Meteorology - Water and Humidity Lab

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Lab 3 – Lab Report

We were tasked with furthering our knowledge in relative humidity, dew point, specific heat of water, and albedos. By doing so we were using instruments such as a psychrometer, which you sling around in your hand, and providers you the dry and wet bulb temp whereby further you can find out the dew points and relative humidity. We also were able to find the dew point using aluminum cups, water, and ice cubes method. We also measured the effects of albedo by measuring the temperature change in two different colored surfaces over a fifteen-minute period.

Tables

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| --- | --- | --- | --- | --- |
| Sling Trial | 1 | 2 | 3 | Average |
| Dry Bulb Temp | **21.7** **°C** | **21.7** **°C** | **22.2** **°C** | **21.87 °C** |
| Wet Bulb Temp | **18.3** **°C** | **17.2** **°C** | **16.1** **°C** | **17.2 °C** |
| Wet Bulb Depression | **3.4** **°C** | **4.5** **°C** | **6.1** **°C** | **4.67 °C** |
| RH (%) | **72.5%** | **64.1%** | **52.8%** | **63.13%** |
| Dew Point Temp | **16.5 °C** | **14.6 °C** | **131.83 °C** | **57.93** |

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| --- | --- | --- | --- | --- |
| Aluminum Cup Trial | 1 | 2 | 3 | Average |
| Dew Point Temp | **10** **°C** | **6** **°C** | **5** **°C** | **7** **°C** |
| Air Temp | **25** **°C** | **25** **°C** | **25** **°C** | **25** **°C** |
| RH (%) | **72.5%** | **29.5%** | **27.5%** | **43.1%** |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| In °C | Start | 30 Sec | 1 Min | 1.5 Min | 2 Min | 3 Min | 5 Min | 7 Min | 9 Min | 11 Min | 13 Min | 15 Min | Total Increase |
|
| Alum. | **27** | **28** | **30** | **31** | **32** | **34** | **35** | **35** | **35** | **36** | **36** | **37** | **10** |
| Black | **27** | **30** | **31** | **35** | **36** | **40** | **42** | **45** | **45** | **46** | **47** | **48** | **21** |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| In °C | Start | 30 Sec | 1 Min | 1.5 Min | 2 Min | 3 Min | 5 Min | 7 Min | 9 Min | 11 Min | 13 Min | 15 Min | Total Increase |
|
| Water | **25** | **26** | **26** | **26** | **27** | **27** | **28** | **28** | **29** | **30** | **30** | **30** | **5** |
| Sand | **28** | **30** | **31** | **32** | **32** | **33** | **34** | **35** | **36** | **38** | **39** | **40** | **12** |
| Damp Sand | **28** | **29** | **29** | **29** | **30** | **31** | **33** | **34** | **35** | **38** | **38** | **38** | **10** |

**Part 1 – Humidity and Dew Point Analysis**

How do the relative humidity values from part (a) compare to the relative humidity values from part (b)? How to the dew point temperatures compare? Which technique, the sling psychrometer or the dew point cups, do you think is more accurate for obtaining information about the humidity of the atmosphere? Why?

Relative humidity (RH) decreased substantially between part A and B. The reason for this is although the relative humidity went down; the absolute humidity actually would of gone up. Just because RH goes down does not mean that the actual amount of moisture went down. The dew point cups are more accurate than a psychrometer. A psychrometer can be inaccurate by simply facing the wrong way, such as in the wind vs. not in the wind or being effected by the natural heat that our body puts off.

**Part 2 – Albedo Analysis**

Which container of air, the aluminum or the black, increased in temperature the most in 8 minutes? Now relate this to the earth: Which area of the earth would you expect to absorb more (and thus reflect less) of the sunlight that makes it to the surface, the Amazon rainforest, or the Alaskan Tundra, and why?

The black container of air increased the temperature the most. As we learned in class, black is the most absorbent whereas white is the highest reflection. This can easily be demonstrated by wearing a white vs. black shirt during the Texas summer heat. You would expect that the Amazon rainforest would absorb the most whereas the Alaskan Tundra because of its white color would reflect the most.

**Part 3 – Specific Heat of Water Analysis**

How do the abilities to change temperature differ for dry sand and water when they are exposed to equal quantities of radiation? How do the abilities to change temperature differ for dry sand and damp sand when they are exposed to equal quantities of radiation?

Dry sand absorbs much more radiation than water because sand is considerably tighter packed than water and the specific heat is lower. The same is true for dry vs. damp sand. Because you are taking a tightly packed substance, such as dry sand, and adding water which is not as highly packed, you get a combination effect with damp sand. This effects the specific heat and thus does not make radiation as absorbent as dry sand.