Syllabus: Geography SS2984 Great Plains Storm Chase

Summer Session I (May 14 – 28, 2006)

Course Description. Geography 2984 is an intensive 2-week field methods course in forecasting severe convection in the Great Plains environment. Traveling to the central U.S. by van, students will formulate forecasts for severe and potentially tornadic thunderstorms, and navigate the class to a favored target region prior to storm initiation. Once in the near-storm environment, students will observe and document storm structure associated with severe weather. An activity fee will apply to cover travel, lodging, food, and equipment expenses. (3hr./3cr.)

Prerequisites: CEE/GEOG2984 Applied Meteorology or GEOS/GEOG3114 Introduction to Meteorology.

Instructors/Trip Leaders: Dave Carroll(carrolld@vt.edu): leader. We have a very experienced crew leading the storm chase, with over 25 years of chase experience in forecasting and safely navigating around severe storms.
Kevin Myatt: co-leader; Seth Price: radio communications; Ethan Knocke: lead forecaster.

Student Responsibilities. Each student is expected to participate fully in the following:

- morning forecast discussion and analysis
- on-road analysis of model updates and weather conditions
- use of radio, computer(radar), navigation, and communications equipment
- evening discussions/wrap-ups of daily events
- lessons on convective storms as time permits

Note: This field methods course is appropriate for only those students with a very strong desire to learn about severe thunderstorms and tornadoes. The long daily routine can be taxing both physically and mentally, and students must be prepared for early rising and long hours riding in vehicles.

Text: Storm Chasing Primer (the instructor's guide to forecasting severe convection)

Topics.

1) Basics of Deep Convection: convective variables and the thunderstorm life cycle; hazards associated with thunderstorms.

2) Severe Thunderstorm Dynamics: classification of thunderstorms; atmospheric conditions favoring severe convection.

3) Severe Thunderstorm Structure: low-level (cloud base) features, mid-level features, and upper-level features of severe/tornadic storms.

4) Supercells: conditions needed for mesocyclone formation; mesocyclone influence on storm structure and severe potential.

5) Tornadoes: life-cycle and current research thoughts on tornadogenesis; historical storms and important research.

6) Forecasting Severe Convection Part I: the role of instability; measures of instability including CAPE, CIN, Lifted Index, CAPE density; using Skew-T plots in forecasting.

7) Forecasting Severe Convection Part II: the role of existing wind fields; quantitative analysis of wind parameters including 0-1km helicity/shear, deep-layer (0-6 km)shear vectors, 4-6km SR winds, anvil level SR winds, boundary interactions and hodographs; tornadic supercell vs. non-tornadic supercell environments.

8) Putting it All Together: utilizing forecast model parameters, upper-air sounding data, current weather conditions and boundary locations to forecast areas of potential severe storm and tornado development.

Grading. Grades will be based on student performance on:

- daily convective analysis (completed on paper) 25%
- attendance of all discussion/analysis meetings 25%
- proficiency in use of field equipment 25%
- online forecasting/analysis exam due 1 week after returning 25%