Geography Coursework

Question of the course work:

Does temperature vary with height and aspect across The Devil's Kneading Trough

Identification of the Question:

In my opinion there should be a relationship temperature varies with height an d aspect. The theory behind those temperature varies is that cold air sinks down the valley during the night. To be more precisely it is the ground temperature which have been cooled down by the ground and so it became more dense than the rest of the air. As the ground air has now a high density it sinks down the valley. So the bottom of the valley should be colder than the rest of it. But during the day when the shortwave radiation of the sun starts to have an impact the bottom of the valley becomes warmer than the top because the bottom has more surrounded land which gets heated up. So my theory would be that temperature falls during the morning or night but rises during the day. Another theory of me would also be that the west sloap becomes quicker warmer than the east slope. This should be caused by the shortwave radiation of the sun. In the morning just the west sloap gets this radiantion because the east sloap lies in the shade.
It is possible to answer it by specific measurments.

Development of a Strategy:

To answer the question we need a suitable step valley where we can collect our primary data like ground and air temperature, profiles and aspect.The valley should be step so that we can height distances relative quickley. The secondary data will the data that we can't really colect from the valley like height and pressure.
The investigation will be done on a Thurday the 25 th September 2003 a sunny day with almoust no wind influence.This are the perfect conditions for good measurements.
The measurements have to be taken as quickly as possible, so that the radiaton of the sun does not alter the measurements, therefore a team of 6 people is needed.
The investigation will take about 7 hours because we need readings for the morning and the afternoon.

This how the is going be exactly like:

8:00 am	Meet at Magistrates' Court
8.30 am	Arrive at The Devil's Kneading Trough
8:50 am	Start first Transect
12:30 pm	Lunch
1:30 pm	Start 2nd Transect
3:00 pm	Return to School

Risk assesment:
Main hazards are steep slopes, brables and wire fences. Unexploded bombs have been found in this area. It is safe if you do not touch any metal object if you should find one.

Collection of Data:

We will have to measure the ground and air temperature, and the a spect of the valley at certain points to get any conclusion to the question. We need the aspect to draw a crossection of the valley so that we can read the hight of the drawn graph. To measure the aspect we will need a (clinometer) and ranging poles. The accuracy will depend on how verticaly the are ramped into the ground.
The temperare is going to be measured by to two digital thermometers. One will be used to measur the ground temperature and the other to measure the air. The thermometers will be hold in shade to prevent influence of short wave radiation on the thermometer.

We are going to use the systematic method of sampling. That means we will measure temp. and aspect every 20 meters(to measur the distance we use a).
The statistic method gives the best results to draw a precised crossection.
The data will be collected in the morning (8:50 am) and in the afternon (1:30 pm) to see the impact of night and day on the valley.
But before the real investigation starts a trial run has to be done.

Analysis, Evaluation and Interpretation:

Presentation of Data:
Primary Data

First Transect:

Point	Angle (in degrees)	Distance (in metres)	Temperature (in celsius)
A	-31	10	Ground:8\Air:11.6
B	-34	10	11.1\12.8
C	-32	20	9.9\12.3
D	-29	20	10.8\12.4
E	-34	20	11\12.8
F	-32	20	10\13.5
G	-25	20	10.6\13.8
H	3	20	11.1\14.4
I	32	20	11\17.4
J	33	20	12.1\18.9
K	31	20	13.2\16.9
L	26	20	15\16.3
M	23	20	13\17.5
N	20	20	14\20.8
O	11	20	12.3\20
P		20	14.2\16.5

Second Transect:

Point	Angle (in degrees)	Distance (in metres)	Temperature (in celsius)
A	-31	10	Ground:12.6\Air:22.3
B	-34	10	12.3\20.3
C	-32	20	12.4\21.1
D	-29	20	11.9\19.7
E	-34	20	13\18.4
F	-32	20	12.3\20.9
G	-25	20	12\19.3
H	3	20	13.2\20.6
I	32	20	11.4\21.6
J	33	20	14.4\20.9
K	31	20	14.6\21.1
L	26	20	13.7\20
M	23	20	16.2\19
N	20	20	16.3\18
O	11	20	14\19.2
P		20	14.3\19

Spearman formula :

Slope	Temperature	Calculated Spearman Rank	Transect
East	Ground	-0.452380952	First
East	Air	-0.857142857	First
West	Ground	-0.547619047	First
West	Air	0.119047619	First
East	Ground	-0.142857142	Second
East	Air	0.428571428	Second
West	Ground	0.261904761	Second
West	Air	-0.857142857	Second

Secondary Data:

Analysis:

The results of the Spearman rank formula on the frst transect show us that there is no real corolation between these results. Just only one result of the formula of the east slope air temperature gets close to a corolation. It would be a negative. This means that air temperature falls with rising height. But this result was totally unexpected.
You can see on the crossection graph that the temperature on the west slope during the first transect was about 2.5 degrees higher than on the east slope.

The results of the Spearman rank formula on the second transect also show no corolation. It is again only one result which gets close. The air temperature on the west slope dercreases with height. This corolation this time was expected.

When you compare both transects you can see that the air temperature is always higher. You can see it so clearly on the two crossection graphs that a Man - Whitney U test is unnecesary to do.
The temperature on the east slope starts to become the same as the west slope temperature during the day.

Conclusion:

Just half of the results cover my theories. One theory which is complety proved by the results is that the east slope at 9:00am is defenetly warmer than the east. This caused by the solar short wave radiation which has no impact on the east slope because of its shade.
I couldn't prove that cold air sinks down with the results I got because the coldest point of the valley is not the bottom. I am also very dissapointed about that after using the Spearman Rank formula the results showed no corolation between height temperature. Maybe the first transect had been started too late so that the bottom could warm up during the morning and it is also possible that to prove my theory I would had to think about factors that could have an influence on it i.e. vegetation and soil.
Therefore the air temperature at the bottom is the warmest but the ground temperature is still lower than the ground temperature of the west sloap. This could be because the surfaces is goalt clay and it takes more time to heat it up.
The air temperatur is higher than the ground temperature. This could be affected by the longwave radiation of the ground.