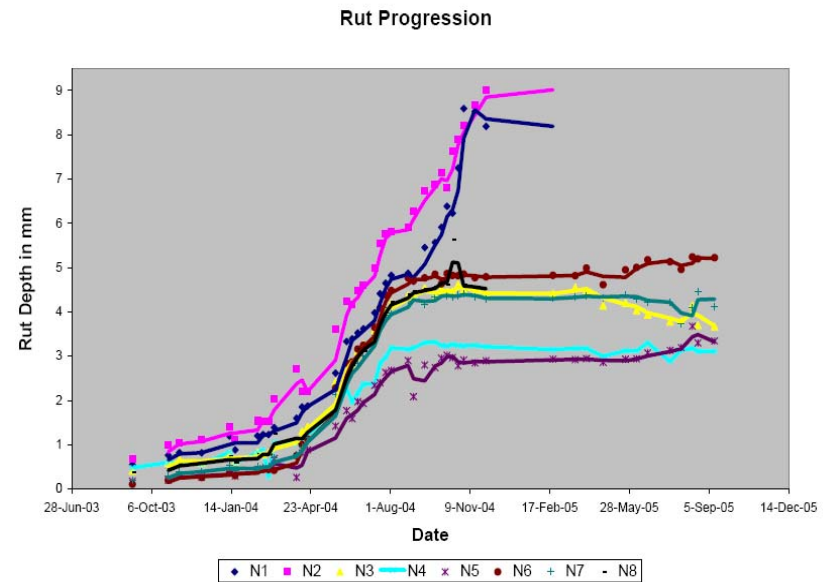
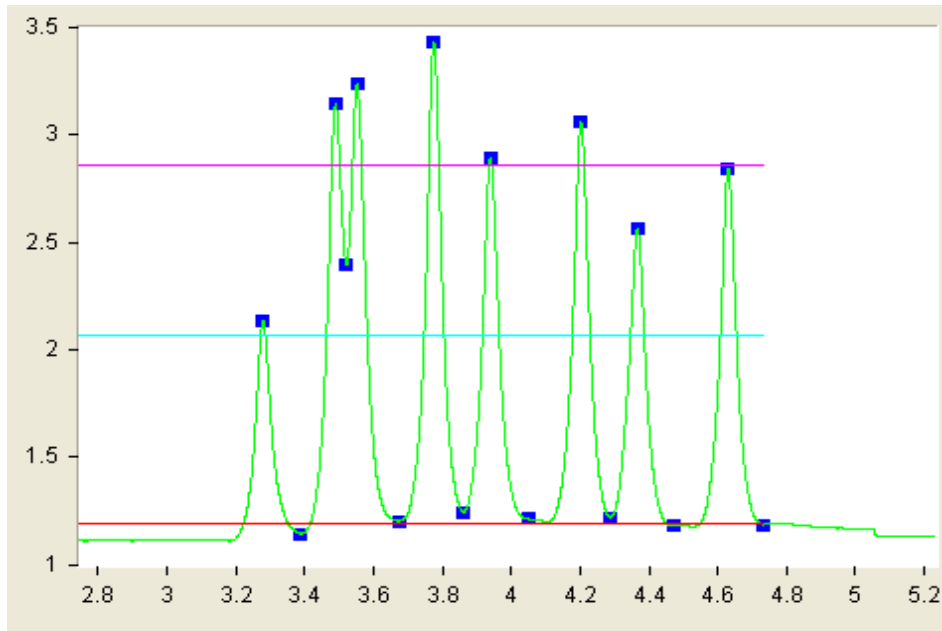
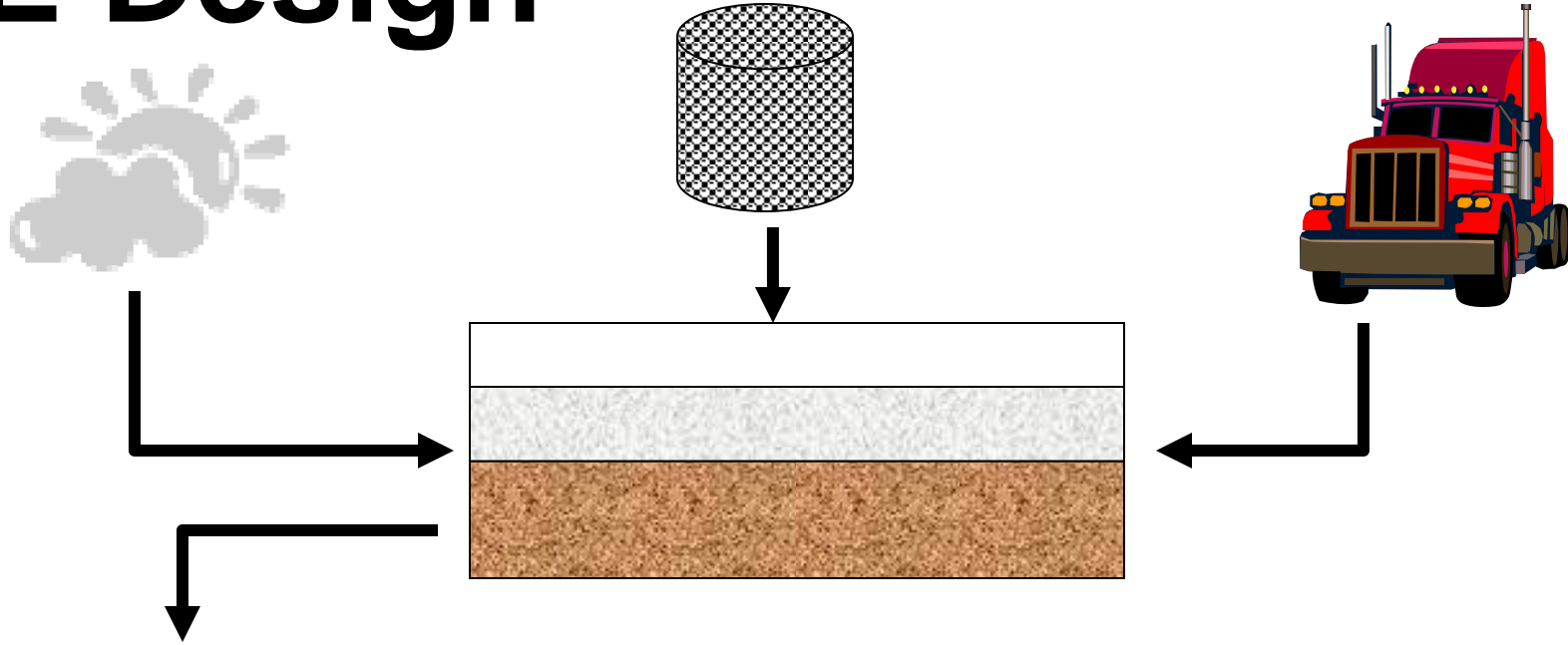


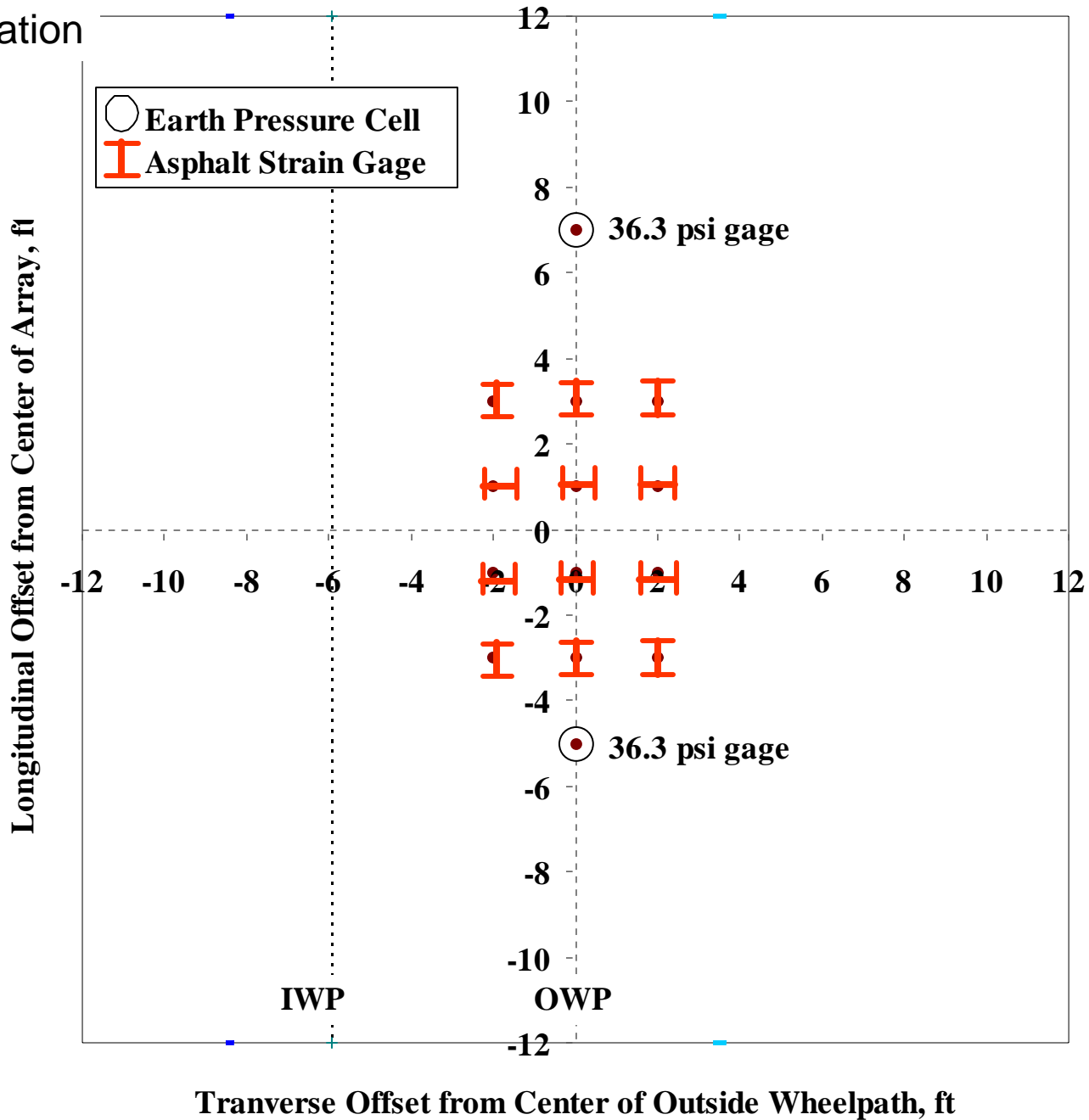


Pavement Responses Under Load
Test Track Sponsor Meeting – May 25, 2010

M-E Design



Instrumentation



Data Collection and Processing

46,530 Axle Events in Database

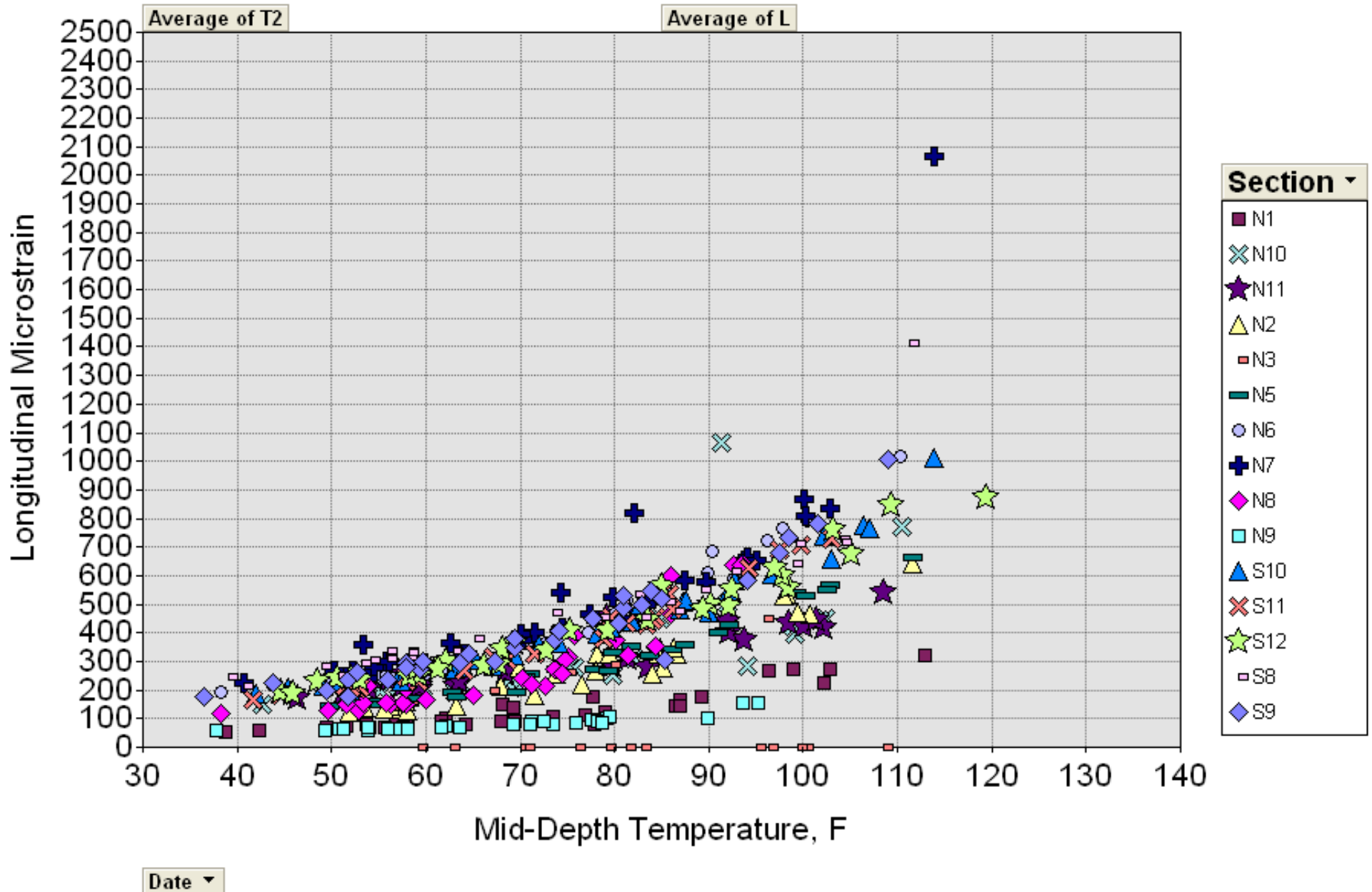
- All sections
- Weekly
- 3 passes of each truck at 45 mph
- Analyze data according to axle type

- Steer (1)
- Tandem (2)
- Single (5)

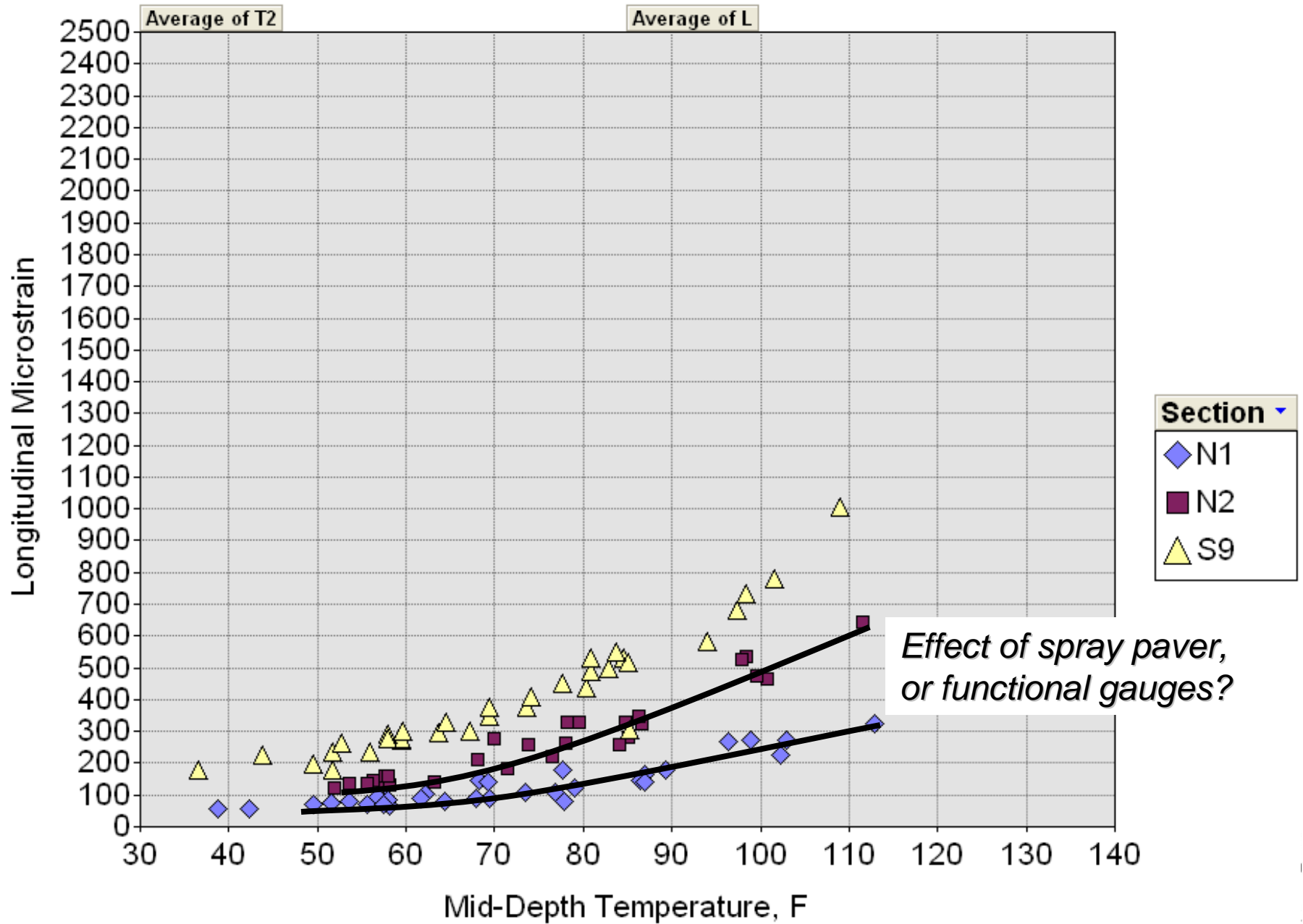


- Determine best hit per pass among working gauges
 - Take 95th percentile of all best hits from all passes
- Record temperature at time of data collection

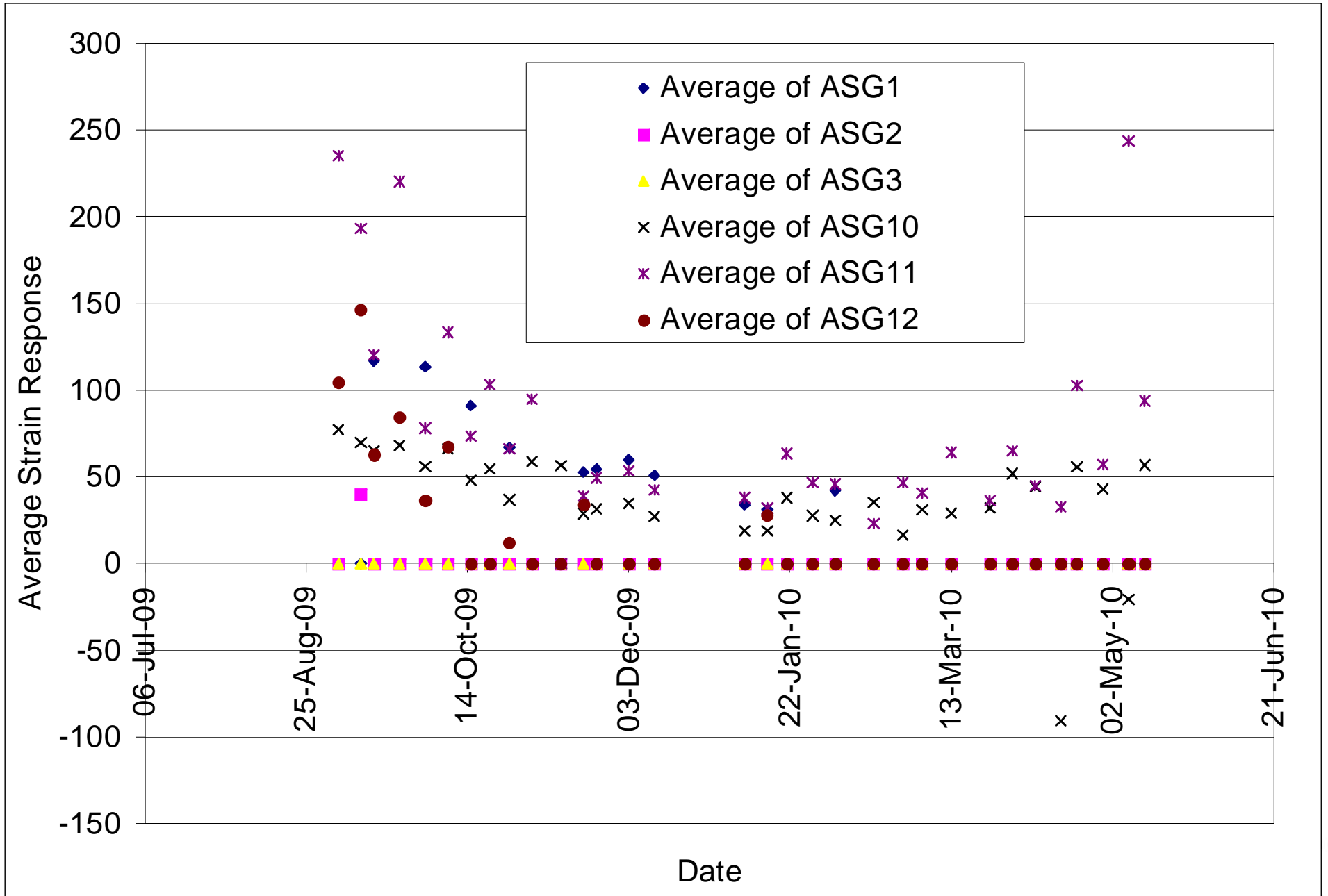
Strain vs Temperature



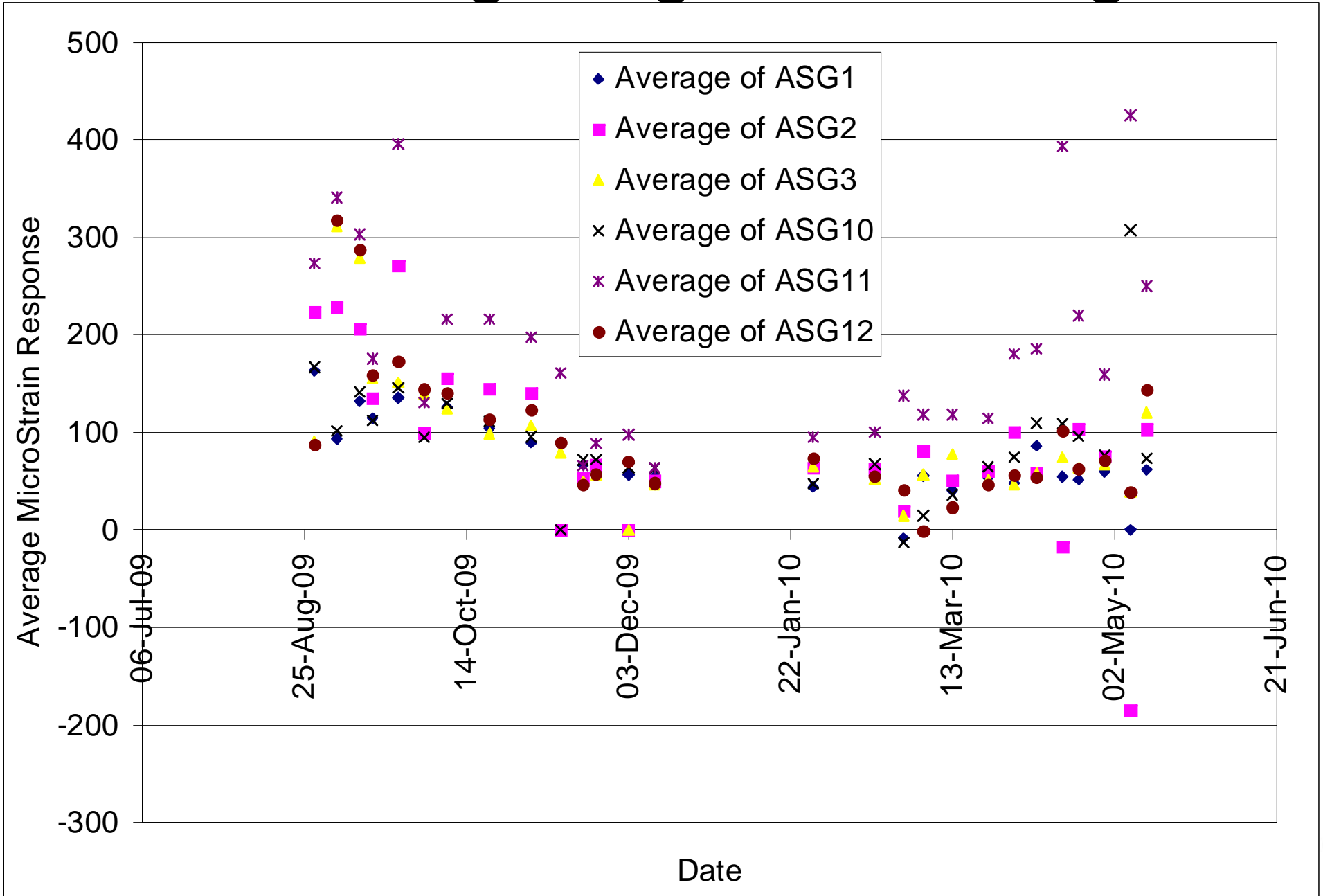
FL (N1 and N2)



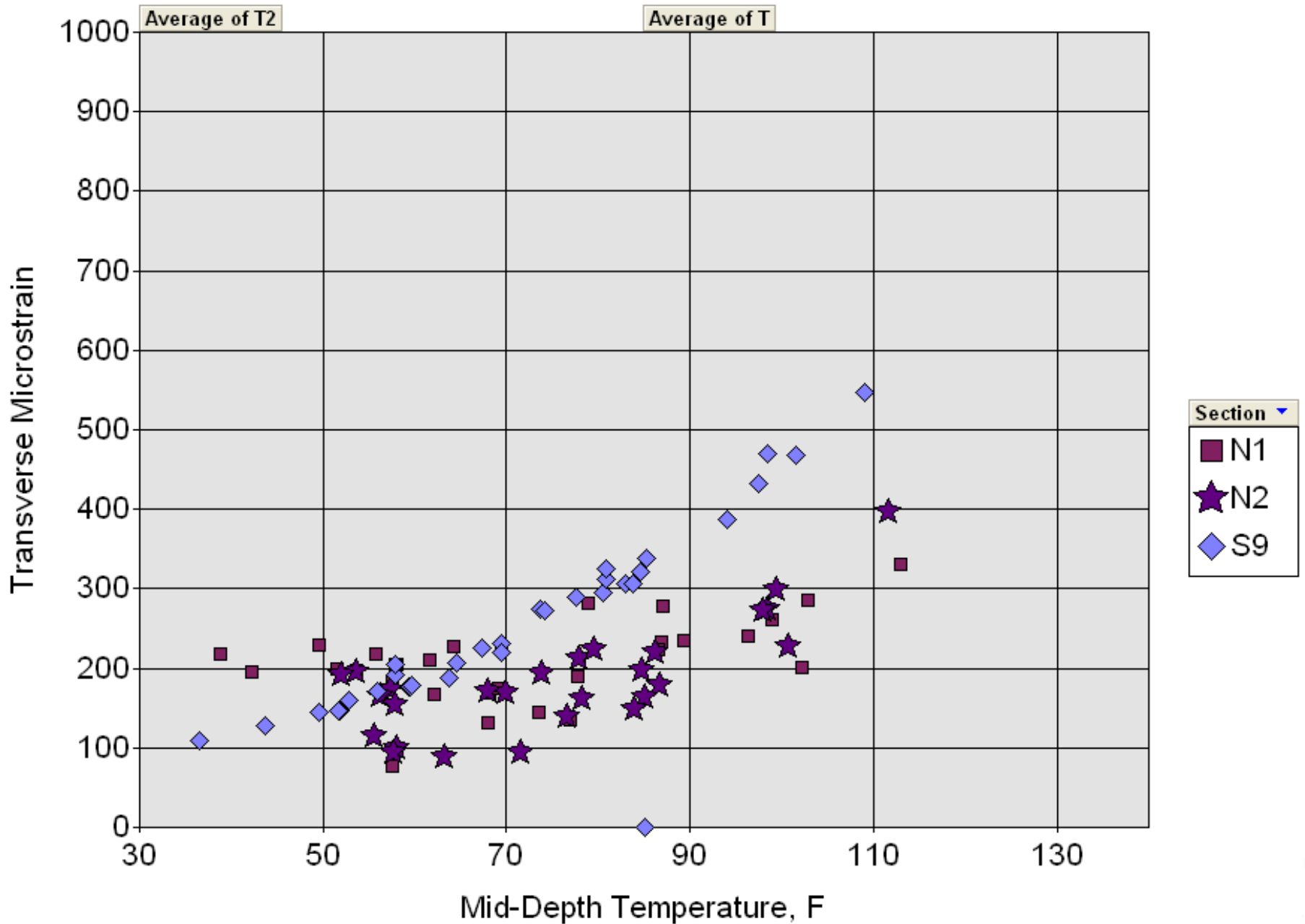
N1-Working Longitudinal Gauges



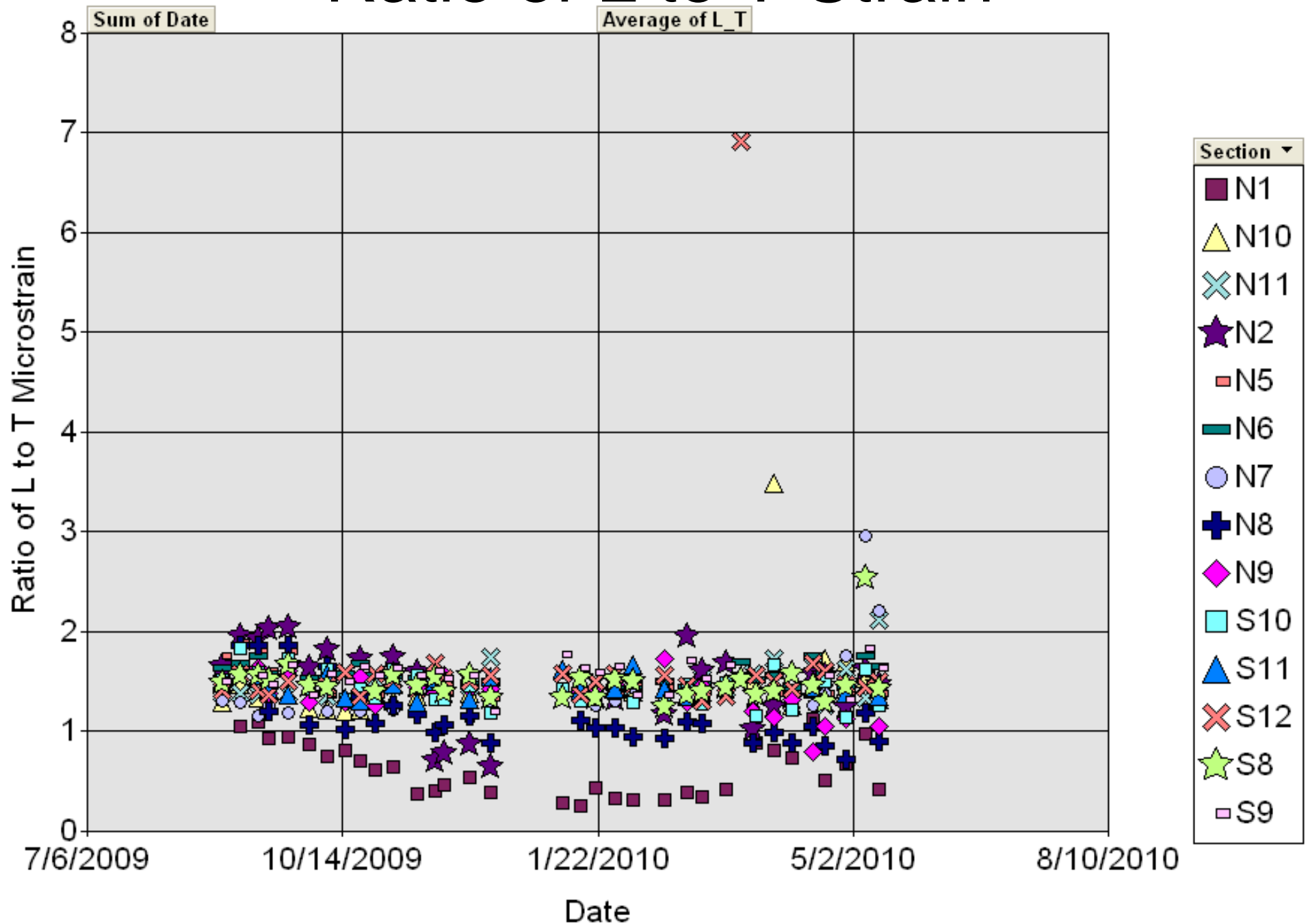
N2-Working Longitudinal Gauges



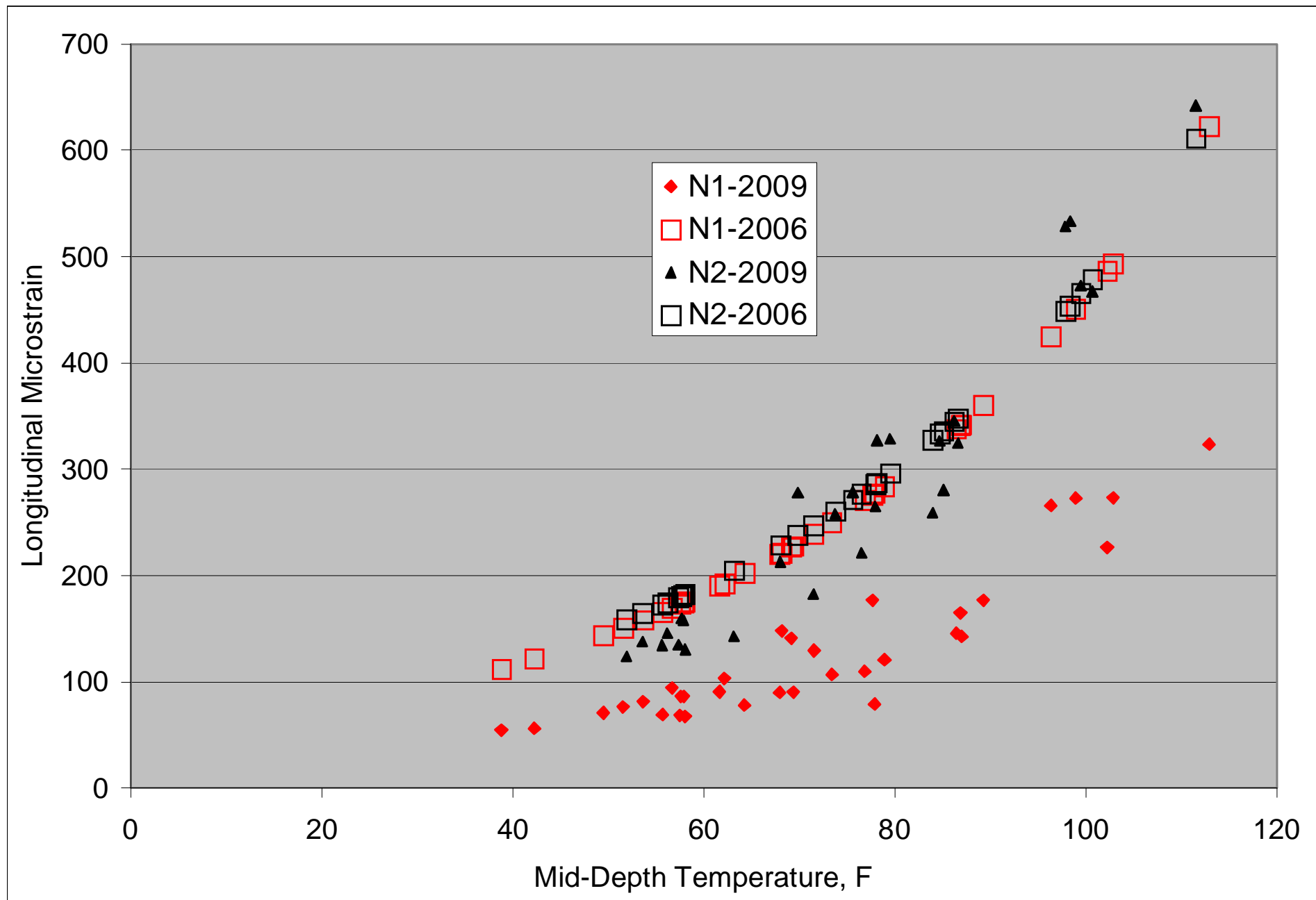
N1 and N2 – Transverse Gauges



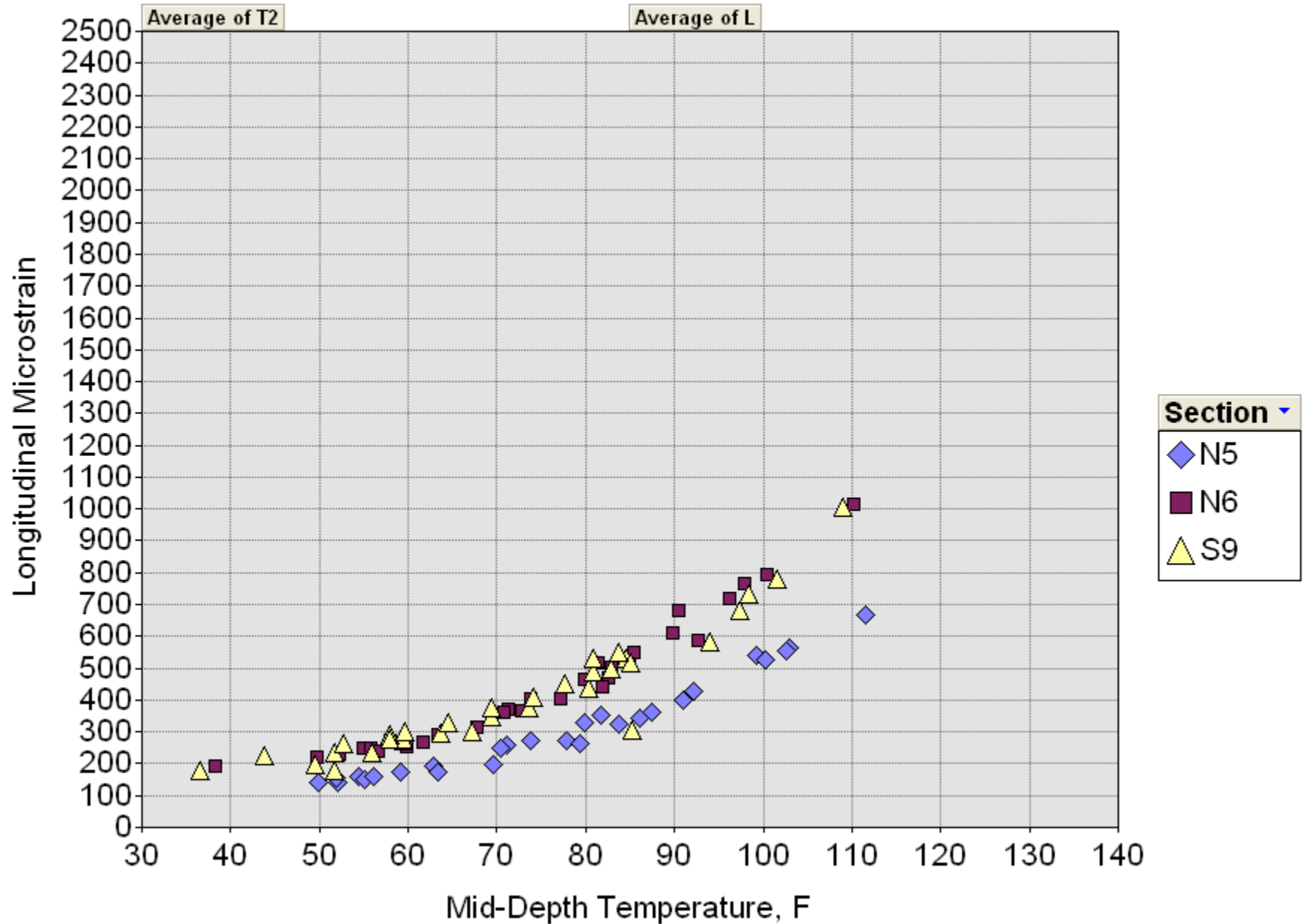
Ratio of L to T Strain



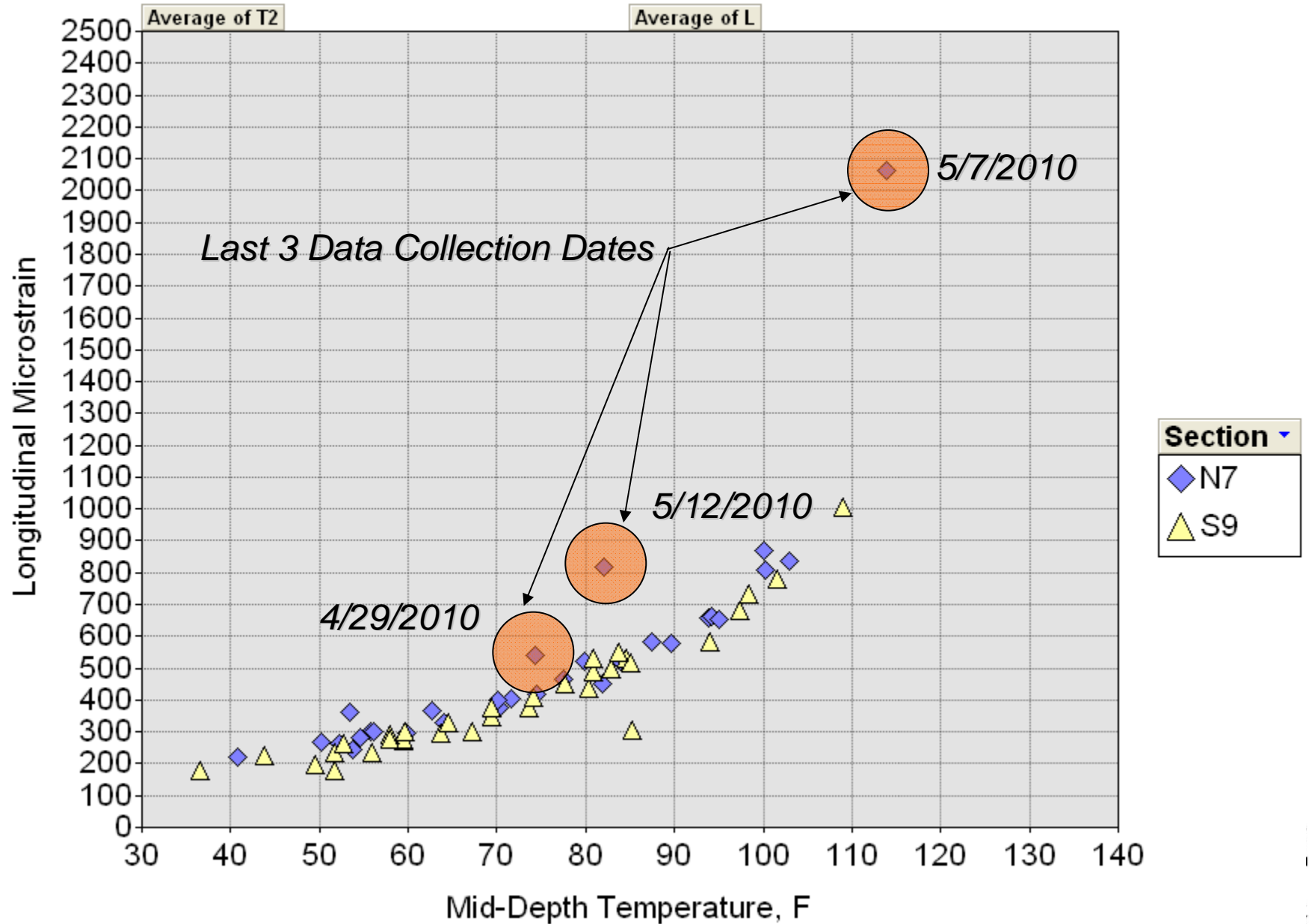
Comparison to 2006 Data



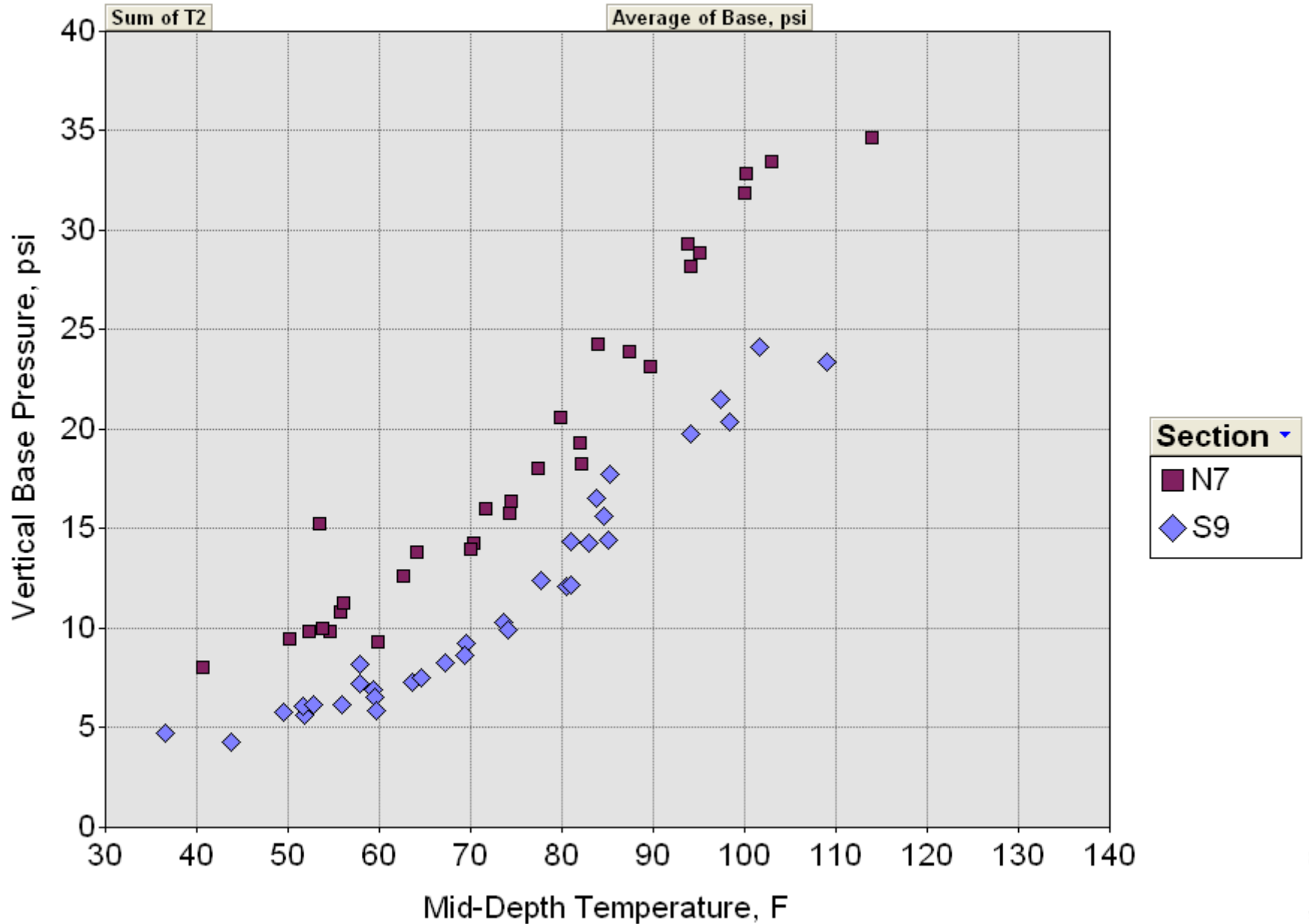
Thiopave[®] (N5 and N6)



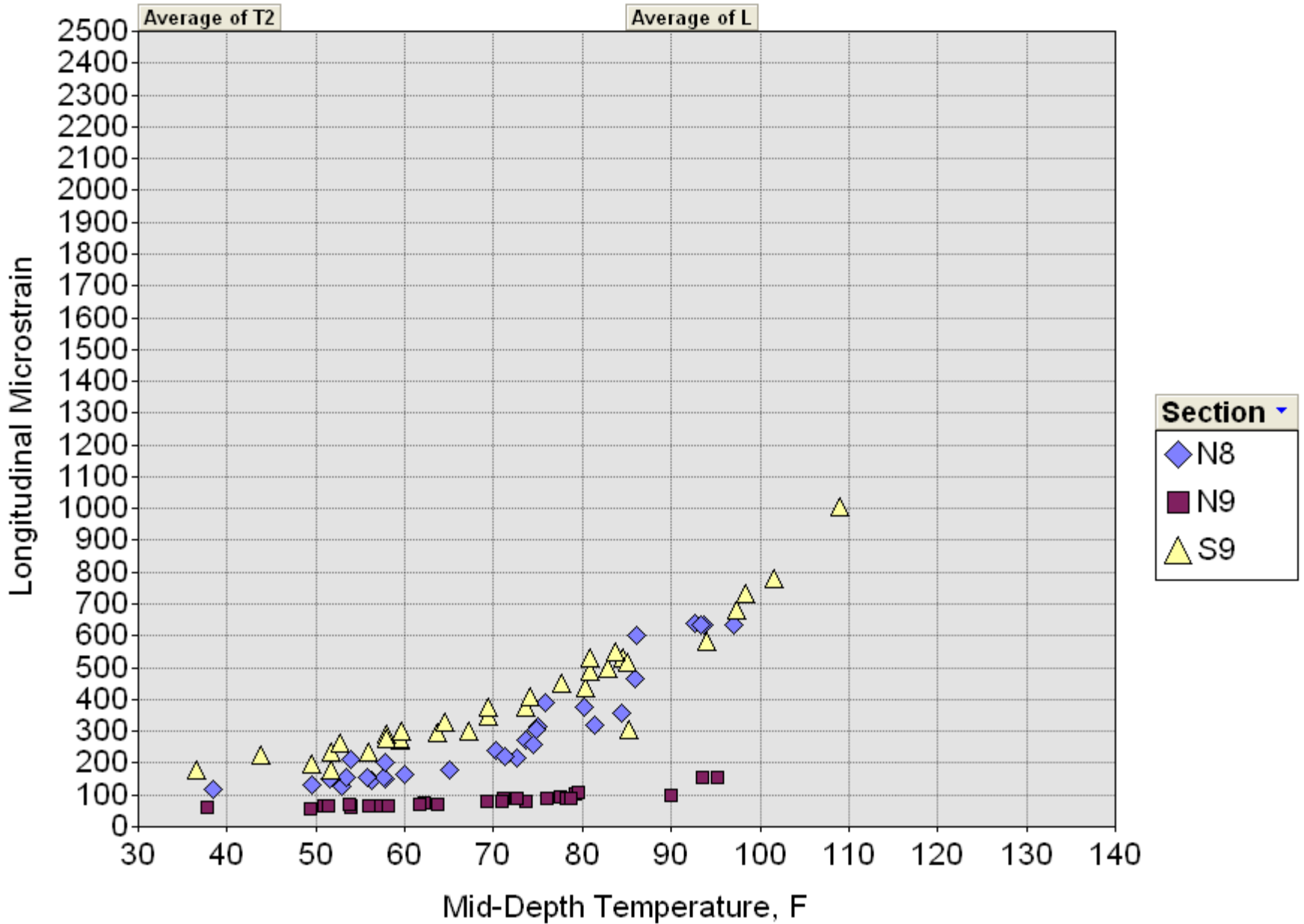
Kraton (N7)



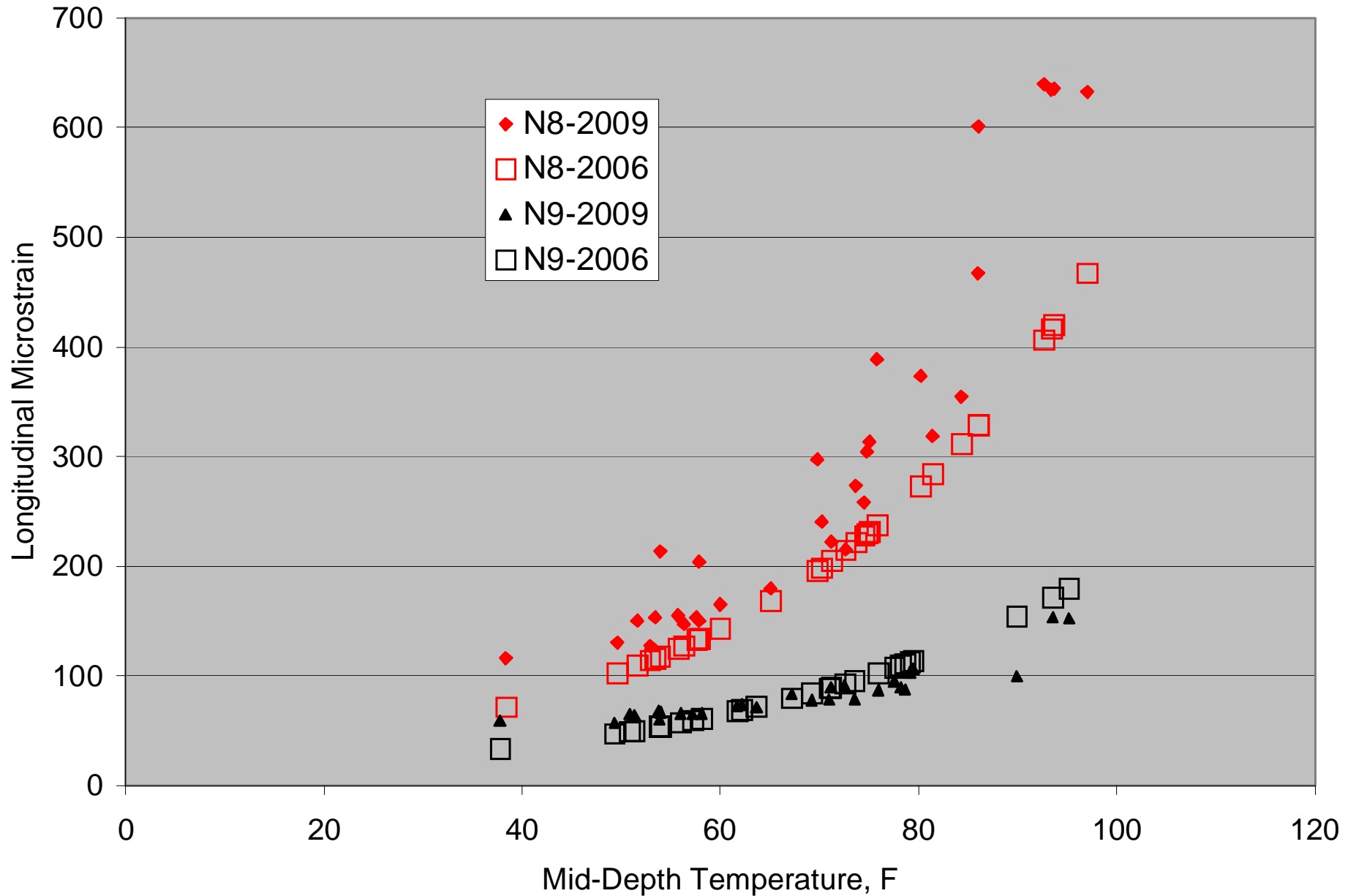
Kraton (N7) Pressure



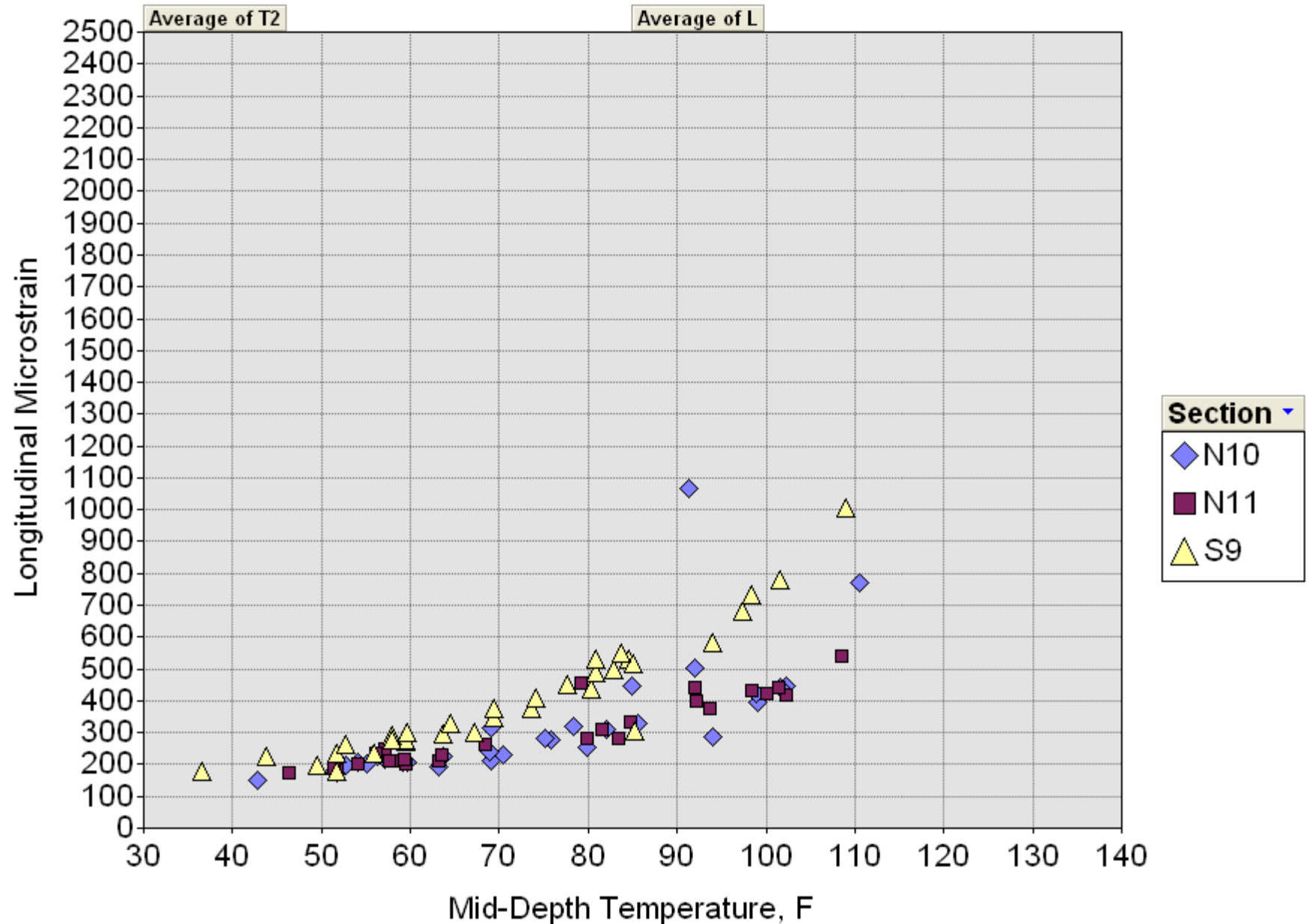
Oklahoma (N8 & N9)



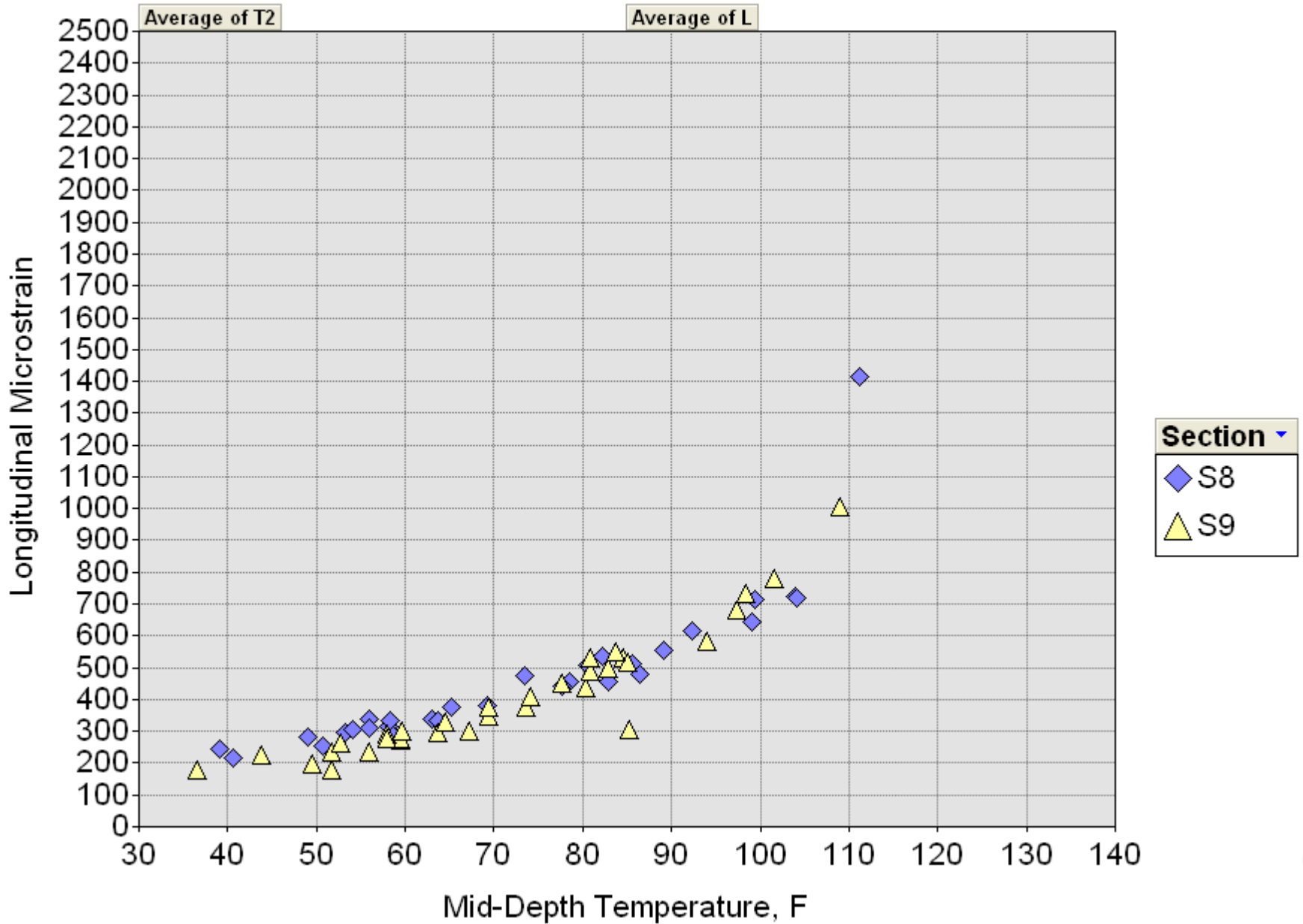
N8 & N9 – Comparison with 2006 Data



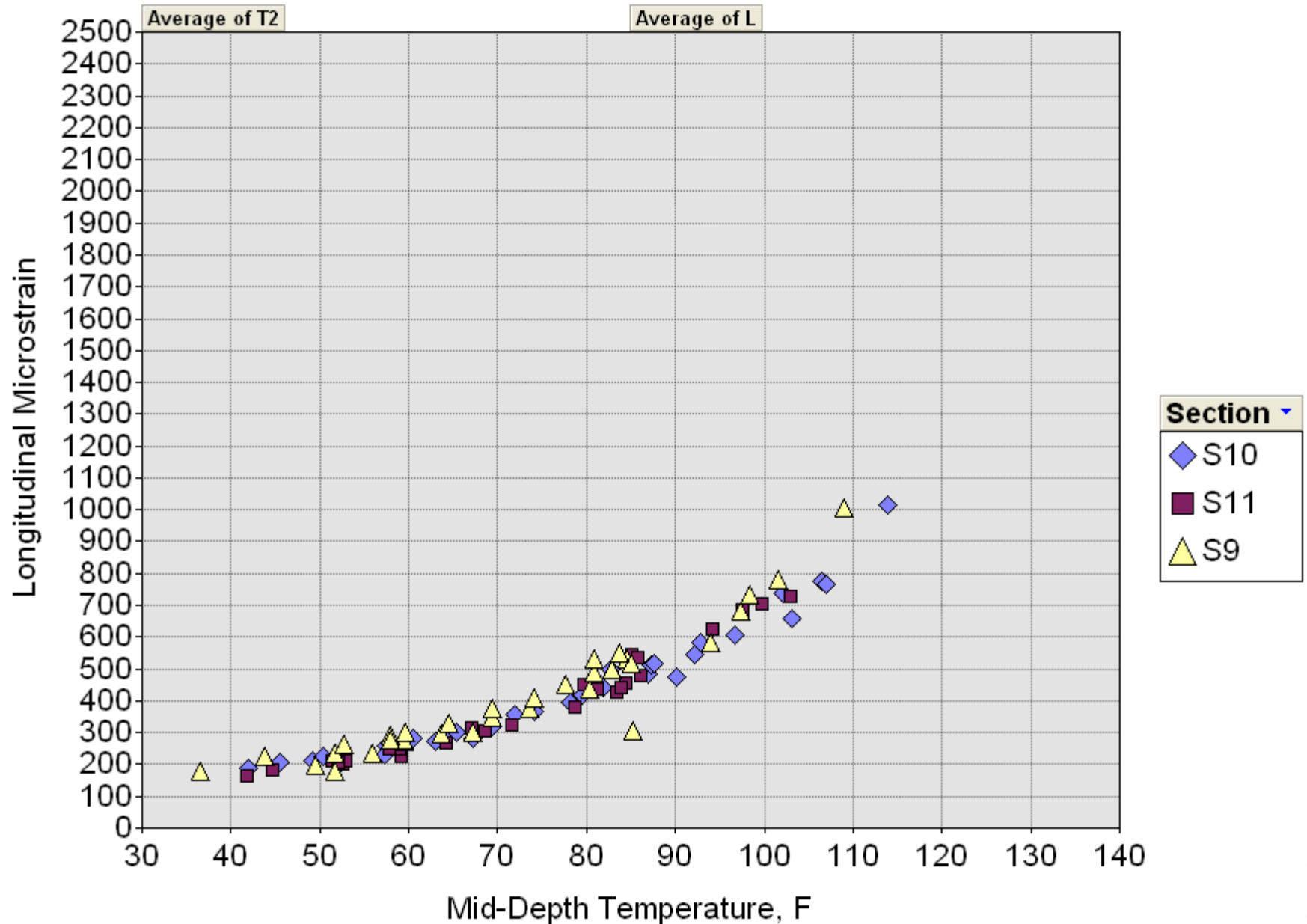
Group Experiment – High RAP (N10 and N11)



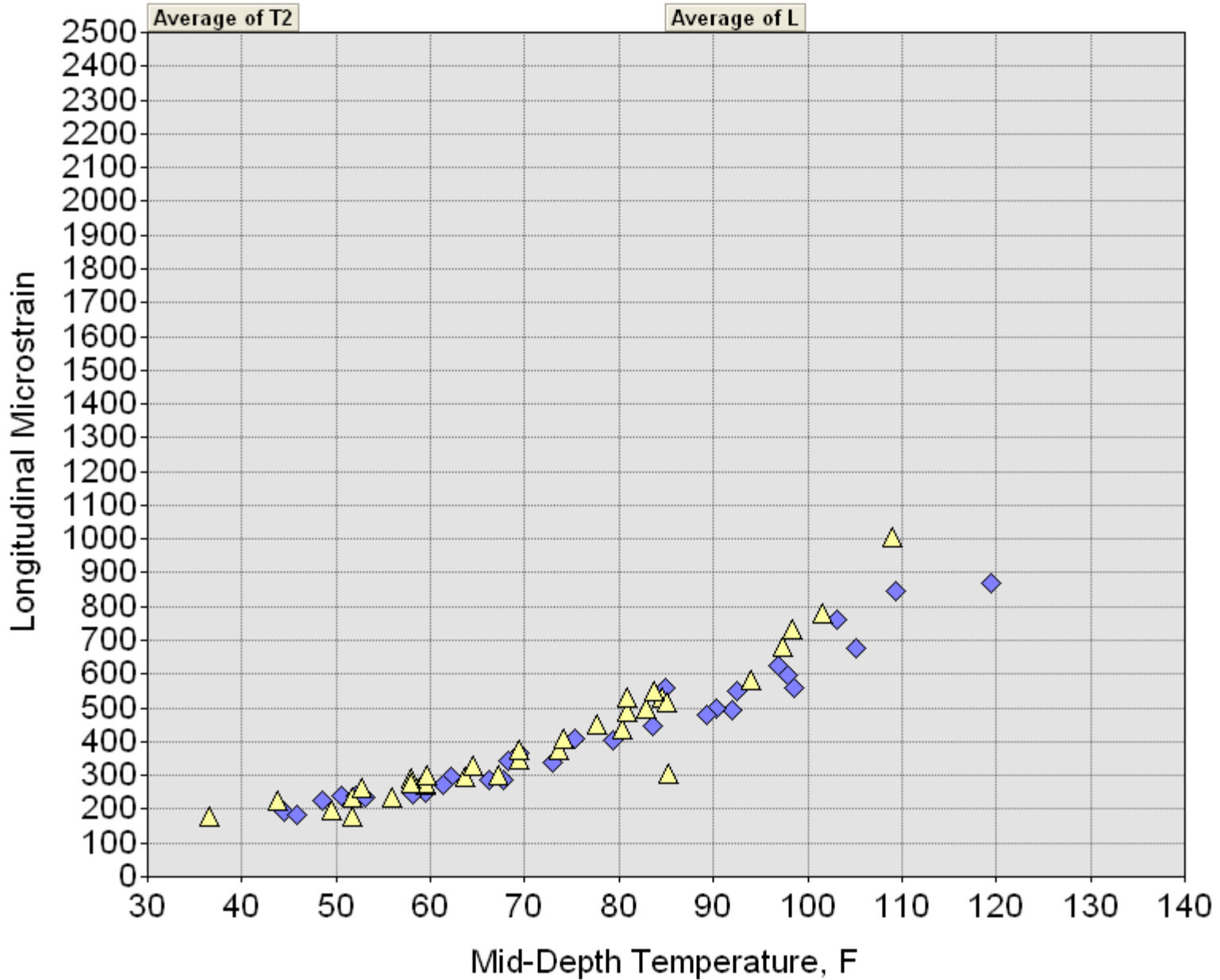
Group Experiment – OGFC (S8)



Group Experiment – Warm Mix (S10 & S11)



TLA – S12



Temperature Correction

- Fit exponential functions to each data set

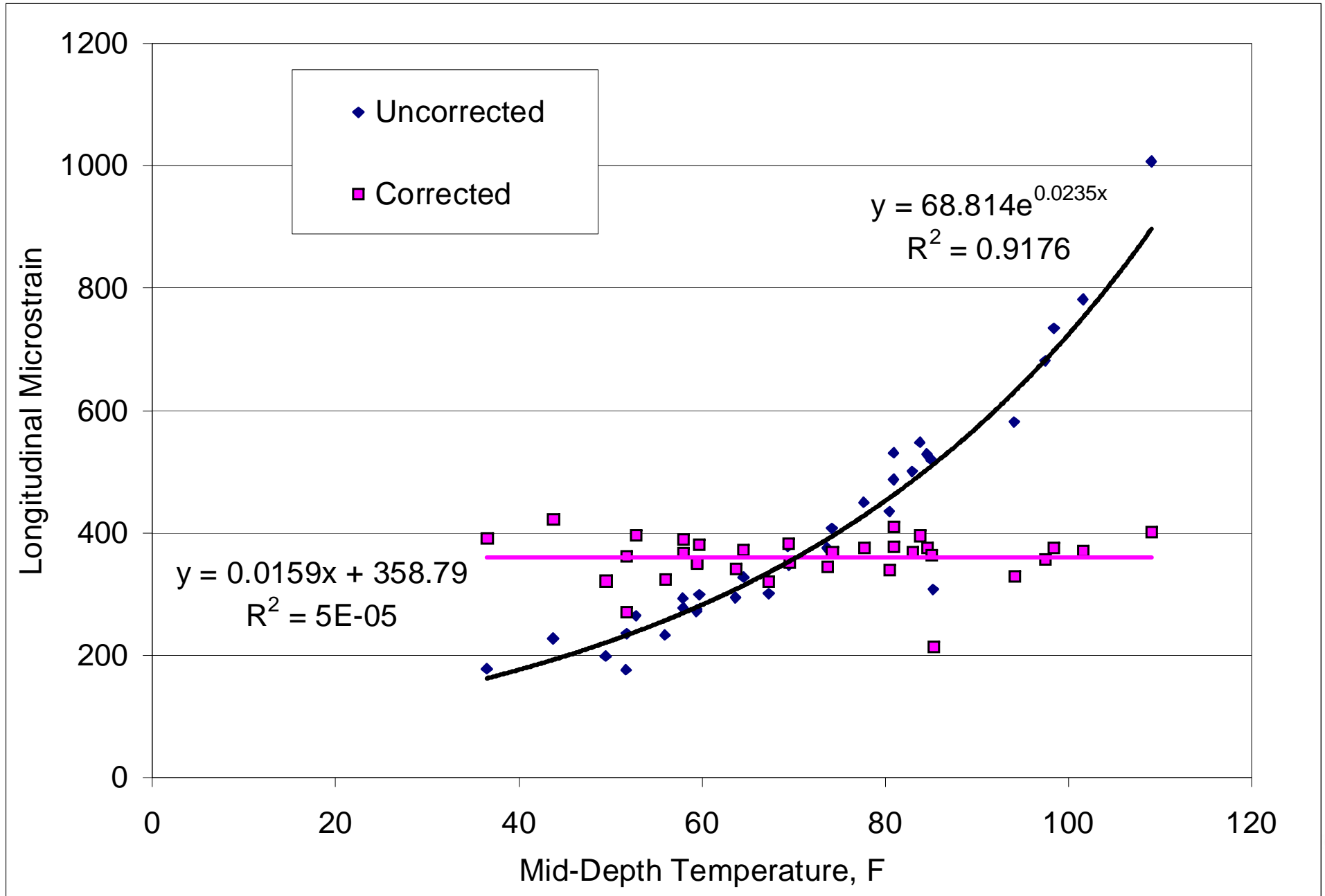
$$\varepsilon = k_1 e^{k_2 T}$$

- Compute temperature-corrected strain

$$\frac{\varepsilon_{T_{ref}}}{\varepsilon_{T_{meas}}} = \frac{k_1 e^{k_2 T_{ref}}}{k_1 e^{k_2 T_{meas}}}$$

$$\varepsilon_{T_{ref}} = \varepsilon_{T_{meas}} e^{k_2 (T_{ref} - T_{meas})}$$

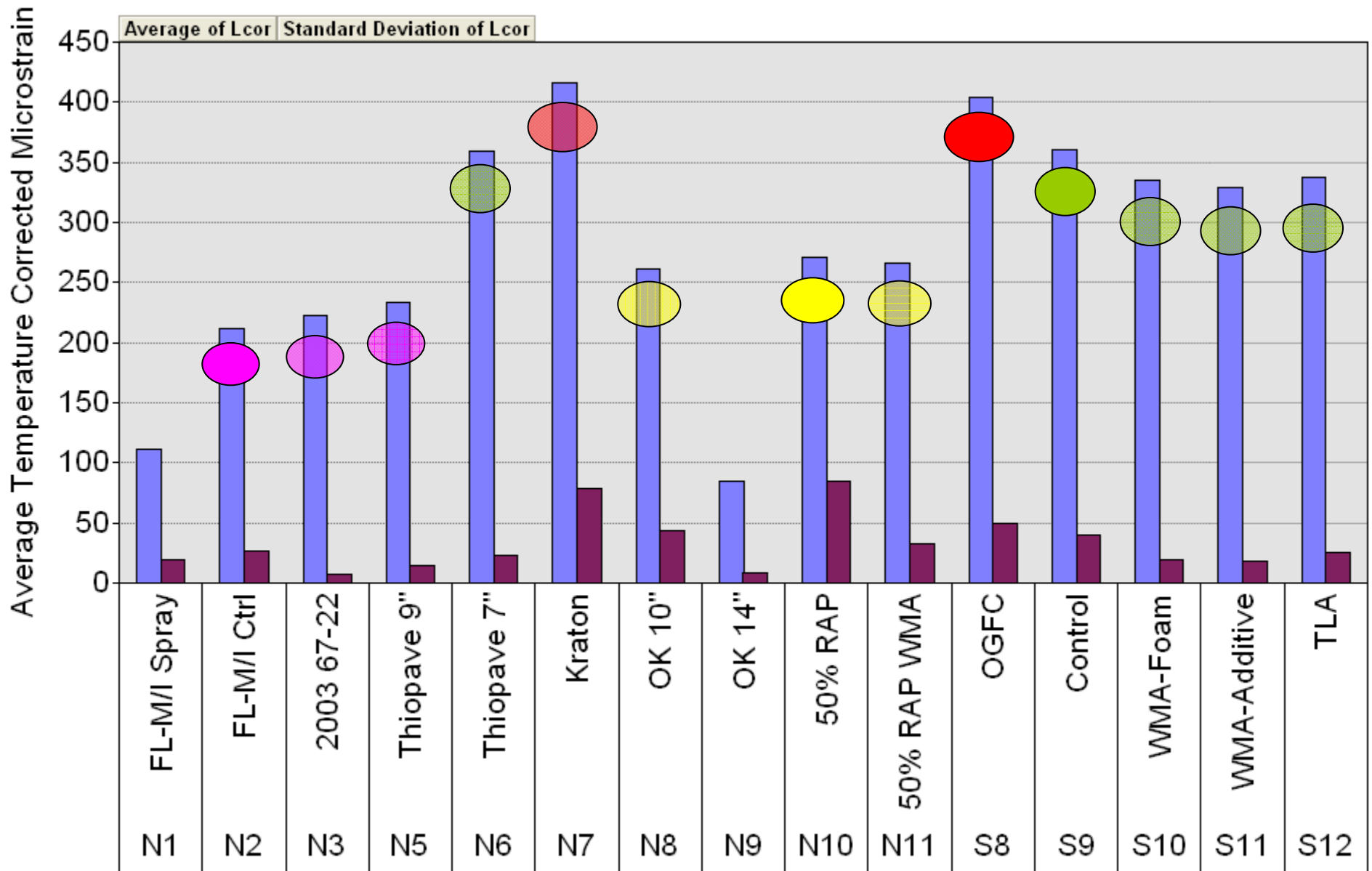
Example – S9



Regression Summary

Section	k_1	k_2	R^2
N1	19.72	0.0245	0.87
N2	28.43	0.0286	0.94
N3	32.23	0.0276	0.99
N5	36.35	0.0265	0.98
N6	60.08	0.0255	0.98
N7	73.88	0.0245	0.89
N8	24.56	0.0336	0.92
N9	26.56	0.0165	0.87
N10	61.34	0.0208	0.73
N11	79.63	0.0171	0.90
S8	101.23	0.0197	0.93
S9	68.81	0.0235	0.92
S10	67.10	0.0229	0.98
S11	55.66	0.0253	0.99
S12	76.61	0.0211	0.97

Strain Comparison – T = 70F



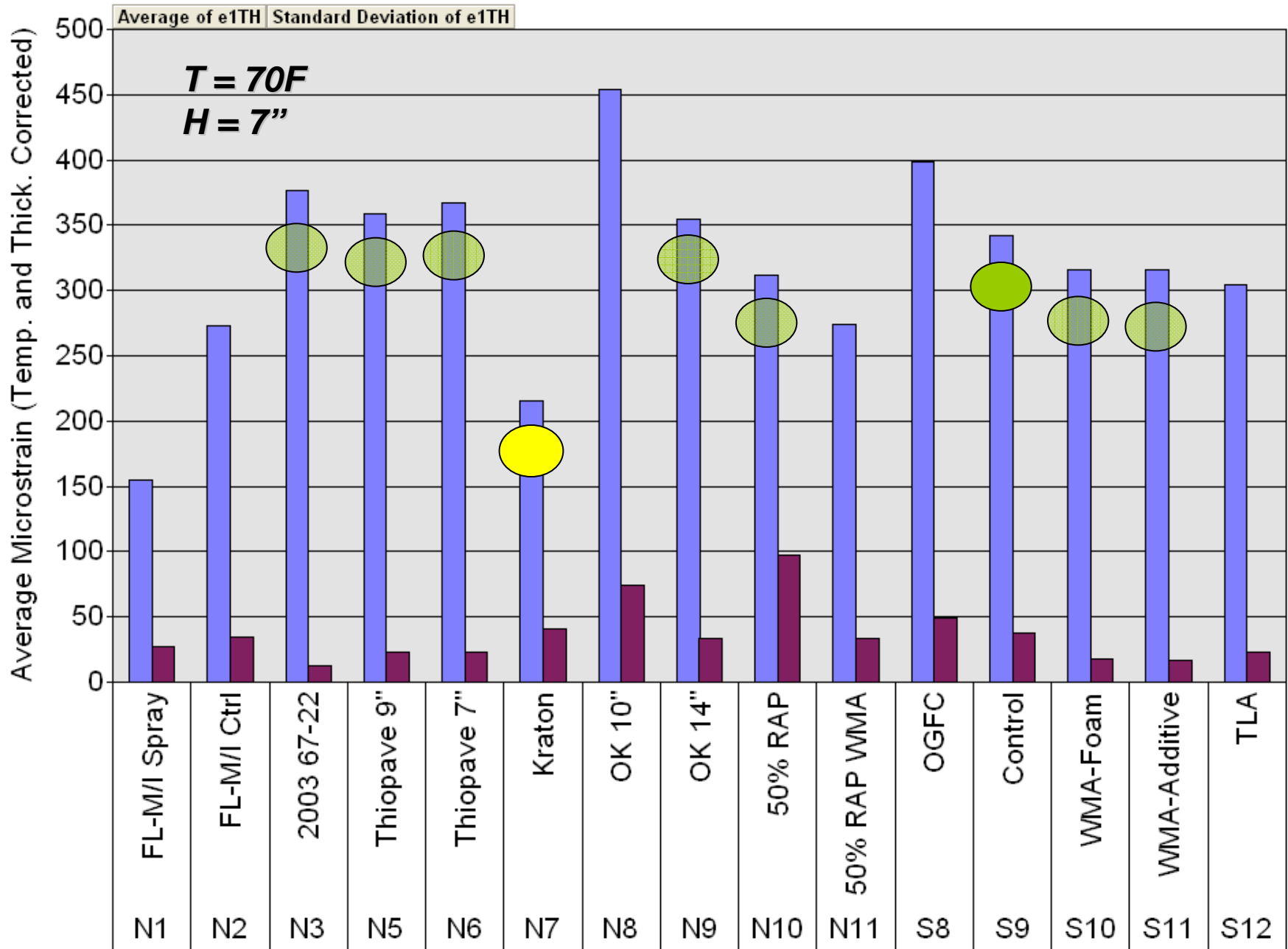
Thickness Correction

- Strain strongly affected by thickness

$$\varepsilon \approx fn (1/h_{h\text{ma}}^2)$$

- Normalize measured strain by corresponding surveyed HMA thickness
- Divide by reference thickness (7")

Thickness and Temperature Corrected Strain



Summary of Key Findings

- Strain and temperature strongly correlated
- Thickness correction also effective
- Temperature-corrected results are as expected
 - Important to tie results to performance measures
- Temperature and thickness-corrected values show slightly different results
 - Kraton section particularly lower
- Continue monitoring sections as summer progresses