressure, temperature and wet bulb temperature
- Rawinsondes
 - Also provide wind speed and direction estimates based on radar tracking



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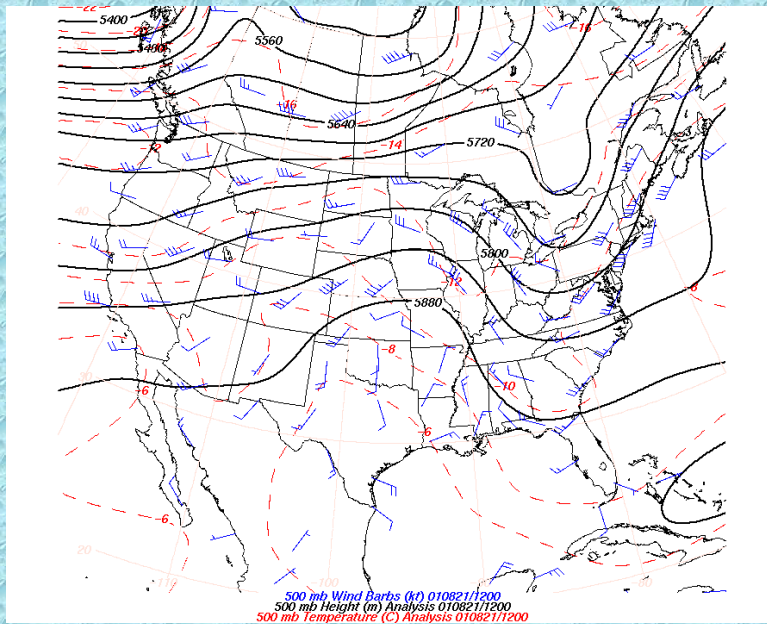
Launching a Weather Balloon



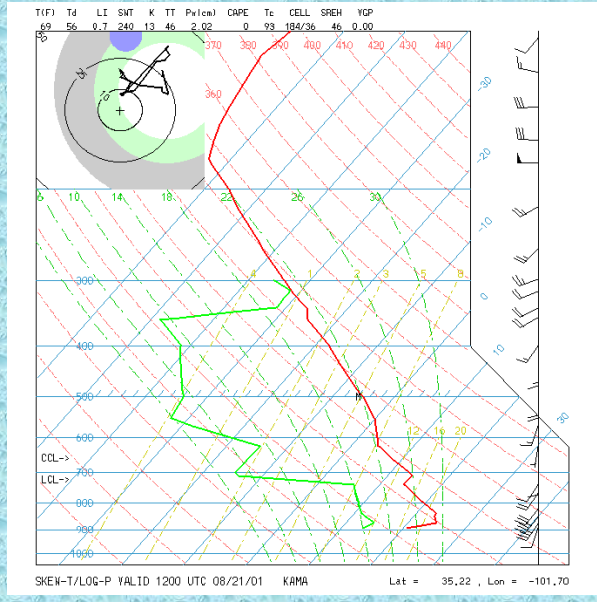
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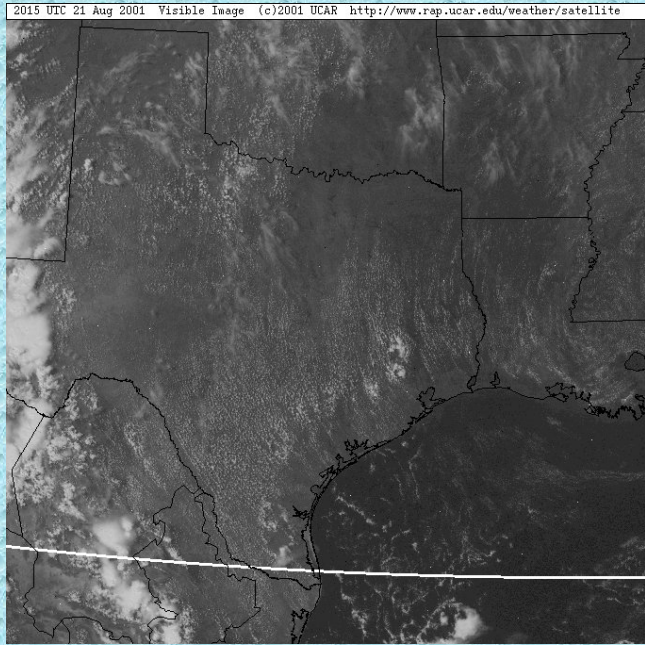
Upper Air Maps

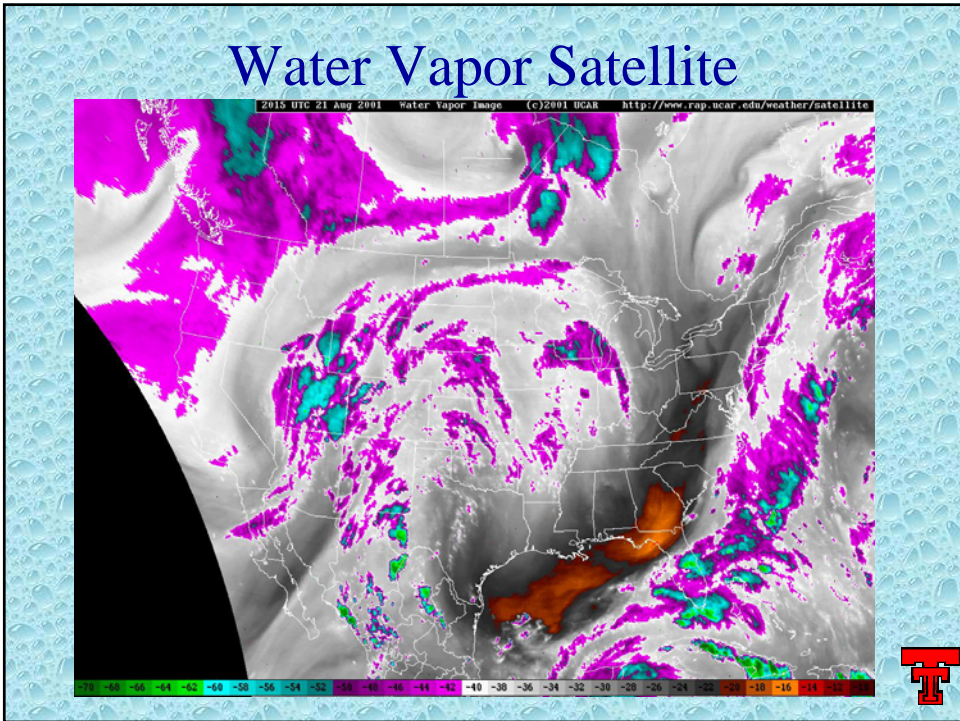
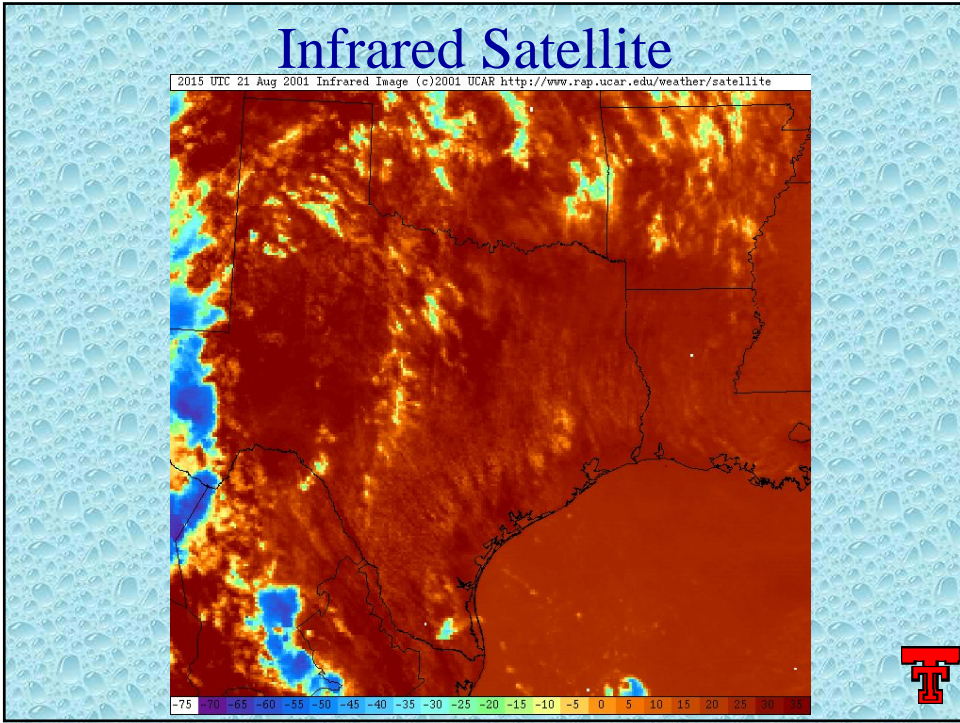


Thermodynamic Diagrams

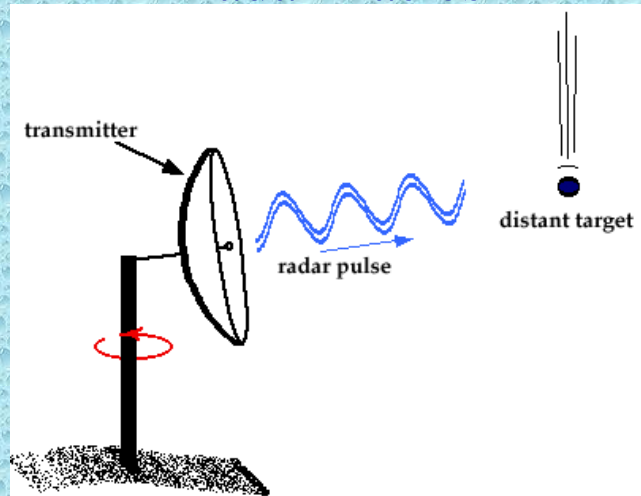


Visible Satellite





Radar Basics

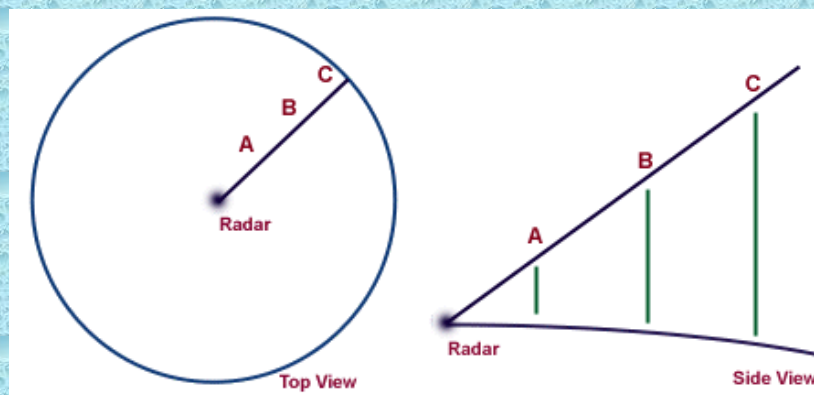


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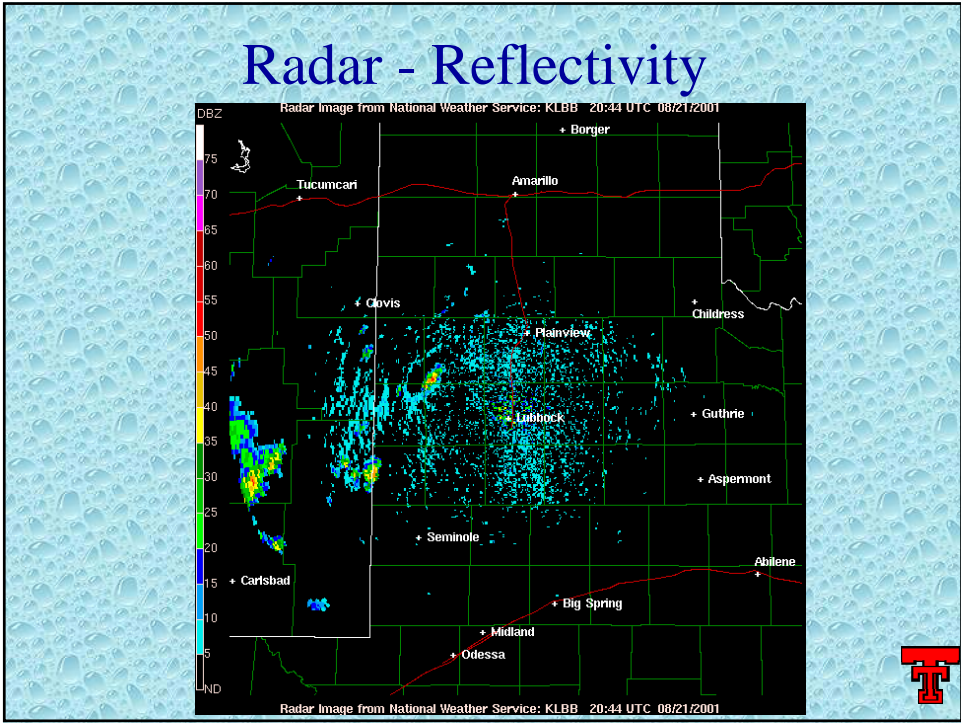


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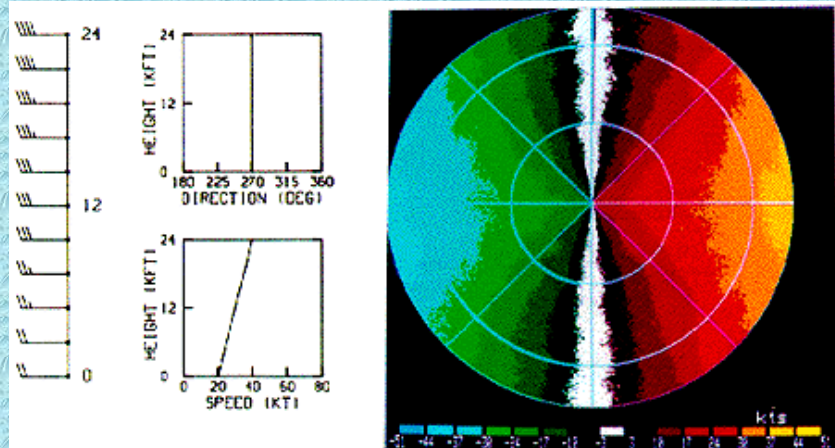
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Radar - Reflectivity



Radar Basics

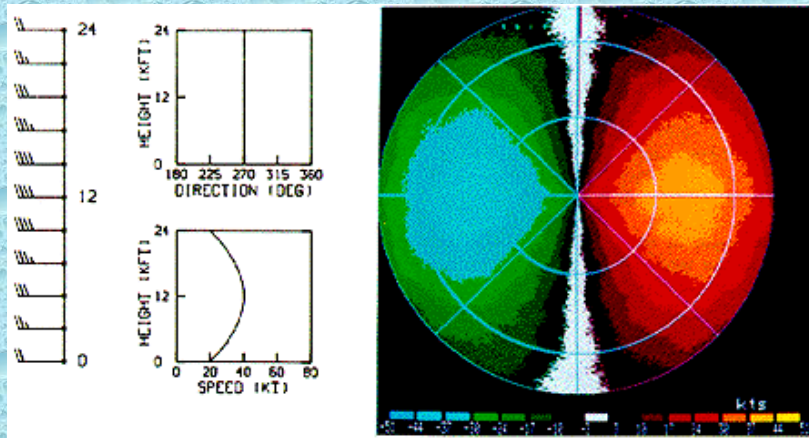


From **Rodger Brown & Vincent Wood** -
 From: "A Guide to Interpreting Doppler Velocity Patterns"

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Radar Basics



From **Rodger Brown & Vincent Wood** -
From: "A Guide to Interpreting Doppler Velocity Patterns"

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Radar – Radial Velocity

