Temperatures, Not Hotels, Likely Alter Niagara Falls' Mist

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What's up with the mist? When the Niagara Parks Commission posed that question back in 2004, the concern was that high-rise hotels on the Canadian side of Niagara Falls were contributing to the creation of more mist, obscuring the very view that millions of tourists flock there every year to see.

The suspicion was that new high-rise buildings were altering airflow patterns, contributing to a higher, thicker mist plume.

Consultants conducted wind tunnel experiments that seemed to confirm that mist levels were enhanced by the tall buildings around the falls, a report that circulated in the Canadian news media.

Now University at Buffalo geologists have determined that the high-rise hotels are probably not to blame.

"According to our findings, it is unlikely that the buildings at the falls enhance the mist," said Marcus Bursik, Ph.D., professor in the Department of Geology in the UB College of Arts and Sciences, who led the study with several students who were investigating the plume for their graduate-degree projects. "Rather, our data show that it's air and water temperature that control the amount of mist.

"It turns out that the bigger the temperature difference between the air and the water, the higher and more substantial is the mist plume and the thicker is the mist at the Falls," he continued.

Bursik, a volcanologist who has studied atmospheric plumes at volcanoes, noted that plumes, regardless of their origin, have common features.

He was motivated to study the Niagara Falls plume back in 2002.

"I started wondering why the plume rose to different heights on different days," said Bursik, who often can see the plume from his building on the University at Buffalo's North (Amherst) Campus about 20 miles away.

According to the data the UB researchers gathered, the plume is highest during times of the year when the water temperature is higher than the

air temperature, which typically occurs during fall and winter.

Bursik explained that in late autumn, even when the air temperature can fall to about 40 or 30 degrees Fahrenheit, the water still remains quite warm, as high as 60 degrees Fahrenheit, conditions that are ideal for a large, high plume.

During the winter, he continued, the temperature of the water remains at 32 degrees Fahrenheit because it is constantly flowing, but the air temperature will plunge by twenty or thirty degrees or more.

"Those temperature differences create more mist flow and a higher plume," said Bursik.

The perception that there have been more misty days in recent years may just be related to temperature trends, he noted.

Using a portable weather station adapted for a backpack, a UB student measured windspeed at the falls to establish airflow and windflow patterns.

Calculations also were made using ambient atmospheric temperature and river-water temperature to make a prediction for the height of the mist plume.

Actual plume height then was measured on different days using the Skylon Tower as a reference point.

"The predicted and measured plume heights matched well, consistent with the notion that the plume is just higher and thicker when the temperature difference is bigger," said Bursik.

The researchers will present their findings at UB's annual Environment

and Society Institute Colloquium on April 21. Findings also were presented during the 36th Binghamton Geomorphology Symposium held at UB last October.

Source: University at Buffalo