CM402

GANDHINAGAR

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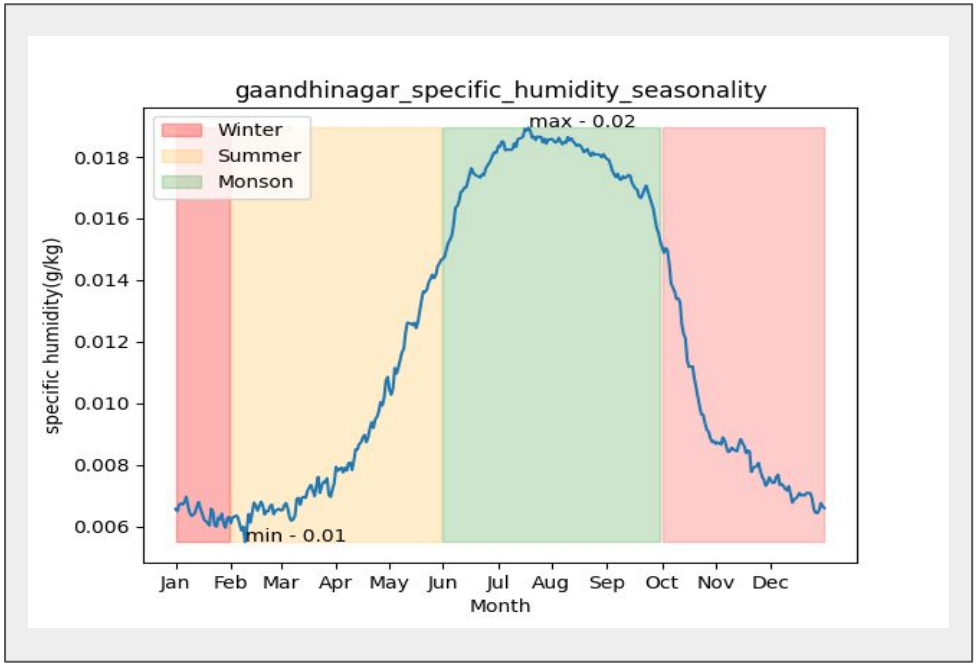
How does specific humidity & relative humidity vary seasonally in your region?

Gandhinagar experiences extreme seasonal variation in the perceived humidity.

In winter, specific humidity is very small, because there is less energy available to evaporate surface water

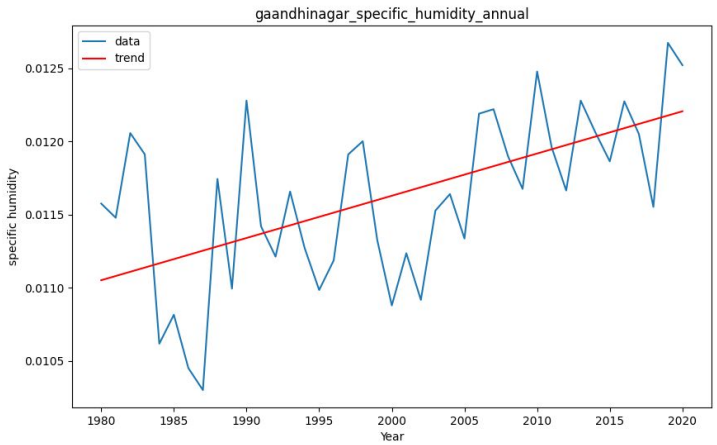
In monsoon, where a seasonal change in prevailing wind direction brings warm, moist air from the adjacent oceans northward into Asia, spreading humidity across India.

high humidity in monsoon
increases during summer to monsoon
decreases during monsoon to winter

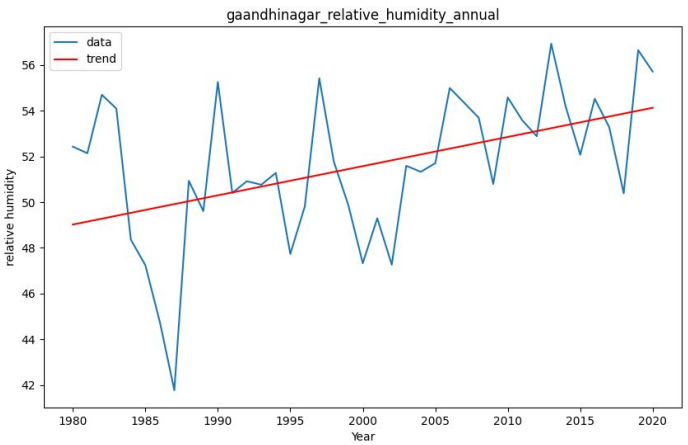


Trends in Specific and Relative Humidity

Specific Humidity



Relative Humidity



As observed from the lines fitted for their graphs, both annual relative humidity and annual specific humidity are increasing overall along time.

How do specific humidity and relative humidity vary seasonally in your region?

Maximum relative humidity(RH) in the month of August
 # 82.75% [Monsoon Season]

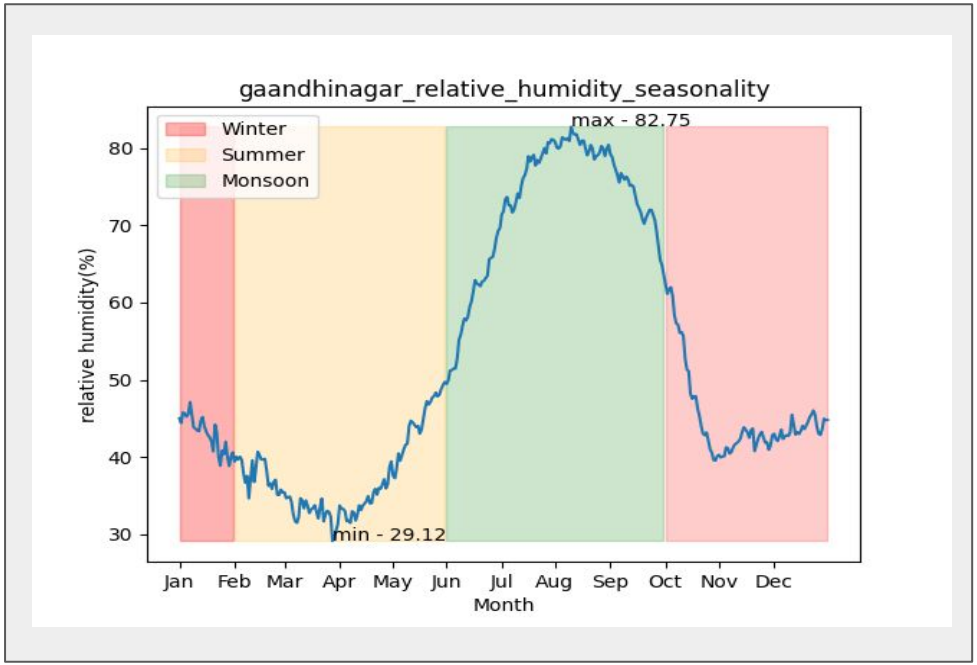
Minimum relative humidity(RH) in the month of March
 # 29.12% [Moving Towards Summer Season]

An **increase** in RH during monsoons is noticed.
 # This increase in RH can be related to the increase in surface temperature.

Increases continuously during pre - monsoon season

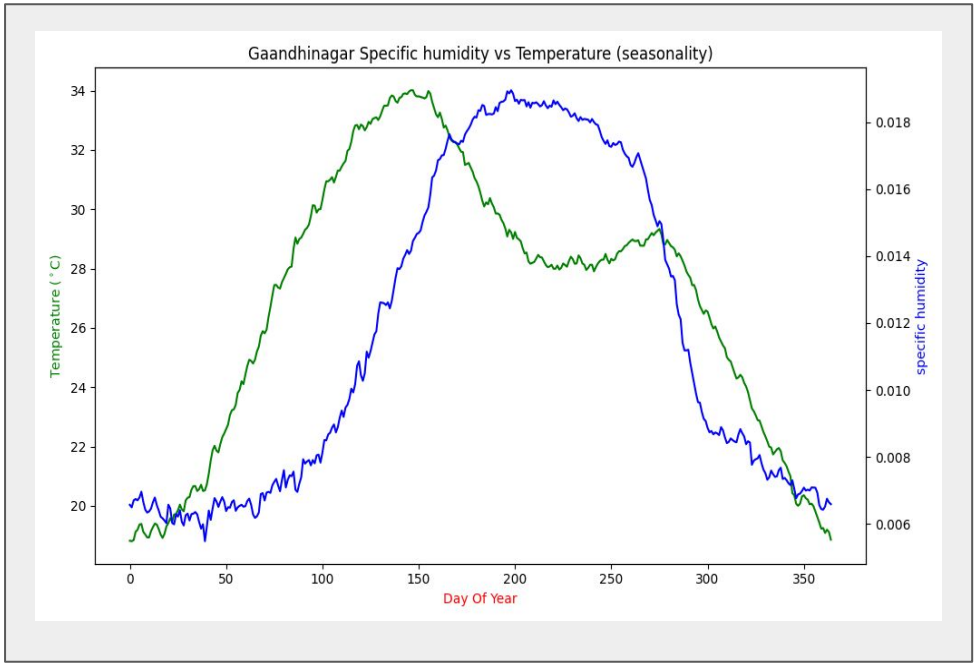
Decreases continuously during post-monsoon season

Local minima seen during early start of winter season



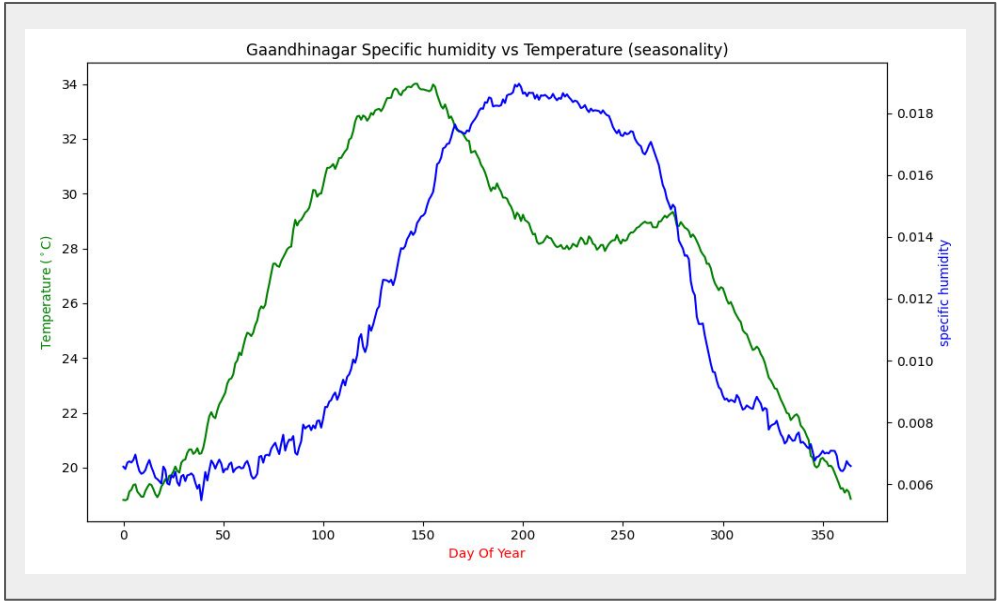
Change of Specific Humidity with Temperature Change

The temperature stays almost constant, fluctuating in January. After which the temperature steadily rises due to the warm summer season. Since, the ability to hold water vapor by hot air is more, the humidity also steadily rises.
After June, the temperature falls due to the cooling from the rainy season. Although specific humidity should fall with decreasing temperature, the humidity rises in the rainy season due to the addition of water vapor by the monsoon winds blowing from the Arabian sea into the land carrying moisture.
After the rainy season, in October, there is a large amount of water vapor in the atmosphere due to the previous rains, but now without the cooling effect of precipitation which increases temperature. After this, the water vapor is used up in this heating effect, leading to condensation, due to which the humidity and temperature sharply drop along with the setting of winter season.



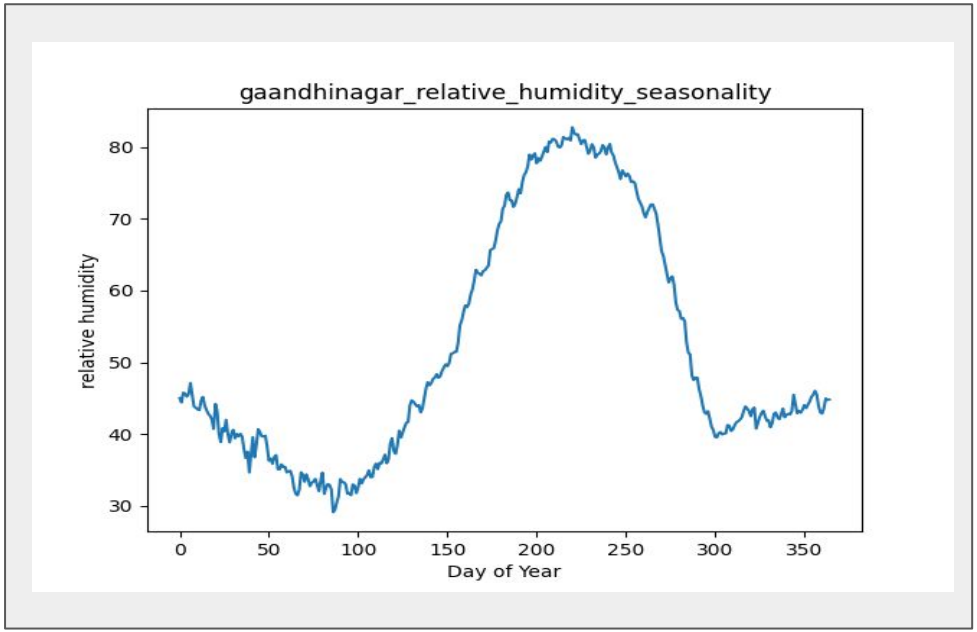
Are the number of seasonal peaks the same in temperature, specific humidity and relative humidity?

No, the number of seasonal peaks are different. Number of seasonal peaks for relative humidity and specific humidity are 1, while there are 2 seasonal peaks for temperature.



If the number of peaks is different, explain why

Number of peaks are different due to the rise of specific humidity, causing dip in temperature, resulting in two local maximas for temperature. Since relative humidity is inversely proportional to temperature.

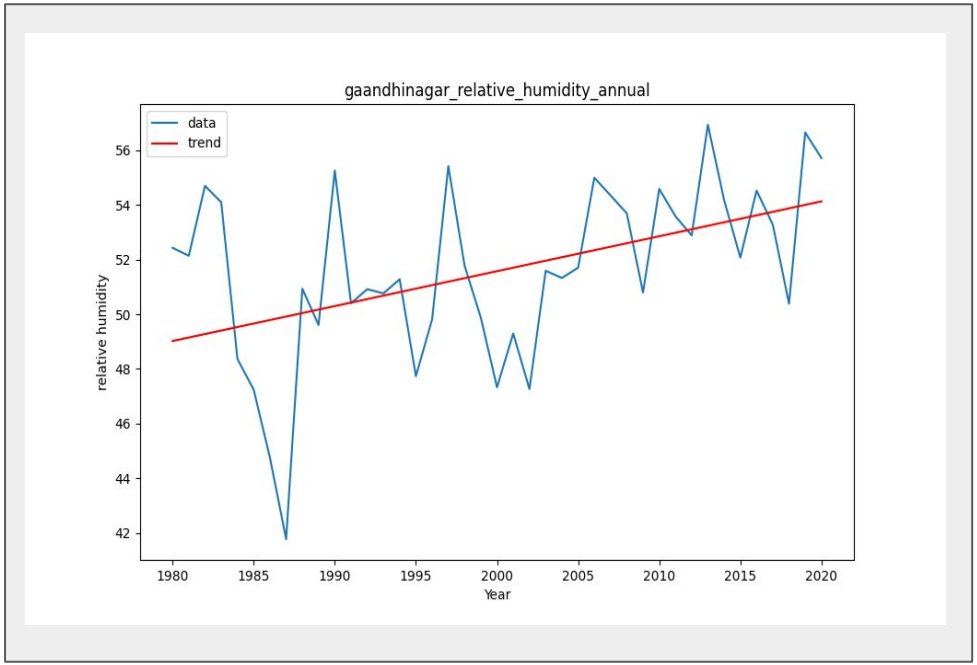


Why do you expect the relative humidity to remain nearly constant during global warming?

According to the Clausius-Clapeyron equation, the air can generally hold around 7% more moisture for every 1C of temperature rise. Therefore, for relative humidity to stay the same under 1C of warming, the moisture content in the air also needs to increase by 7%.
real world have limiting factors

Average relative humidity in Gandhinagar appears to be **slightly increasing** over past four decades.

Earth is warming and warmer air can hold more water vapour
Heat is moved around the globe by atmospheric winds and ocean currents
Increase in carbon dioxide (CO2) in the atmosphere, as well as changes in temperature and moisture, affect how much moisture plants release.
urbanisation and a move to intensive and irrigated agriculture, which all affect local moisture levels



Thank You!!