

Theory: Controls of Humidity1) **Local Evaporation:**

- Local evaporation is a source of water vapour for the air.
- The greater the local evaporation, then the higher the humidity

2) **Air Temperature:**

- Air temperature controls how much water vapour the air can hold (higher saturation point)
- Warmer air holds more water vapour and allows for a higher humidity

3) **Advection:**

- Air coming from a low evaporation source will bring dry air (low humidity) over a site
- Air coming from a high evaporation source will bring moist air (high humidity) over a site

Data:

Dry and wet bulb temperature:

Shaded Site	Dry	Wet
Ground	13.5°C	12.2°C
Chest	14.2°C	13.8°C

Open Sky	Dry	Wet
Ground	13.1°C	12.1°C
Chest	13.2°C	12.8°C

Wind Speed:

Shaded Site	8.6km/hr √ 2.39m/s
Open Sky	3.8km/hr √ 1.06m/s

Height of mid chest:

135cm=1.35m

Shaded Site Observation	
Direction of Wind	Coming from North East direction, closer to East
Potential upwind surfaces	<ul style="list-style-type: none"> ● Buildings such as Clearihu and the Library ● Tall trees along the side of Quadra ● The slope difference between UVIC and Cadboro Bay ● Ocean cold breeze coming from the bay
General weather conditions & ground surface	<ul style="list-style-type: none"> ● Windy day ● Small light rain shower ● Raining on and off for every 5 minutes ● Fairly cloudy with scattered small blue sky patches ● Sky is dark, but sun peaking through South West ● Ground is damp and wet ● There are still leaves on the tree above

Open Sky Observation

Direction of Wind	Coming from North East direction
Potential upwind surfaces	<ul style="list-style-type: none"> ● Buildings such as Clearihu and the Library ● Tall trees along the side of Quadra ● The slope difference between UVIC and Cadboro Bay ● Ocean cold breeze coming from the bay
General weather conditions & ground surface	<ul style="list-style-type: none"> ● Less windy ● Cleared up a bit, but still patchy cloud spread out the sky ● North and South still super cloudy ● Clouds moving in a fast pace ● The ground is damp but less muddy than previous site

Case Study:

- a. Local Evaporation:** The local evaporation for the Shaded Site is $-0.0246 \text{ g/m}^2\text{s}$. On the other hand, the Open Sky site has a local evaporation of $0.000352 \text{ g/m}^2\text{s}$. In comparison, the Open Sky site has a higher local evaporation than the Shaded Site. Based on the theory and our result, the Open Sky site has a greater local evaporation, which means it has a higher humidity. (because higher incoming solar radiation leading high evaporation, cloud and tree shade prevent solar from reaching ground; lack evaporation)

b. Air Temperature: Based on the dry bulb measurement at chest height, the air temperature for the Shaded Site is 14.2°C . At the Open Sky site, the air temperature was 13.2°C . Judging from our recorded data, the Shaded Site has a higher air temperature, which means this site has a higher humidity because warmer air holds more water vapour.

c. Advection: The wind speed at the Shaded Site is 2.39 m/s and it is coming from the North East direction, more closer towards the East. The wind at the Open Sky site is also coming from the North East direction, with a wind speed of 1.06 m/s . The wind observed at these two sites is from the same general direction, coming from the Cadboro Bay. The cloudy sky decreases the amount of solar radiation from reaching the ocean water. This means, less evaporation occurring and therefore, lower humidity air. The low humidity ocean air being blow towards UVIC and are force up the hill (slope difference between UVIC campus and Cadboro Bay). The positive slop decreases more humidity. In conclusion, the wind experienced at the two sites comes from a low evaporation source, brining dry air, and therefore, low humidity.
- The vapour pressure at the Shaded Site is 10.8 mmHg based on the data we collected. At the Open Sky site, the vapour pressure calculated based on the data we collected is 10.08 mmHg . Based on the observed vapour pressure, the Shaded Site has a higher vapour pressure, and therefore, a higher humidity. However, looking at the local evaporation result and based on our theory, the Open Sky site has a greater local evaporation, which means it has a higher humidity. This is the case at the Open Sky site because there are no direct above object and fewer clouds acting as blocking agent to prevent the solar radiation from reaching the ground. On the other hand, at the Shaded Site, there are clouds and tree leaves acting as a reflecting agent from preventing the solar radiation to reach the ground. Therefore, at the Open Sky site, more energy reaches the ground surface and is used for the process of local evaporation, leading to higher humidity. I believe this is the most important control

because the local evaporation control determines the amount of water vapour that can exist in the environment's condition.

Based on the collected air temperature for these two sites, the Shaded Site has a higher air temperature than the Open Sky. With that being said, the Shaded Site has a higher humidity because warmer air can hold much more water vapour than the Open Sky air. I believe this is the least effective control because the presence of the air temperature can be affected by countless factors. It is not a stable control to determine the humidity level.

The advection control has a relatively small affect on the differences between these two observed sites. The wind observed at these two sites is coming from the North East direction. The possible source for this observed air is coming from the Cadboro Bay. The cloudy weather prevents the solar radiation to practice evaporation, which means lower humidity air. This low humidity ocean air is being force up the hill towards UVIC, (slope difference between UVIC campus and Cadboro Bay) losing even more humidity during the process. Therefore, the wind experience at the two sites is dry and low humidity air.

In conclusion, based on the theory and the data results we collected, the Shaded Site has a higher humidity than the Open Sky site. However, the difference between these two sites is not very significant due to similar physical controls and weather.