Measuring the Concentration of Anions in Aqueous Samples by Ion Chromatography

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NATIONAL MAGLAB

Introduction

•Ion Chromatography (IC) is used to quantify the concentrations of ions in a sample
•It is applied to Environmental Science in the determination of anions in aqueous samples
Goal: To detect the anions chloride, nitrate and sulfate and determine their concentration in each sample

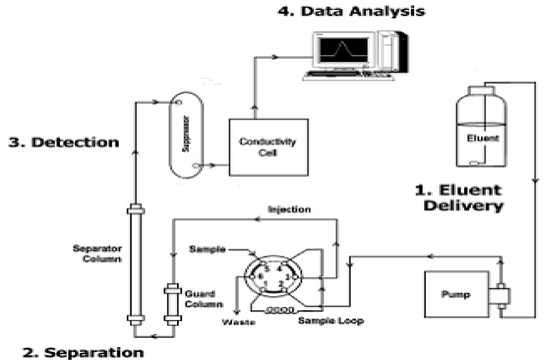
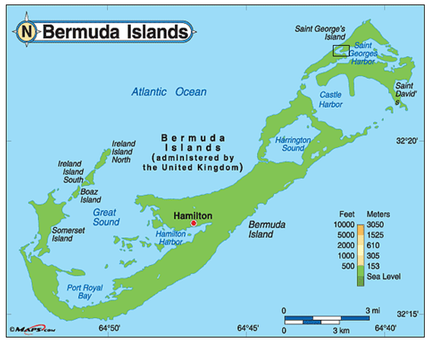


Figure: Diagram of an Ion Chromatograph

Sample Locations



Bermuda

Florida Keys

Sample Collection

Figure: Aerosol Samplers

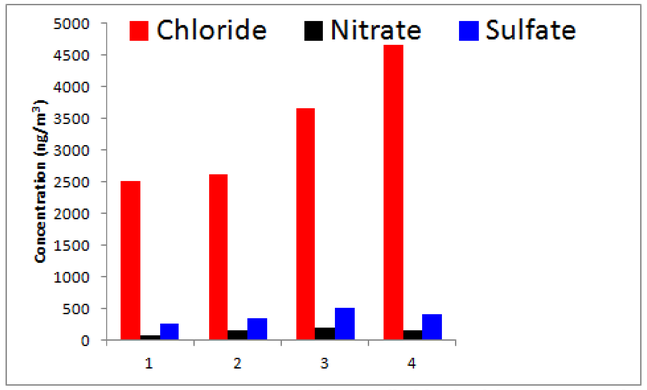
•Samples were collected using high-volume aerosol samplers

Sample Analysis

1. Aerosol filters were leached with 100 mL of ultra high purity (UHP) water (>18 MΩ*cm) – instantaneous leach
2. 4500i Dionex Ion Chromatograph utilized.
3. Concentrations of anions were measured

Results

Florida Keys



The anions, chloride, nitrate, and sulfate at both locations were compared

Bermuda

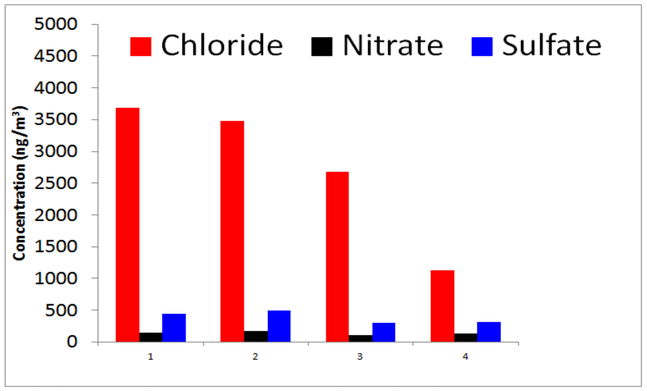
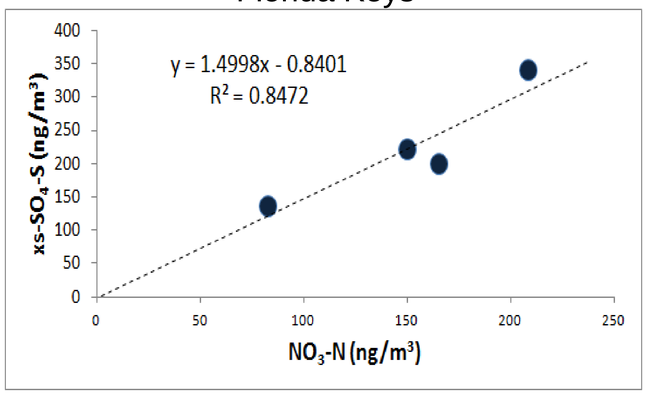


Figure: (left) Florida Keys total concentration of anions. (right) Bermuda total concentration of anions

Florida Keys



Total sulfate and chloride concentrations were used to calculate excess (xs) sulfate

Bermuda

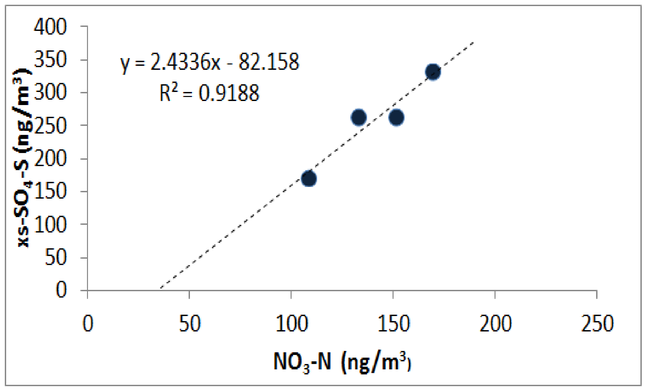
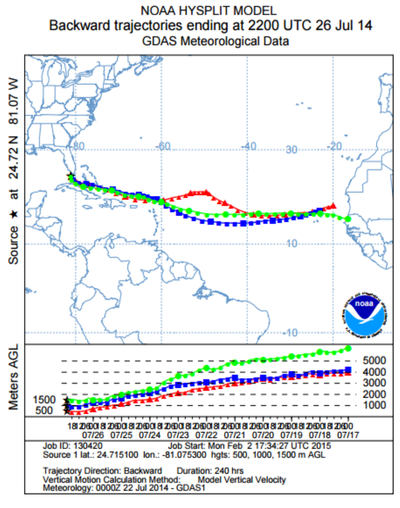


Figure: (left) Florida Keys excess sulfate vs. nitrate. (right) Bermuda excess sulfate vs. nitrate

Origin of Aerosol



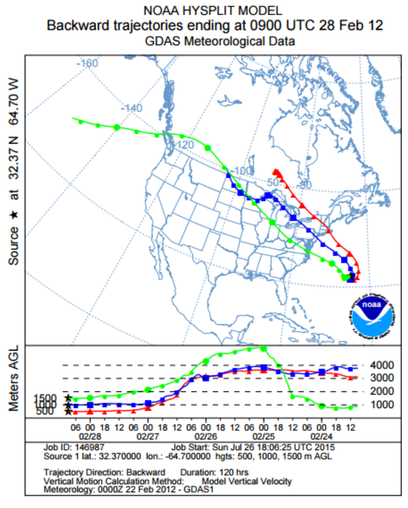


Figure: (left) Florida Keys back trajectory. (right) Bermuda back trajectory

HYSPLIT was used to model air mass back trajectories for a Florida Keys aerosol sample and a Bermuda aerosol sample. http://ready.arl.noaa.gov/HYSPLIT.php

Conclusion

•Excess sulfate displays a positive correlation with nitrate
•Aerosol nitrate and xs-sulfate both produced by fossil fuel burning
•Florida Keys back trajectory from Africa
•Bermuda back trajectory from North America

Acknowledgements

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References

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