MIDTERM I, May 17, 2002

Geography 4321/5321, Snow Hydrology

Due Monday at the start of class.

Name and Initials _____ SS# _____

Write only in the designated spaces. This test has 200 total points. Questions are worth different amounts. **Be explicit about the phase of water in your answers: ice, liquid, gas**.

FILL-IN THE BLANKS.

1. Movement of water vapor from the solid phase to the vapor phase is called _____ (5 pt)?
2. The energy released as liquid water evaporates is called _____ (5 pt)?
3. Vapor pressure can be converted to vapor density using the _____ (5 pt)?
4. The basic, repeating crystalline unit of ice I_h is called: _____ (5 pt).
5. When air temperature is about -1°C, snow crytals grow primarily by _____ (5 pt)?
6. The formation of ice crystals in the atmosphere at temperatures between -40°C and 0°C is called _____ (5 pt)?
7. Solid forms of snow crystals generally grow in this supersaturation range: _____ (5 pt).
8. Radius of curvature increases as the radius of snow grains decreases, causing the vapor pressure over that point to _____ (5 pt)?
9. The inventor of the snow sampling tube was (Mt Rose or Federal sampler) _____ (5 pt).
10. A synomyn for TG snow is _____ (5 pt).
11. A very thin ice sheet underlain by an air gap on the surface of snow and firn is called _____ (5 pts).

12. The relative humidity of pore space in the seasonal snowpack is always about _____ (5 pt).

13. During the winter, snowpacks are generally warmest at the _____ (5 pt) boundary.

14. Belfort precipitation gages generally _____ (5 pt) the amount of solid precipitation.

15. Fill in the following table that compares how TG and ET metamorphism differ. 2 points per answer for a total of 10 points. 15..TS

item	ET	TG
Snow grain size (mm)		
Snow grain shape (describe)		
Snowpack sintering (relative)		
Snowpack strength (relative)		
Vapor Pressure Gradient (mbar/m)		

15..bp

SHORT ANSWERS

16. Give three reasons why most impurities are located on the outside of snow crystals in the atmosphere. (10 points).

17. Why do ice crystals grow at the expense of super-cooled water droplets in the atmosphere? (10 points).

18. List the conditions necessary for snow to form in the atmosphere (10 points).

19. In a regression analysis, what kind of information does the R^2 value provide? (10 points).

20. Calculate SWE in meters, given an average density of 400 Kg/m3 and a snowdepth of 200 cm. Show all formulas, units and computational steps (10 points).

21. Starting with a mass of 10,000 g of ice at 0°C, calculate the energy needed in Joules (J) to answer the following questions. Show all work and equations used.

    a) How much energy is needed to melt the ice at 0°C (10 points)?

    b) How much energy is needed to raise the liquid water temperature from 0°C to +100°C (10 points)?

ESSAY QUESTIONS

22. Explain why you can see your breathe when you exhale on a cold day. Include these kewords: saturation vapor pressure, temperature, relative humidity, specific humidity. 25 points.

23. Devise a teaching module to explain any subject that we've covered some far. I'm looking for an innovative way to convey the subject matter to students in an interesting fashion. Most anything goes: interesting analogies, classroom demonstration, etc. (25 points).