



Brewer Ozone  
Spectrophotometer  
Ozone Cross-section Issues

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# Brewer Mathematics

- Brewer ozone measurements are based on a differential measurement method using 4 wavelengths

Absorption Function (of intensities on slits 3 to 6):

$$F = -\log(I_3) + 0.5\log(I_4) + 2.2\log(I_5) - 1.7\log(I_6)$$

- High-resolution laboratory cross-sections are used and effective cross-sections determined at each wavelength using accurate dispersion information and measured slit functions (ILS) for each instrument

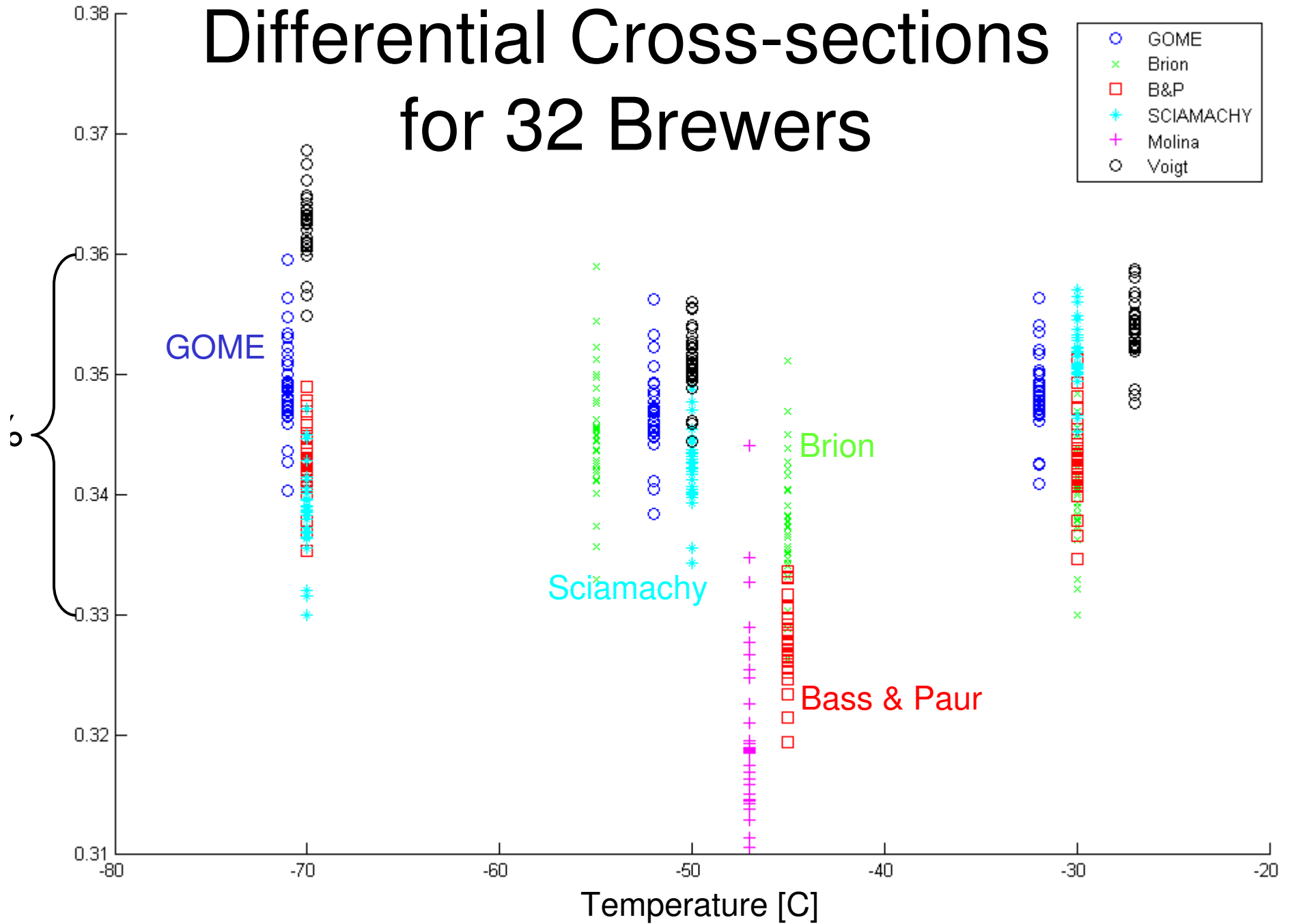
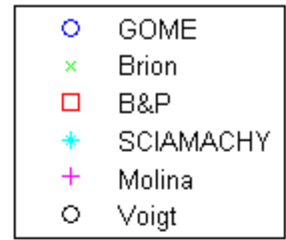
# Different Cross-sections

- Differential cross sections such that:

$$dF/d\text{dozone} = \text{differential cross-section}$$

Were computed using different laboratory data at various temperatures.....

# Differential Cross-sections for 32 Brewers

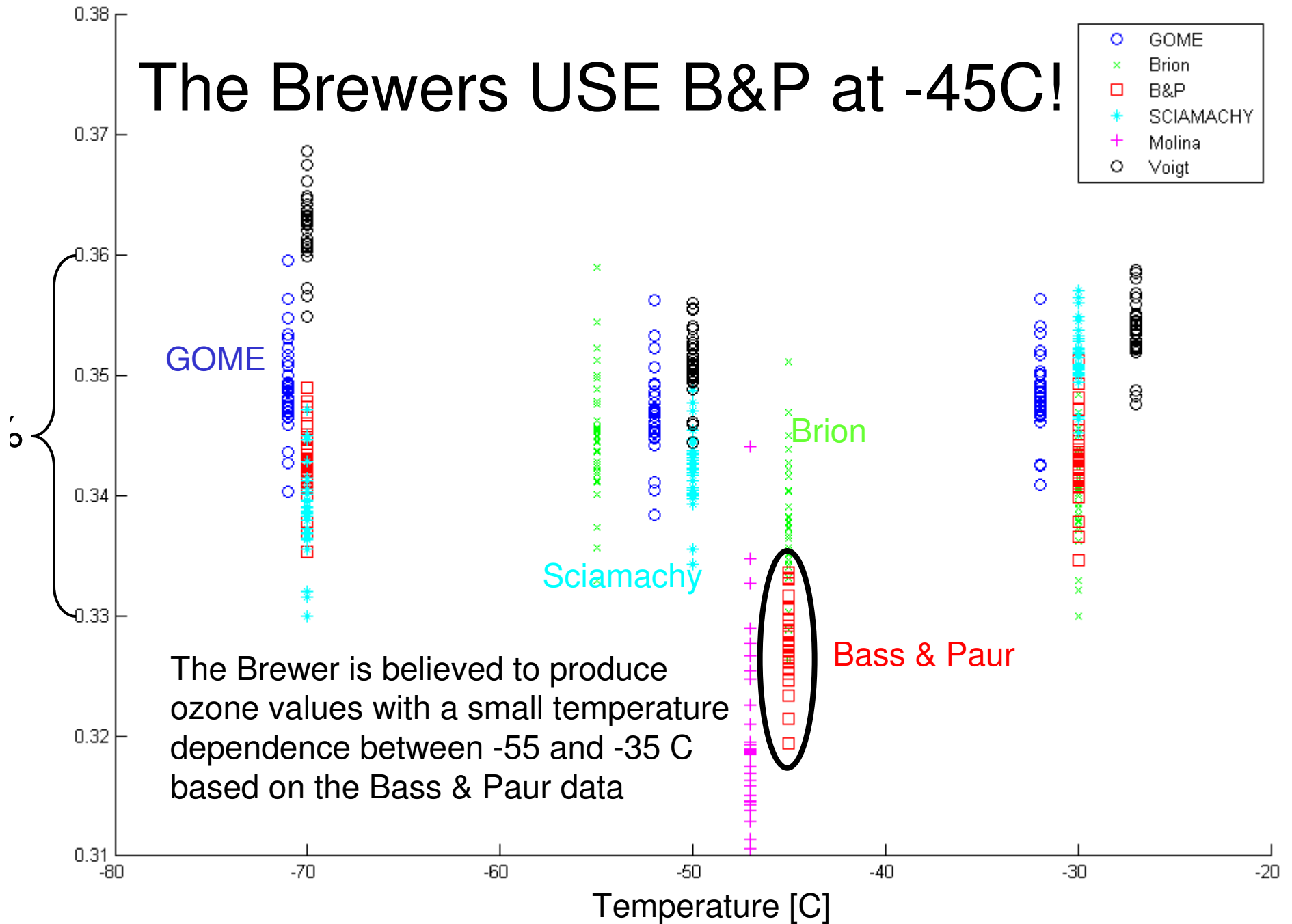


# Impact

- Satellites determine the ozone profile including the height-dependent effects of temperature on apparent absorption
- Columns are summed up from these data
- Ground-based UV instruments directly infer a total column ozone
- If the differential cross-section as zero temperature coefficient the results will be temperature independent



# The Brewers USE B&P at -45C!



# Agreement?

- Some satellite data agree well with the Brewer data over a range of latitudes
- But the cross-sections are different – the Brewer uses Bass & Paur (-45 C) currently
- Satellite data may have been inadvertently ‘tuned’ to agree in the quest for better data
- Also, there are systematic errors in both single Brewer data and Dobson data at large slant column amounts (e.g.: high latitude, winter) because of instrumental stray light

# Conclusion

- At this time it is not clear what cross-sections should be chosen
- Very high spectral resolution is an advantage to bring together satellites, ground based and Lidar measurements
- It is difficult, experimentally, to collect absolute cross-section data that can be rationed with the accuracy needed to define consistent differential cross-sections with the required accuracy





The End  
Thank you...