

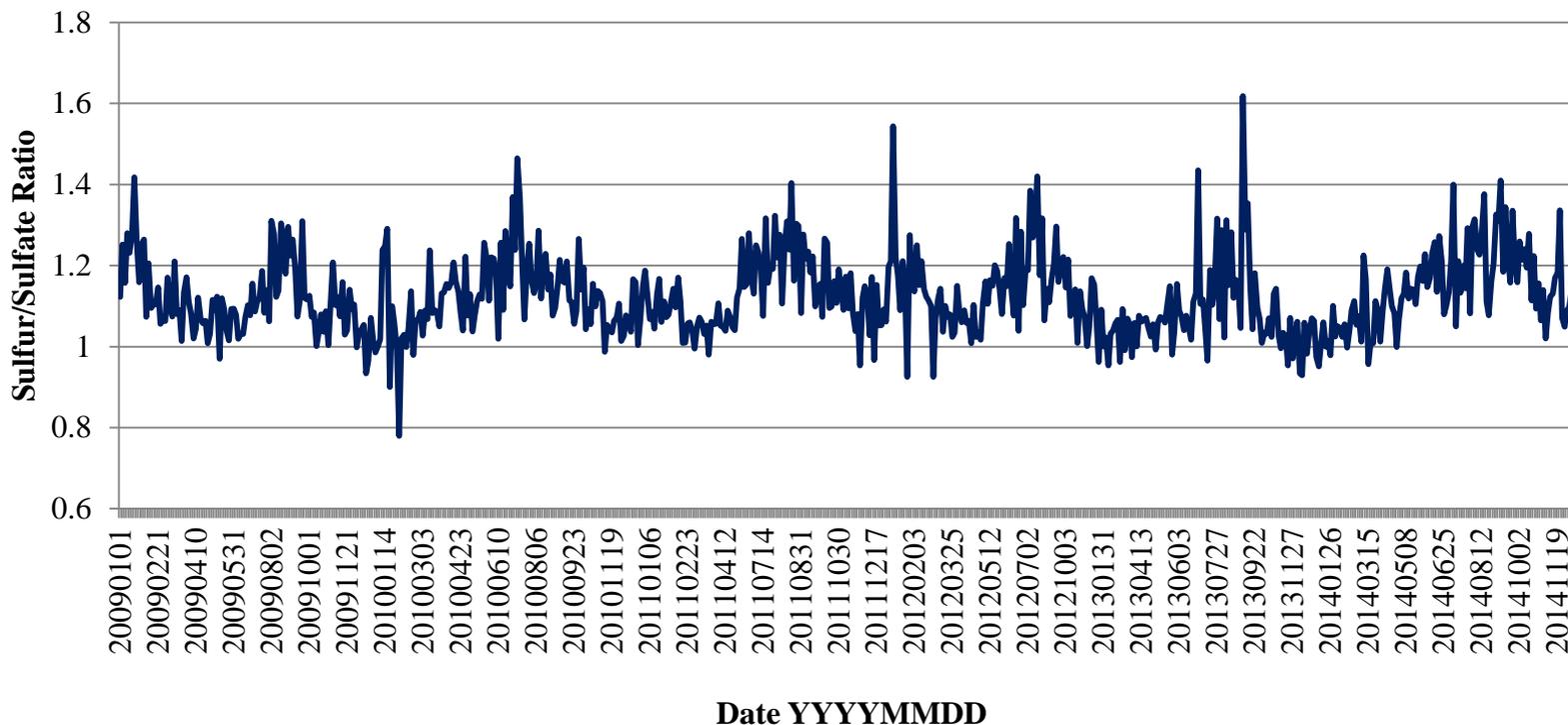


# IMPROVE Steering Committee Meeting Ely Minnesota 2017

Sulfur: Inorganic sulfate Ratios

Acknowledge  
Eric Poitras and Ellen Colclough

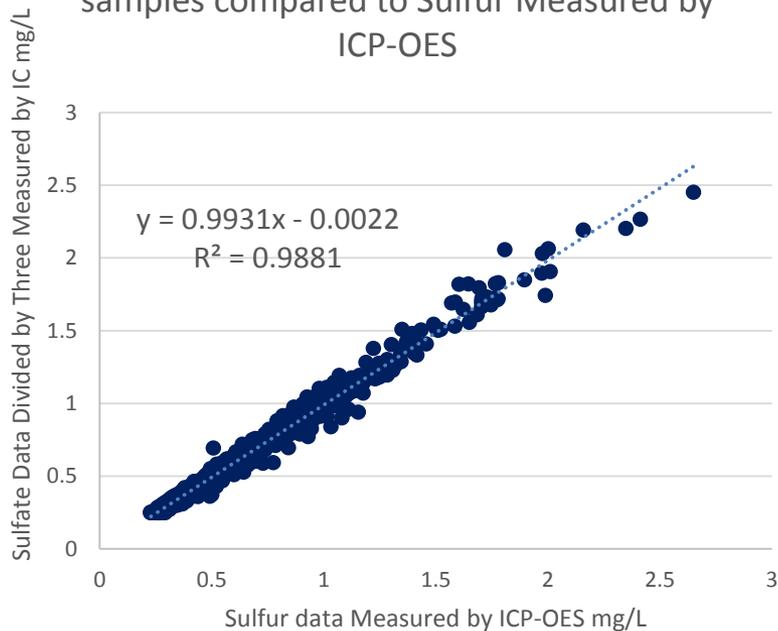
# IMPROVE Sulfur:Sulfate Ratios 2009-2014



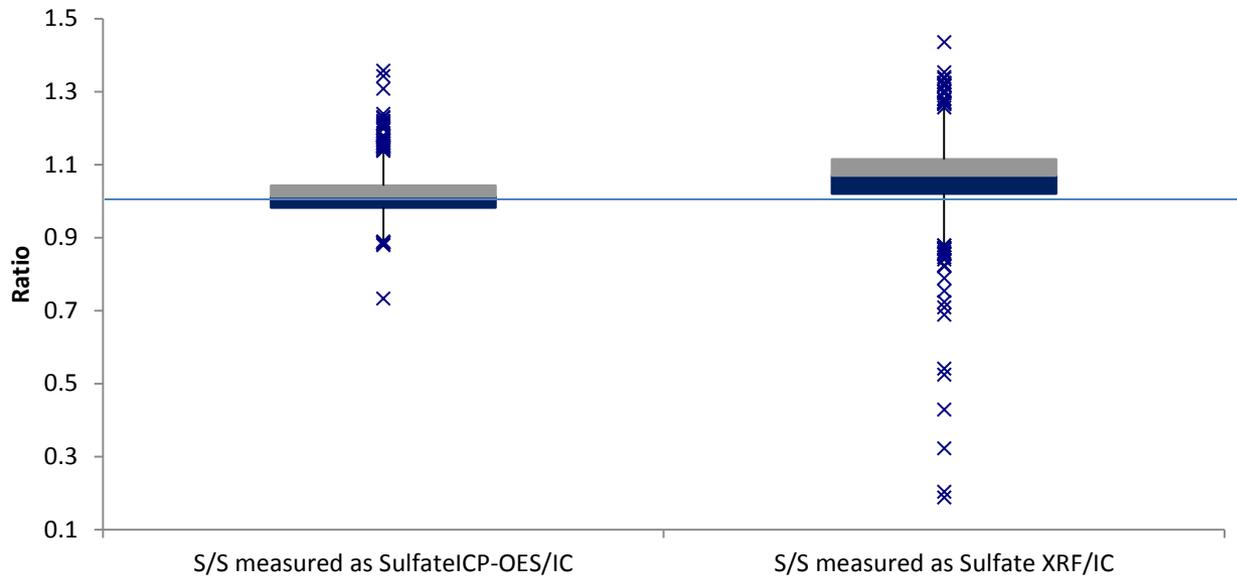
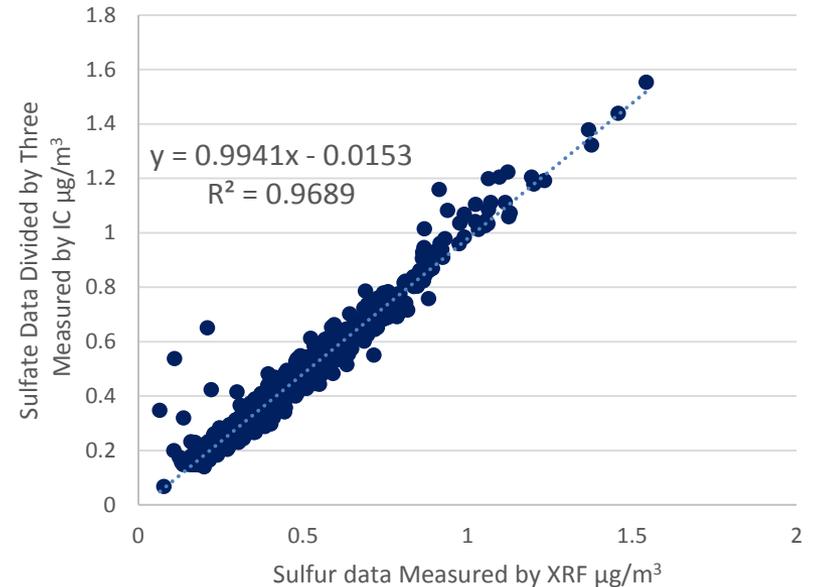
# Method

- Analyzed 2016 IMPROVE filter samples by ICP-OES method.
- Used same standards and QC checks that were used on the IC instruments.
- Compared sulfur determined by ICP-OES to inorganic sulfur to evaluate differences
- *Inorganic Sulfur as Sulfate*  $\frac{\frac{[sulfate]mg}{L} \text{ measured by IC}}{3}$

Sulfate data measured in IMPROVE samples compared to Sulfur Measured by ICP-OES



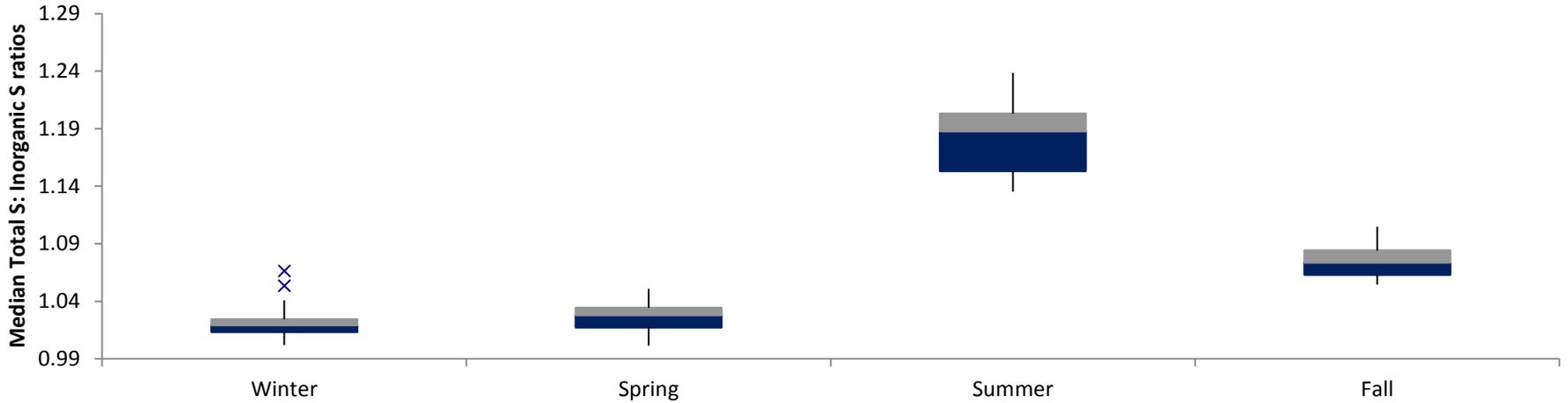
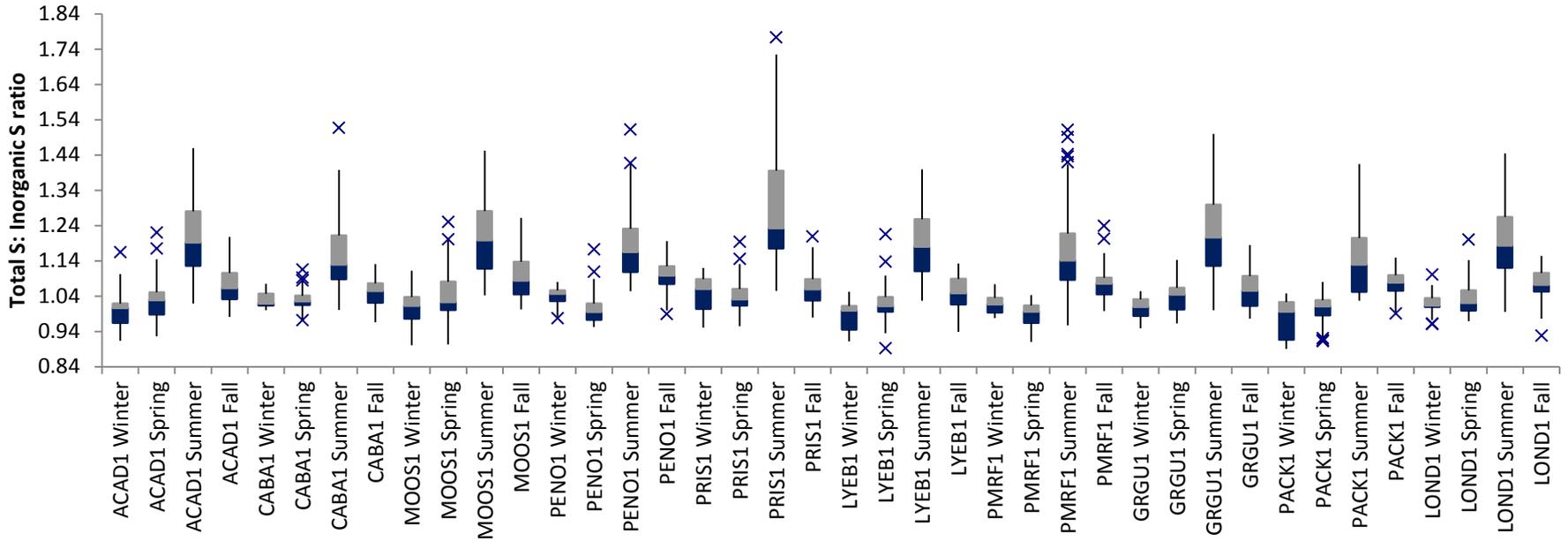
Data Reported by IMPROVE Network from January through March of 2016



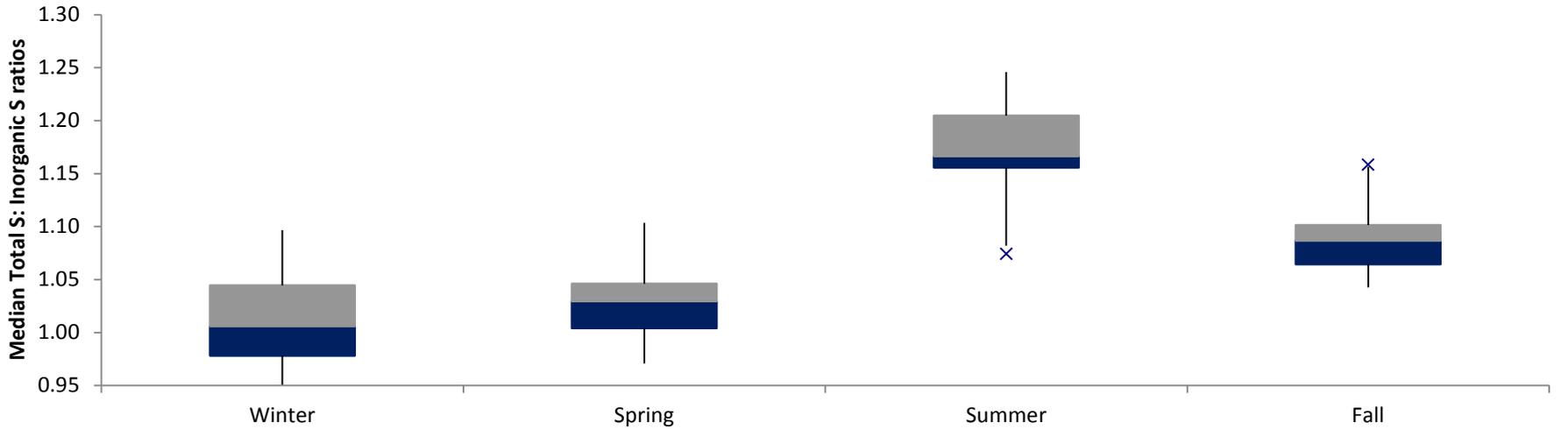
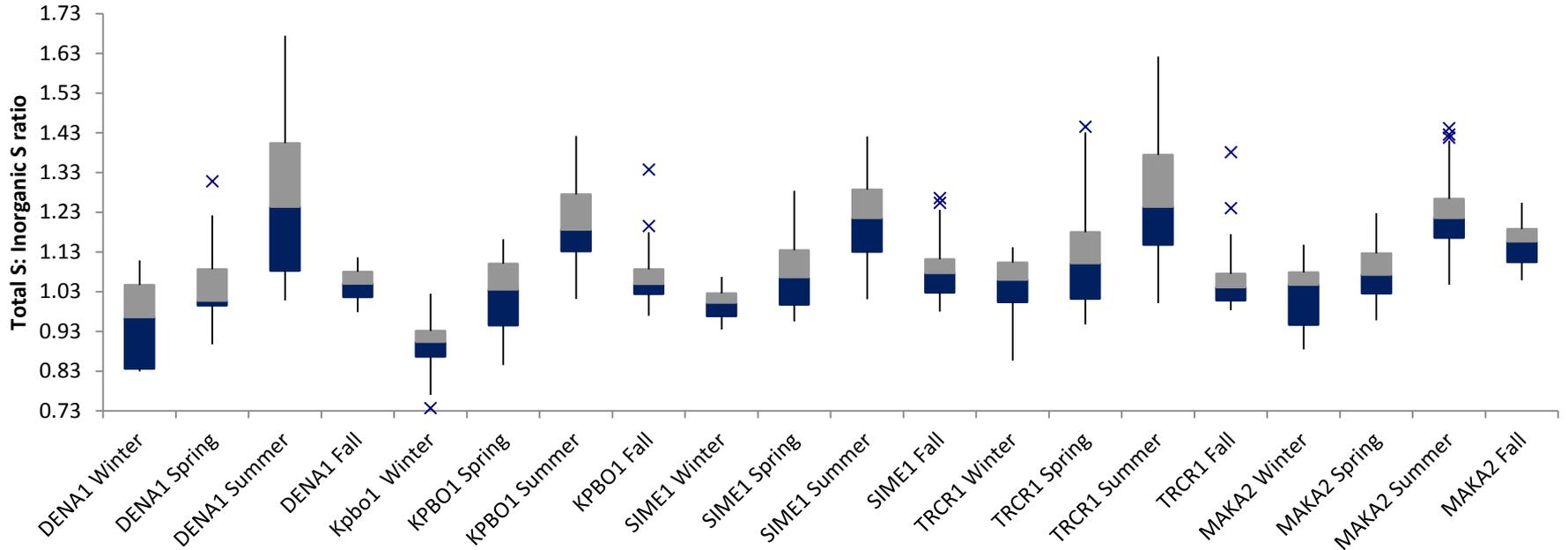
# QC recoveries

Quality Control Solutions	Range of Percent Recovery for Sulfate	Average Percent Recovery for Sulfate	Range of Percent Recovery for Sulfur	Average Percent Recovery for Sulfur
1.20 ppm sulfate	94.3 – 109	98.2	86.0 – 108	96.2
3.00 ppm sulfate	93.4 – 104	99.3	85.2 – 105	95.6
6.00 ppm sulfate	95.5 – 108	99.9	88.3 – 105	97.0

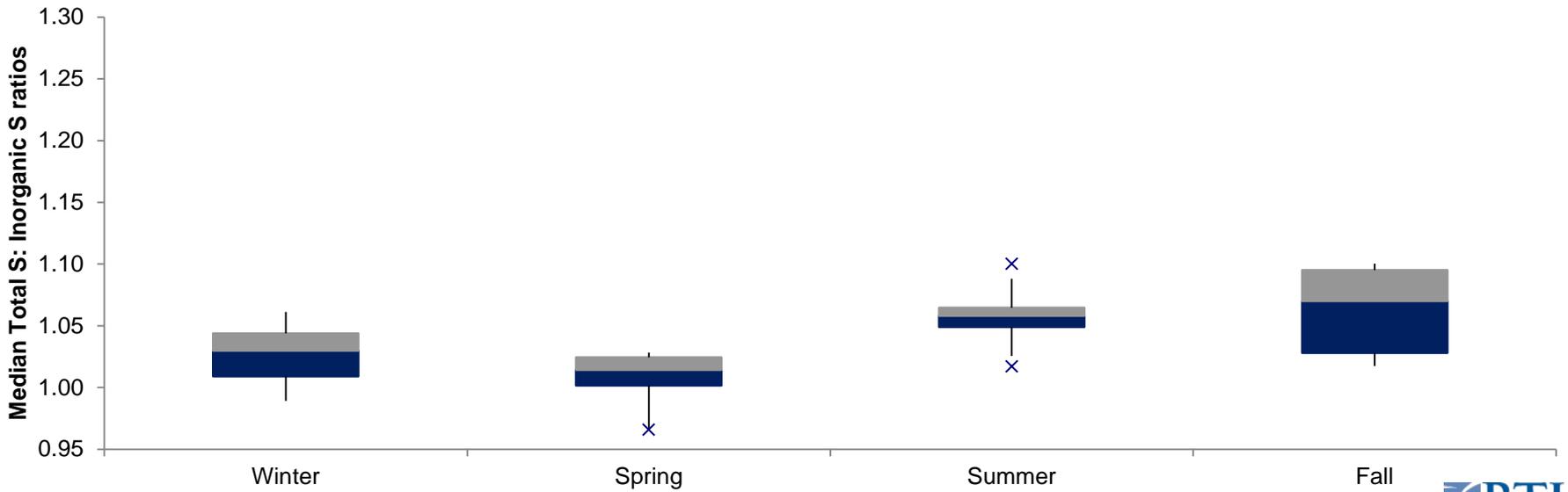
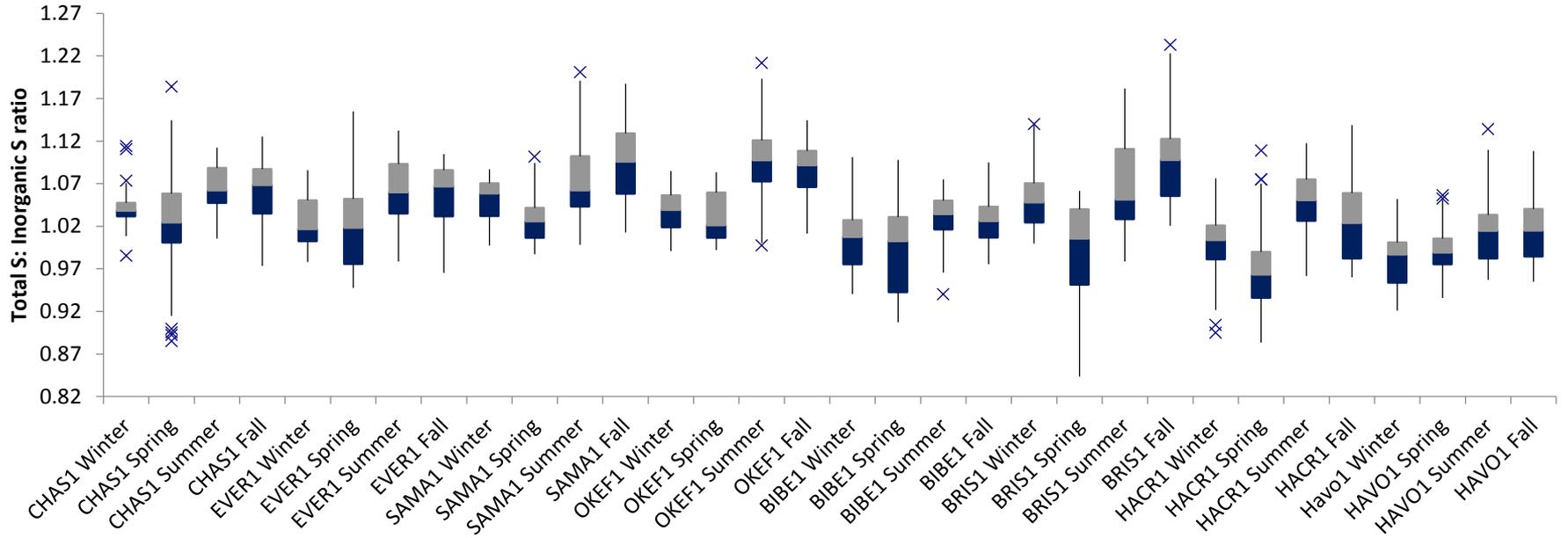
### Northeast Maine, New Hampshire Vermont



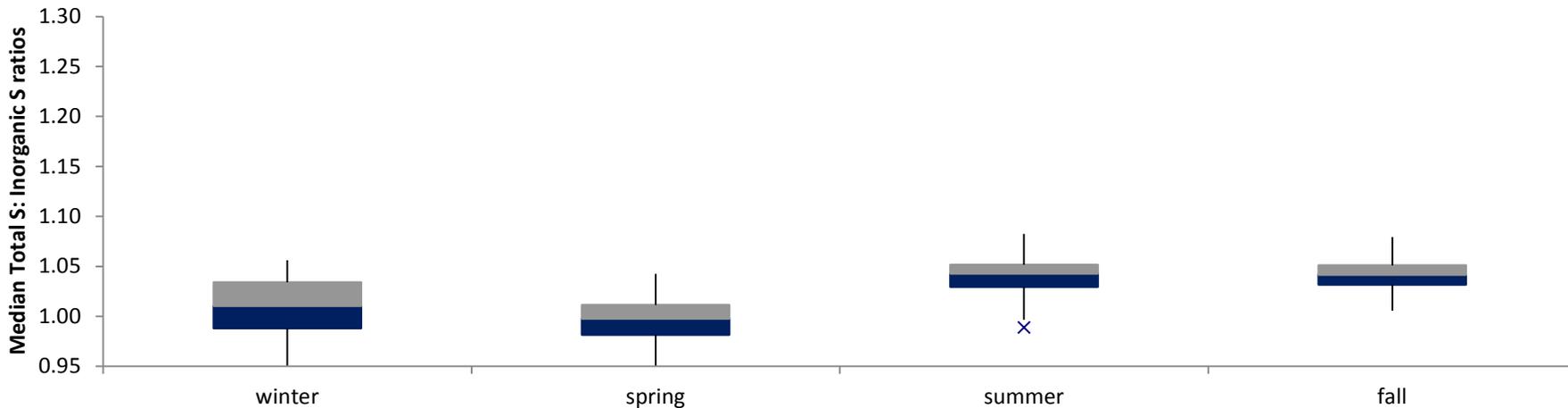
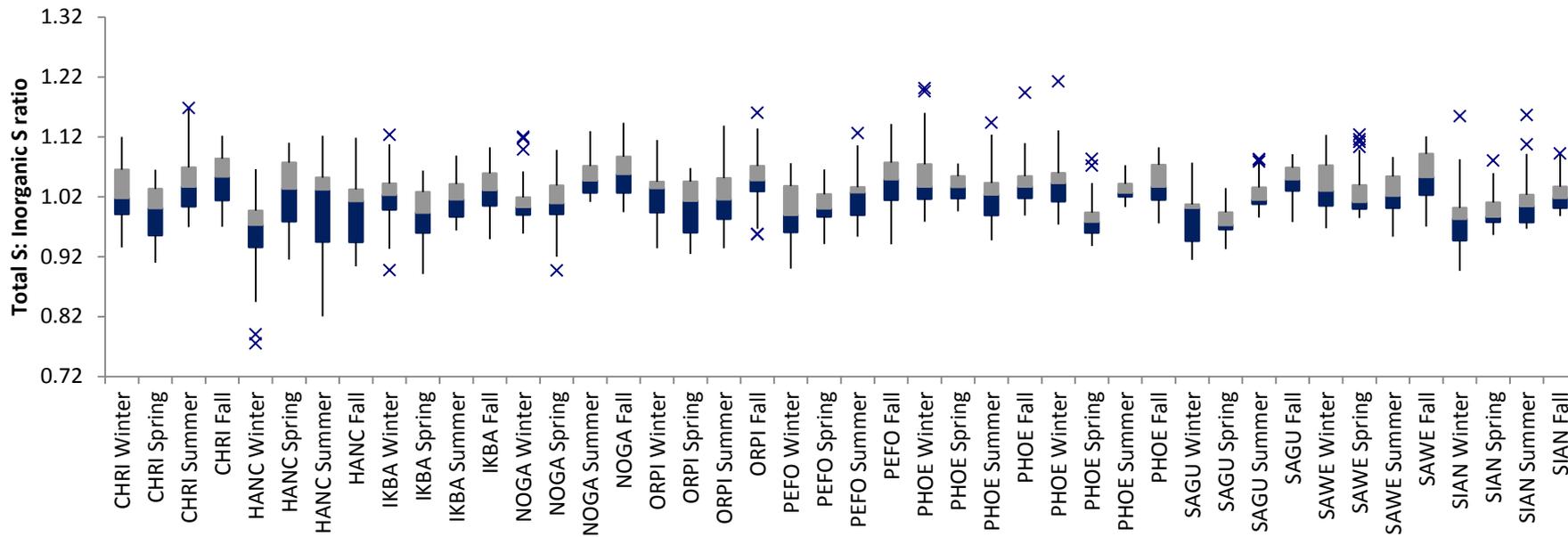
### Northwest Alaska and Washington



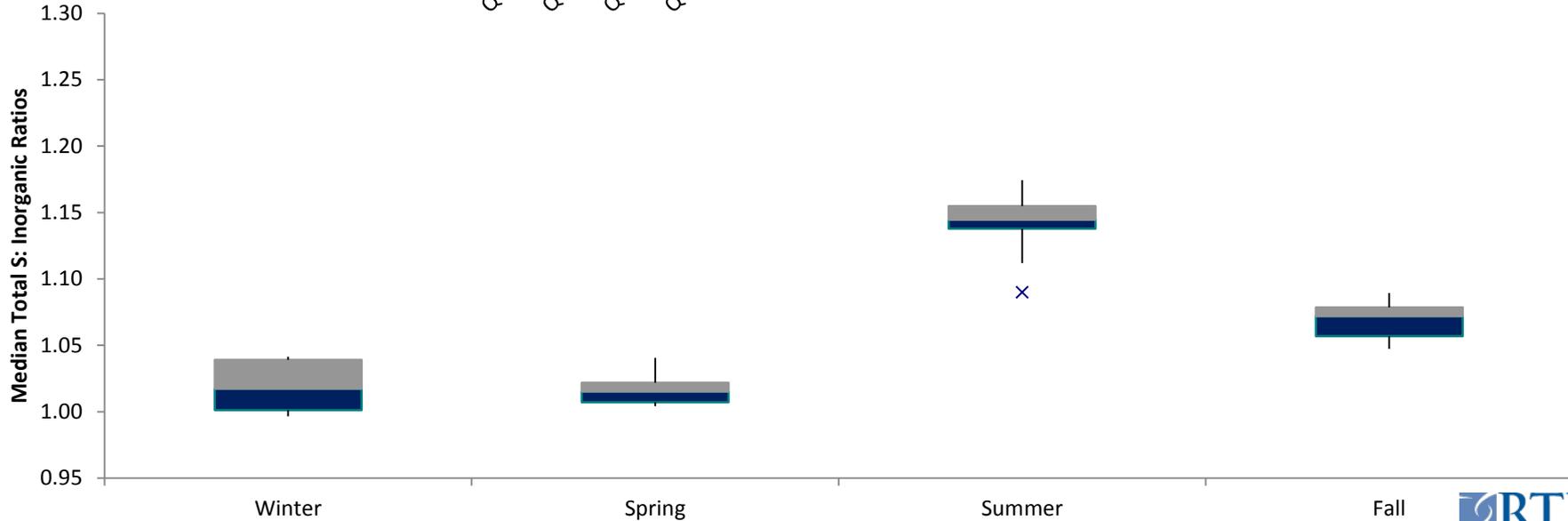
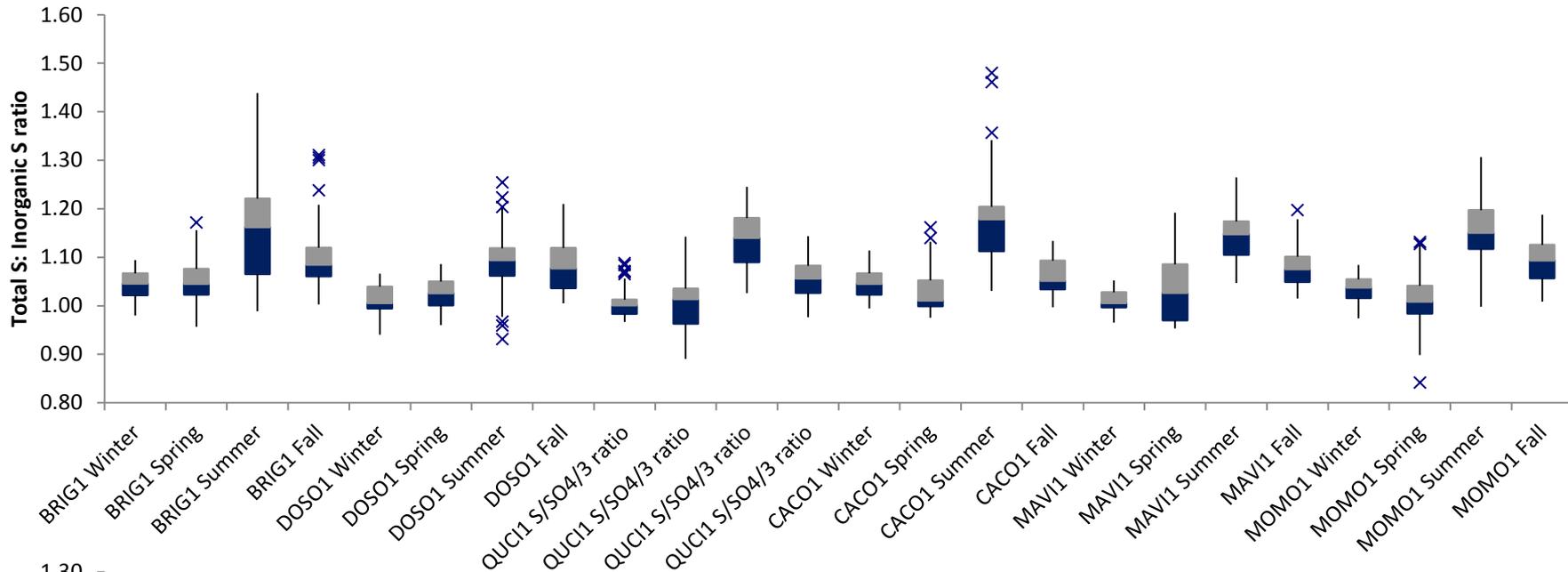
Coastal South Florida, Georgia, Texas, Louisiana, Hawaii



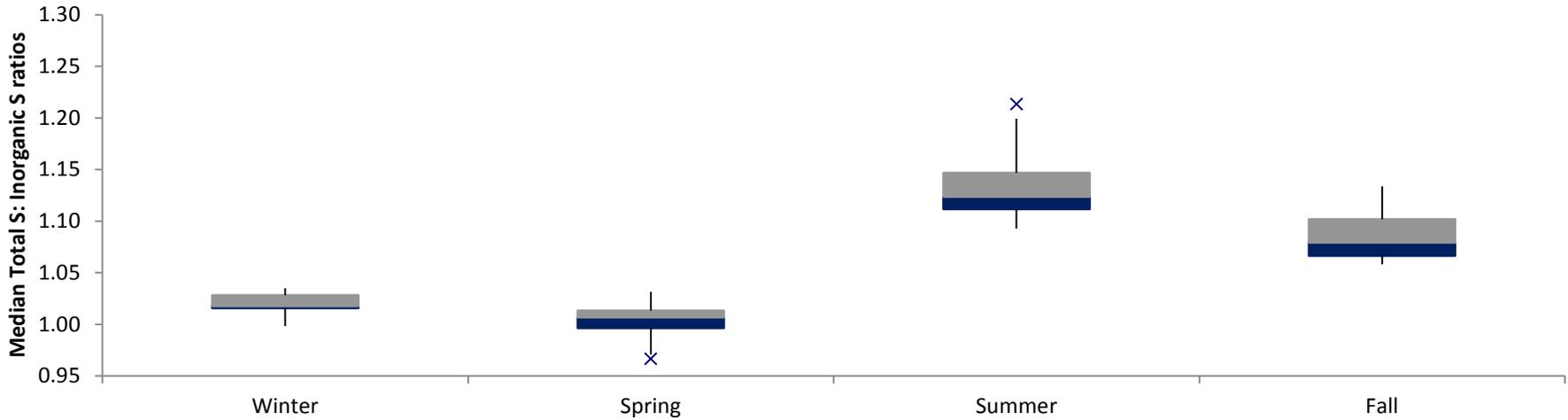
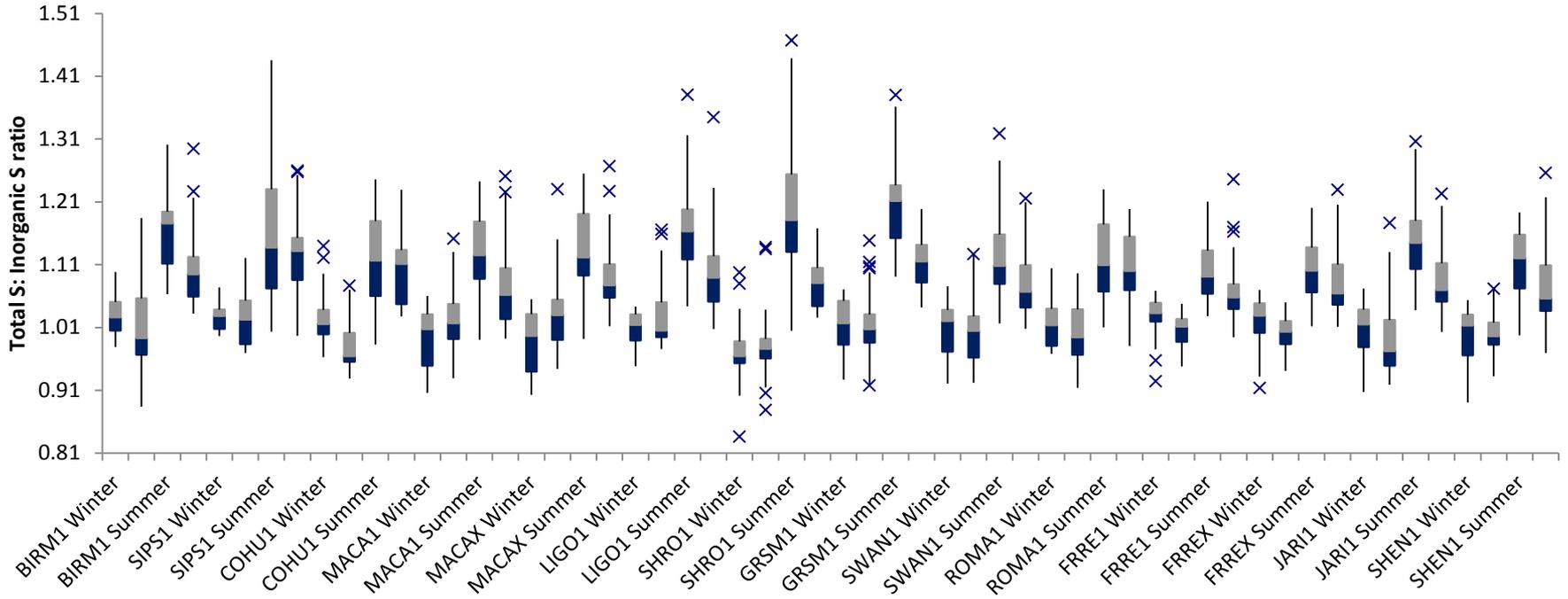
### Southwest Arizona

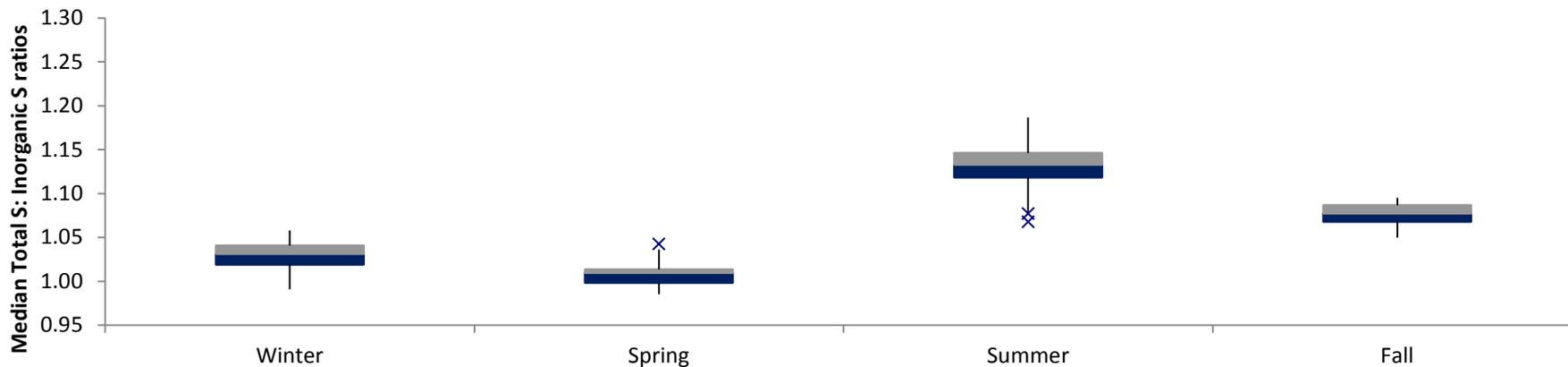
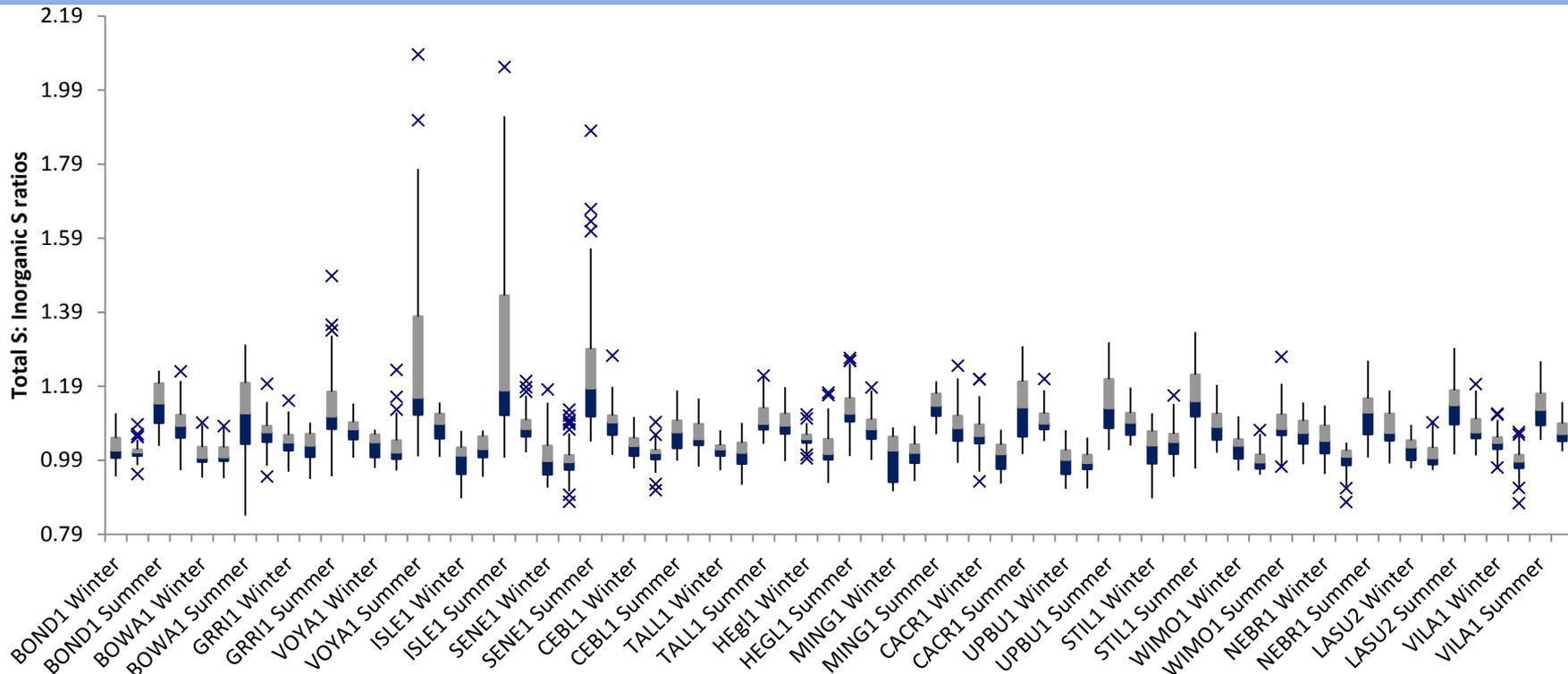


Eastern US Ohio West Virginia, New Jersey, Massachusetts, Connecticut

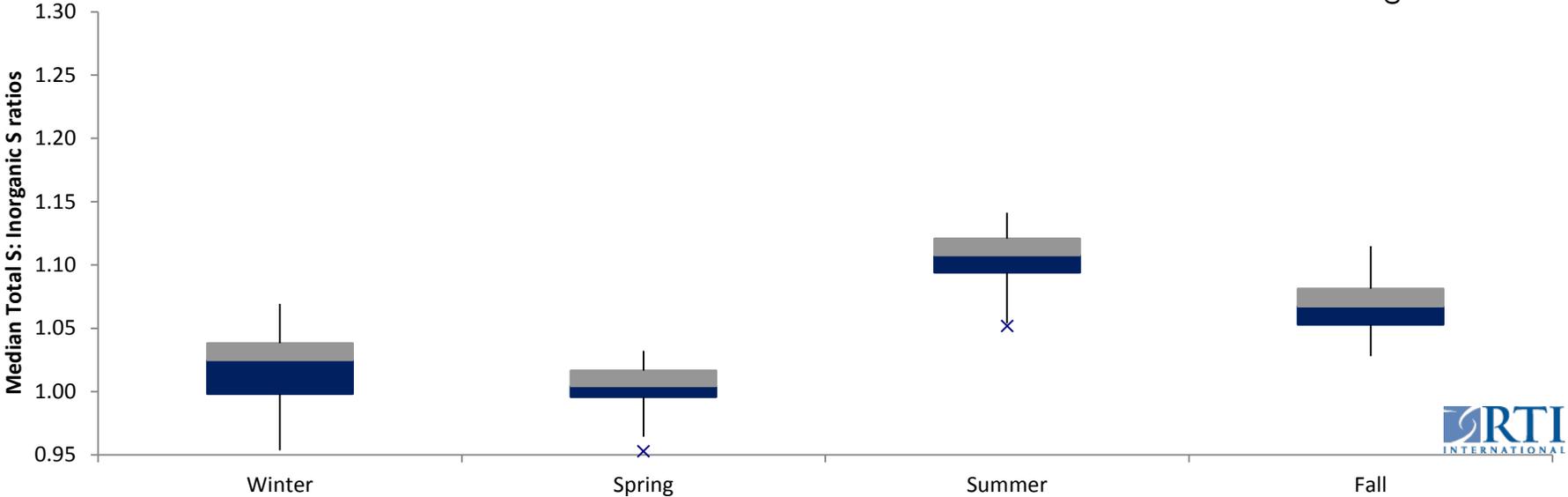
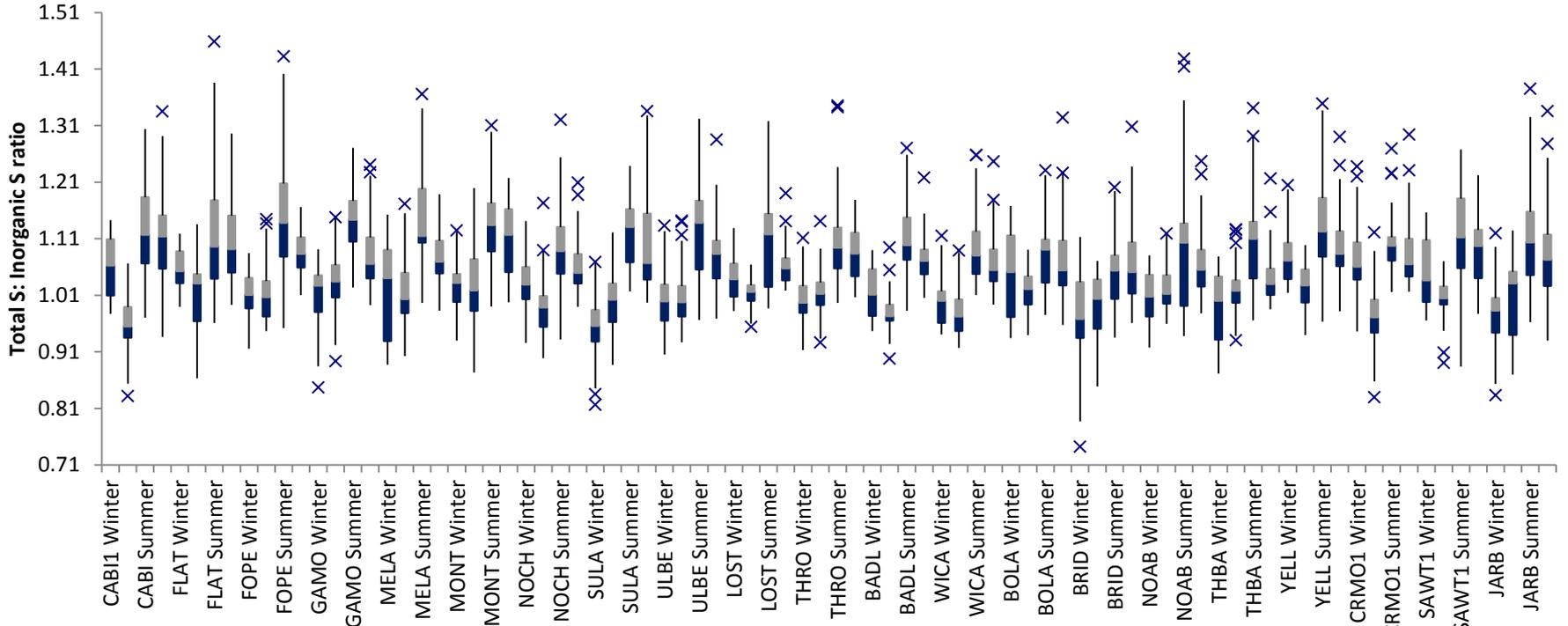


SouthEast Kentucky, Virginia, North and South Carolina, Georgia, Alabama, Maryland and Tennessee





Northern Plains Wyoming, Montana, North Dakota, South Dakota, Idaho, Nevada



## What does this mean and where do they come from?

- We can measure water soluble contributions from organic sulfur species in extracts.
- Interesting to measure the samples using LC/MS technique to potentially identify some of the components present.
- Photooxidation of VOC's released from plants and trees and DMS released from marine sources and plants.

# Discussion

