Characterizing atmospheric sulphur in eastern Newfoundland using lichens and rain

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Epiphytic lichens are useful for atmospheric monitoring as they provide an indirect method of measuring levels of atmospheric pollution. They are particularly sensitive to SO_2 and metals. These pollutants can also be measured directly through method of precipitation collection. Stable isotopes are measured in combination with the chemical data to trace specific sources of sulphur to the atmosphere.

By analyzing both types of samples from the same area it will be possible to assess the degree to which they provide the same chemical information about the atmosphere.

The area of study spans from Bonavista to the Isthmus of the Avalon in Newfoundland. Bonavista represents a coastal area remote from industrial development, whereas the isthmus of the Avalon is the site of two industries, Come by Chance oil refinery and the Hibernia GBS construction.

Samples were analyzed for SO_4^{2-}, Cl-, and NO_3-. Sulphate was then extracted from the samples and analyzed for its S-isotopic composition. The rain samples were measured by pH, conductivity, and trace metals. Values of pH range from 3.97 to 5.36 with a mean of 4.77, below the pH of unpolluted rain (5.5). Conductivity ranged from 13.9 to 162.6 with a mean of 55.46 µs/cm.

Preliminary results show that the ^{34}S values have a large range from 14.07 to 4.98 ‰. Samples from Bonavista have the highest values whereas Come By Chance has lower values. This suggests that the study area is influenced by both marine (high values) and continental sources (lower values) with the possibility of anthropogenic influence near Come By Chance.