

Pavement Evaluation 2019



September 17-20, 2019  
Roanoke, Virginia

# Short-Term Changes, Long-Term Changes, and Repeatability of Localized Roughness in Jointed PCC Pavement

By

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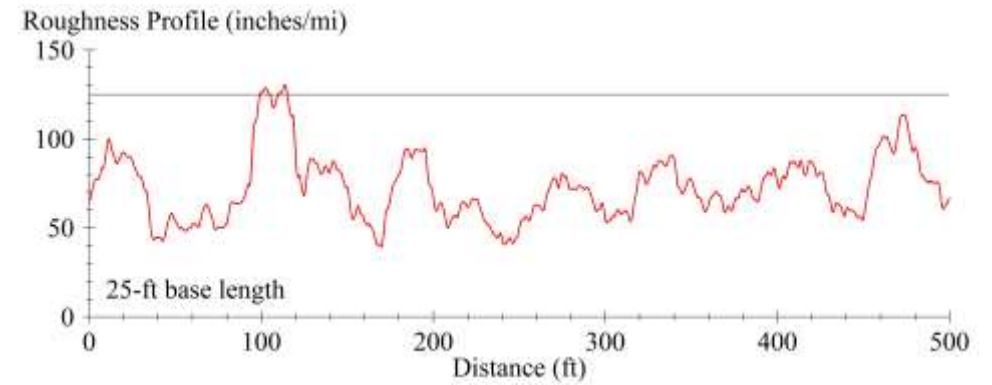
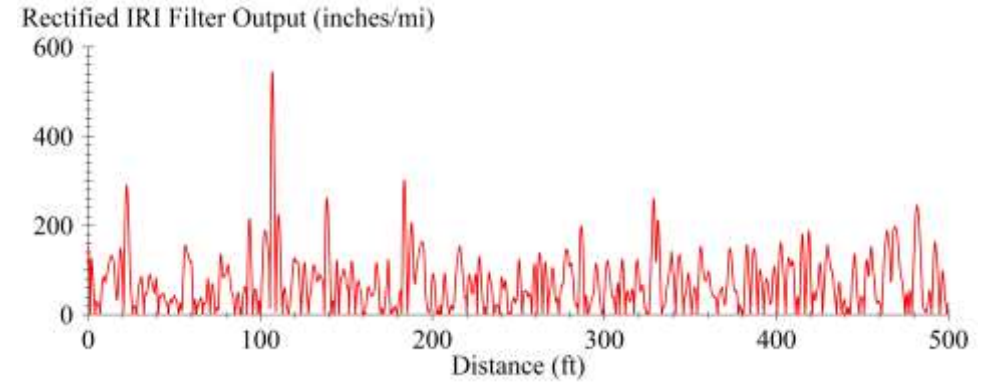
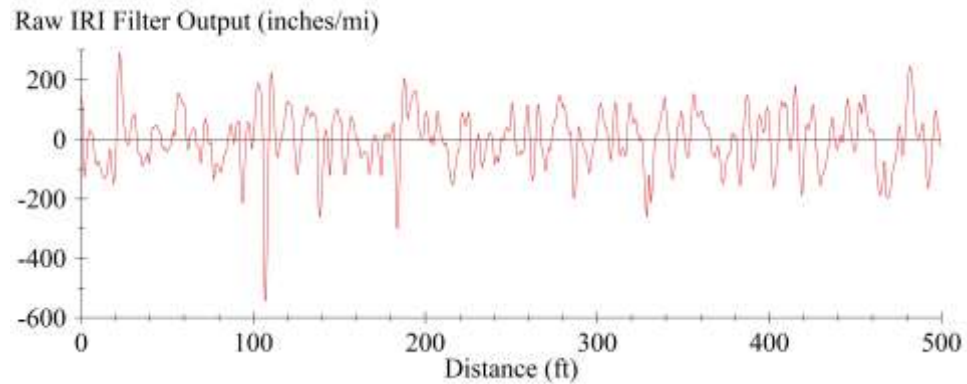
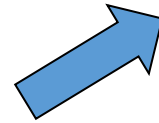
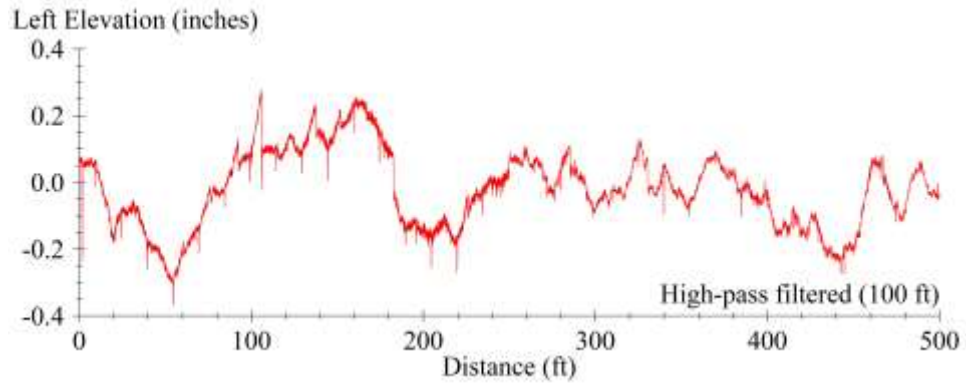
University of Michigan Transportation Research Institute

with Timin Punnackal and Kevin Senn, NCE

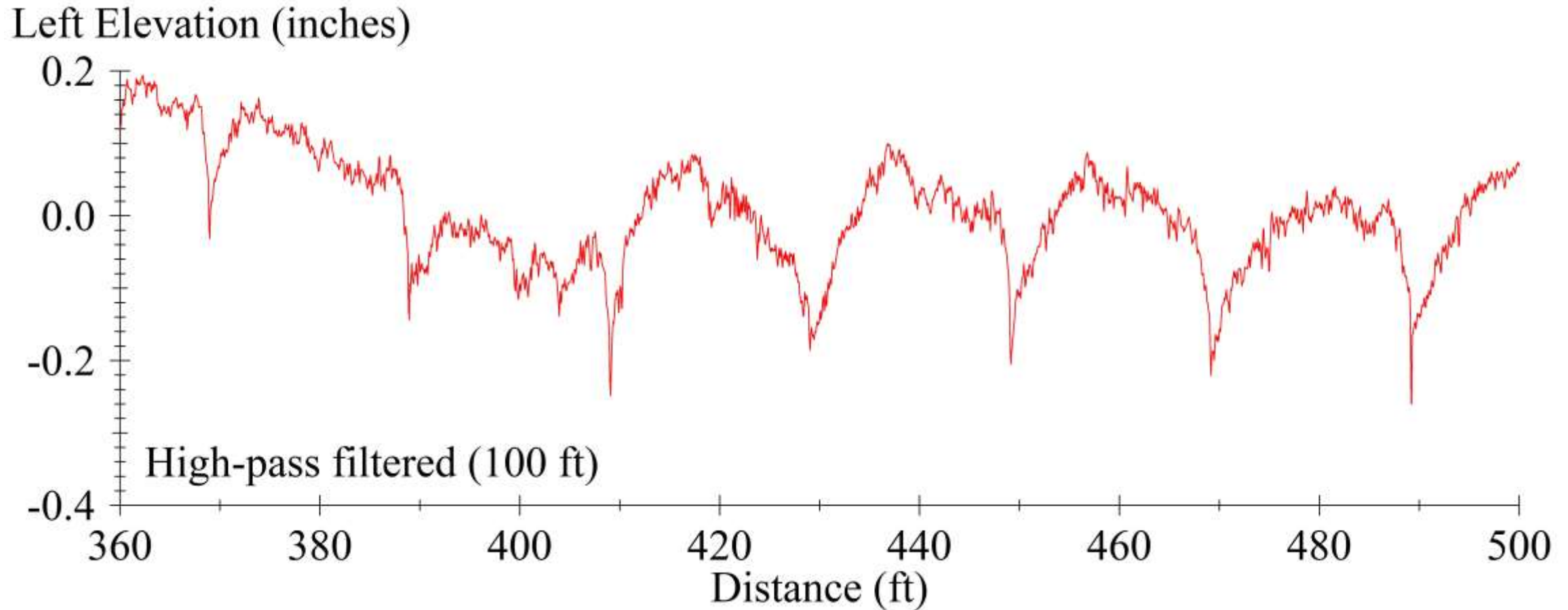
# Motivation

- Jointed PCC profile changes over daily cycles, seasonal cycles, and over the long term.
- Several studies have reported changes in IRI, but have not addressed localized roughness.
- Measured localized roughness affects project-level evaluation and construction quality assurance.
- Data from a study of curl and warp were well suited for this.

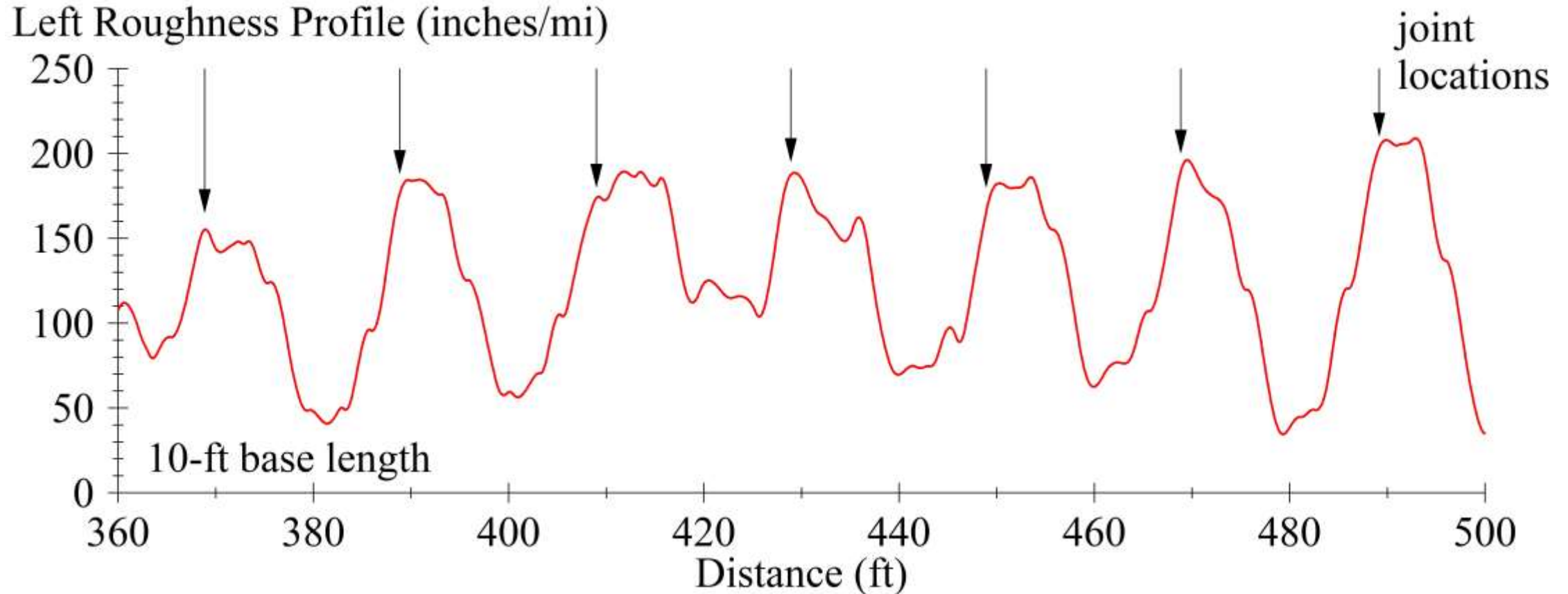
# Roughness Profile



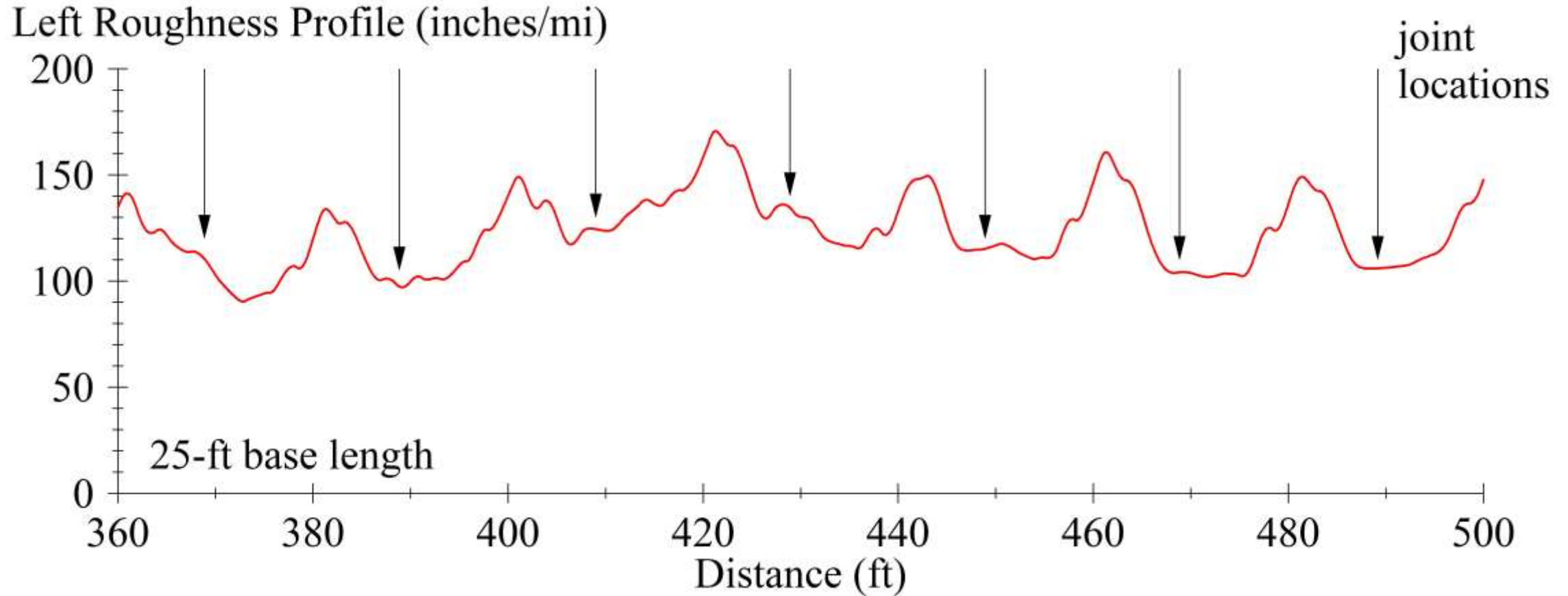
# Importance of Base Length



# 10-ft Base Length

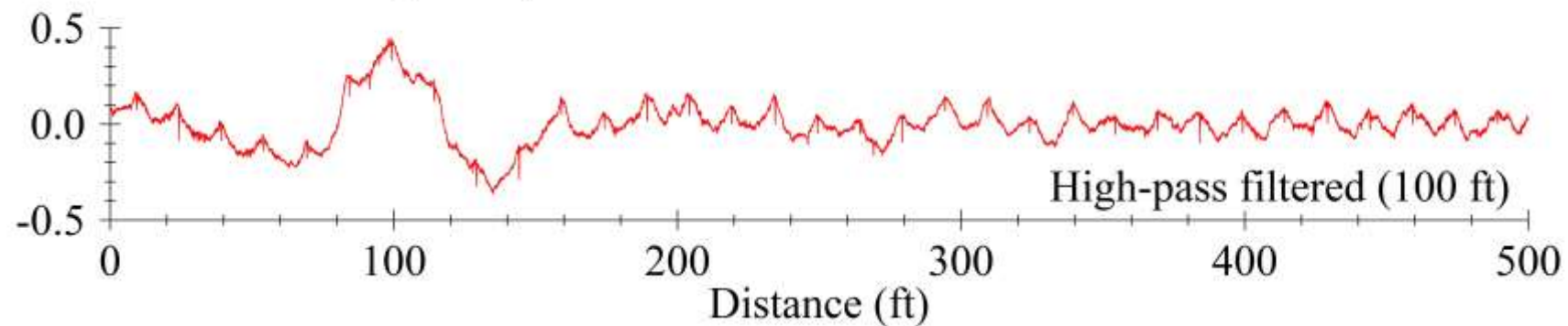


# 25-ft Base Length

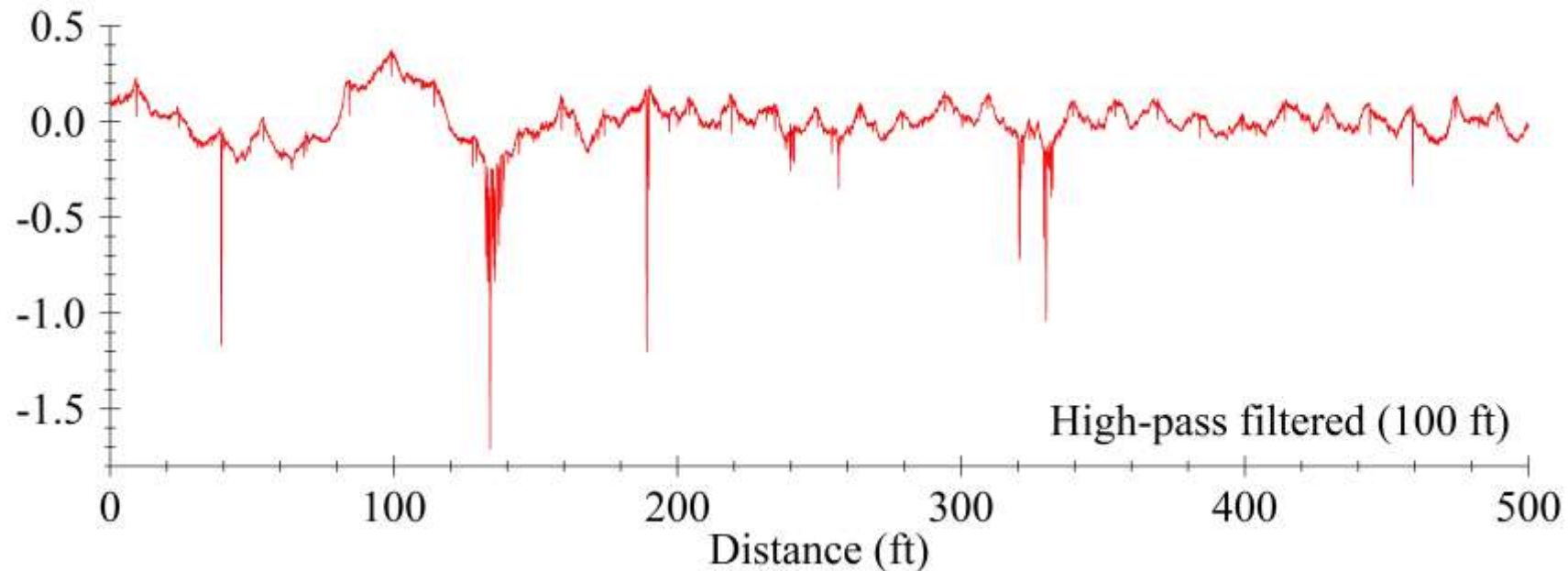


# Example Profiles

Left Elevation Profile (inches)

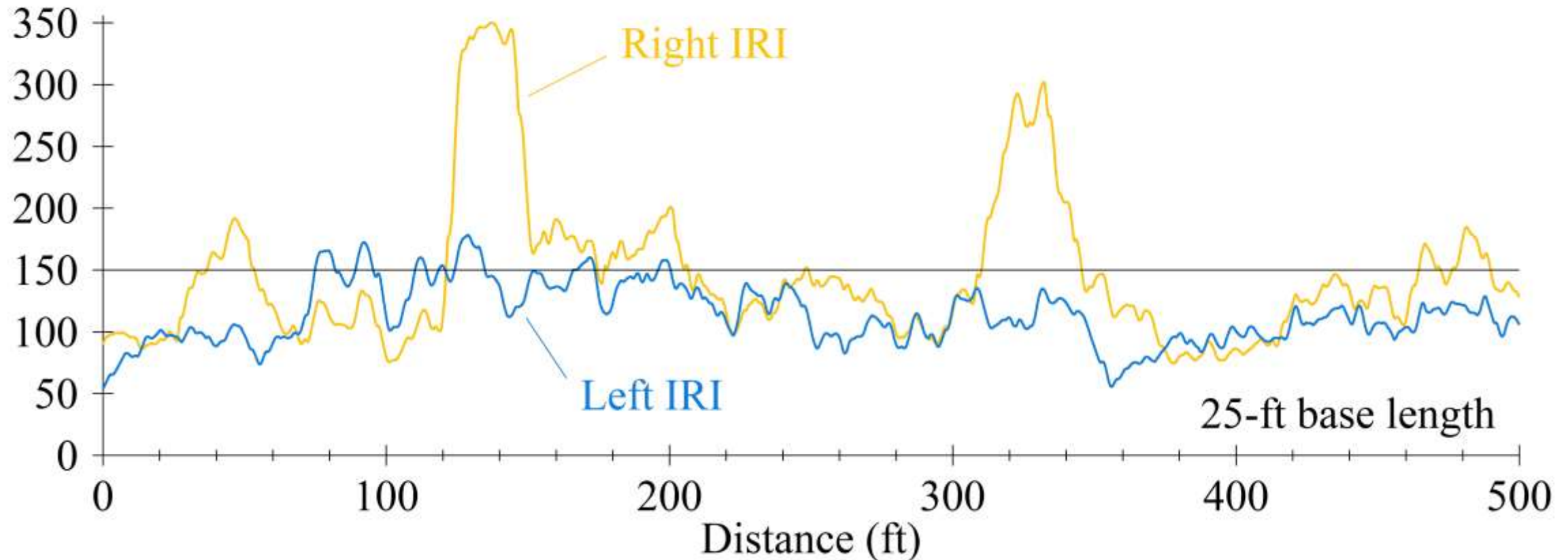


Right Elevation Profile (inches)



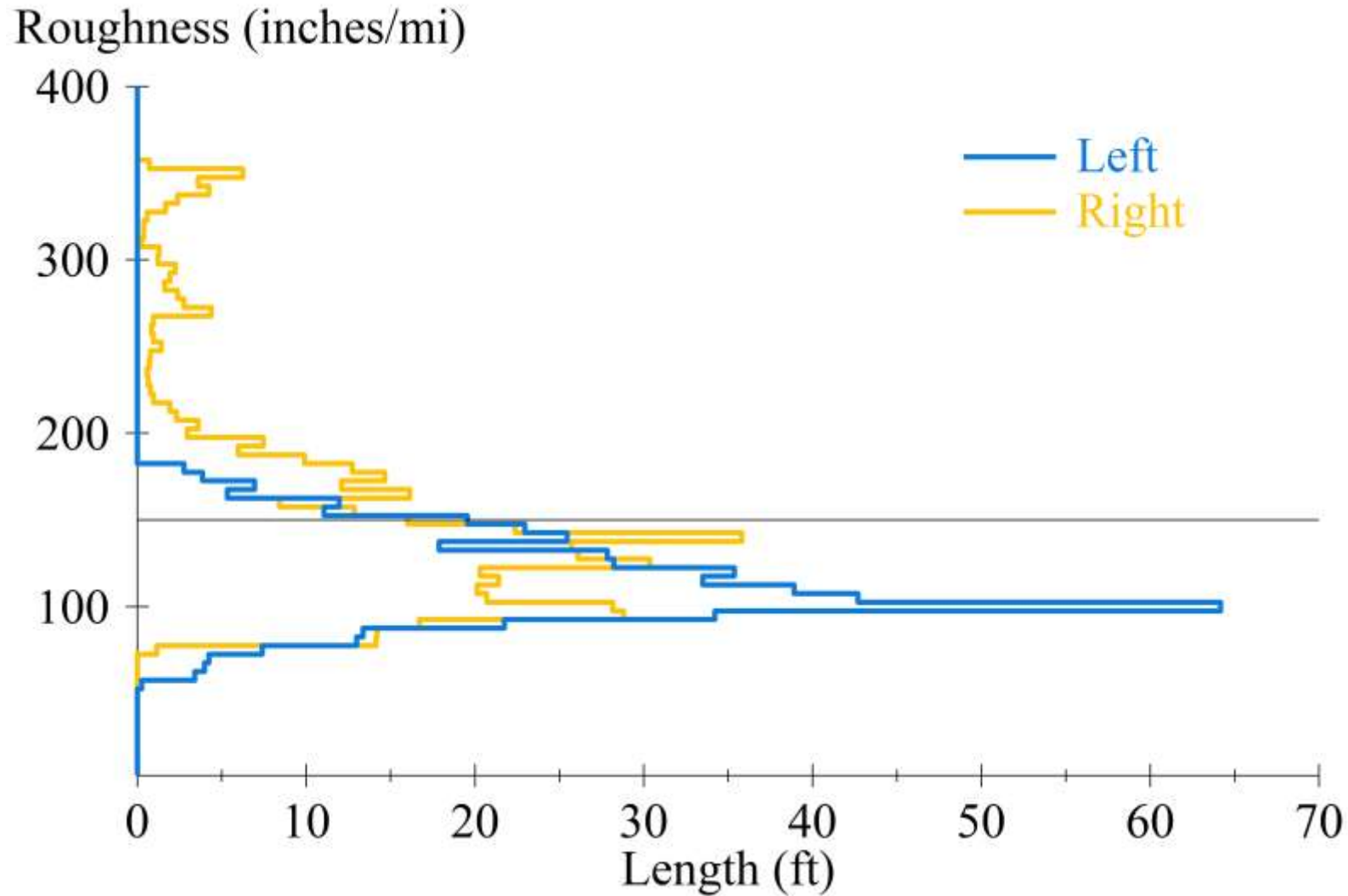
# Roughness Profile

Roughness Profile (inches/mi)





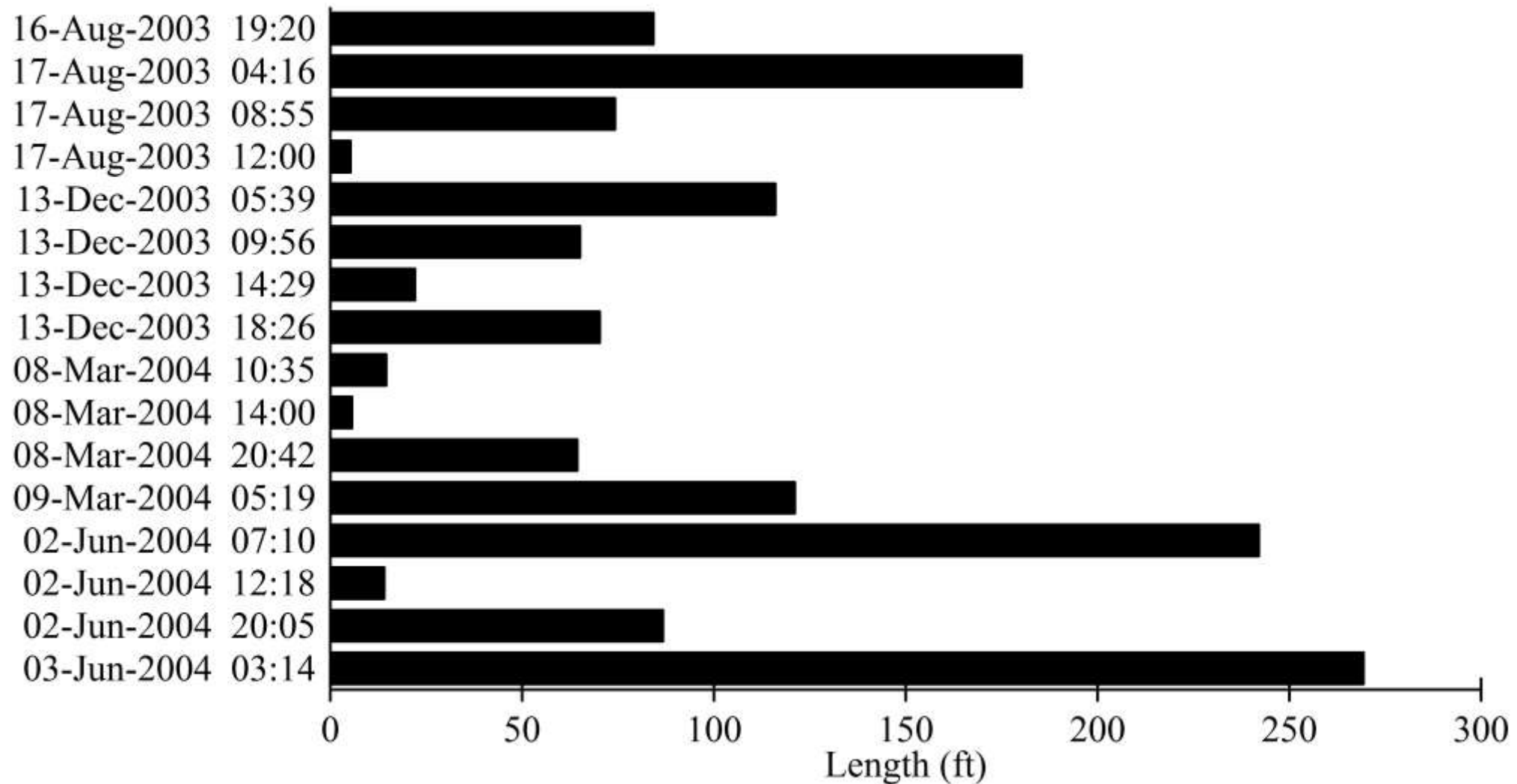
# Roughness Histogram



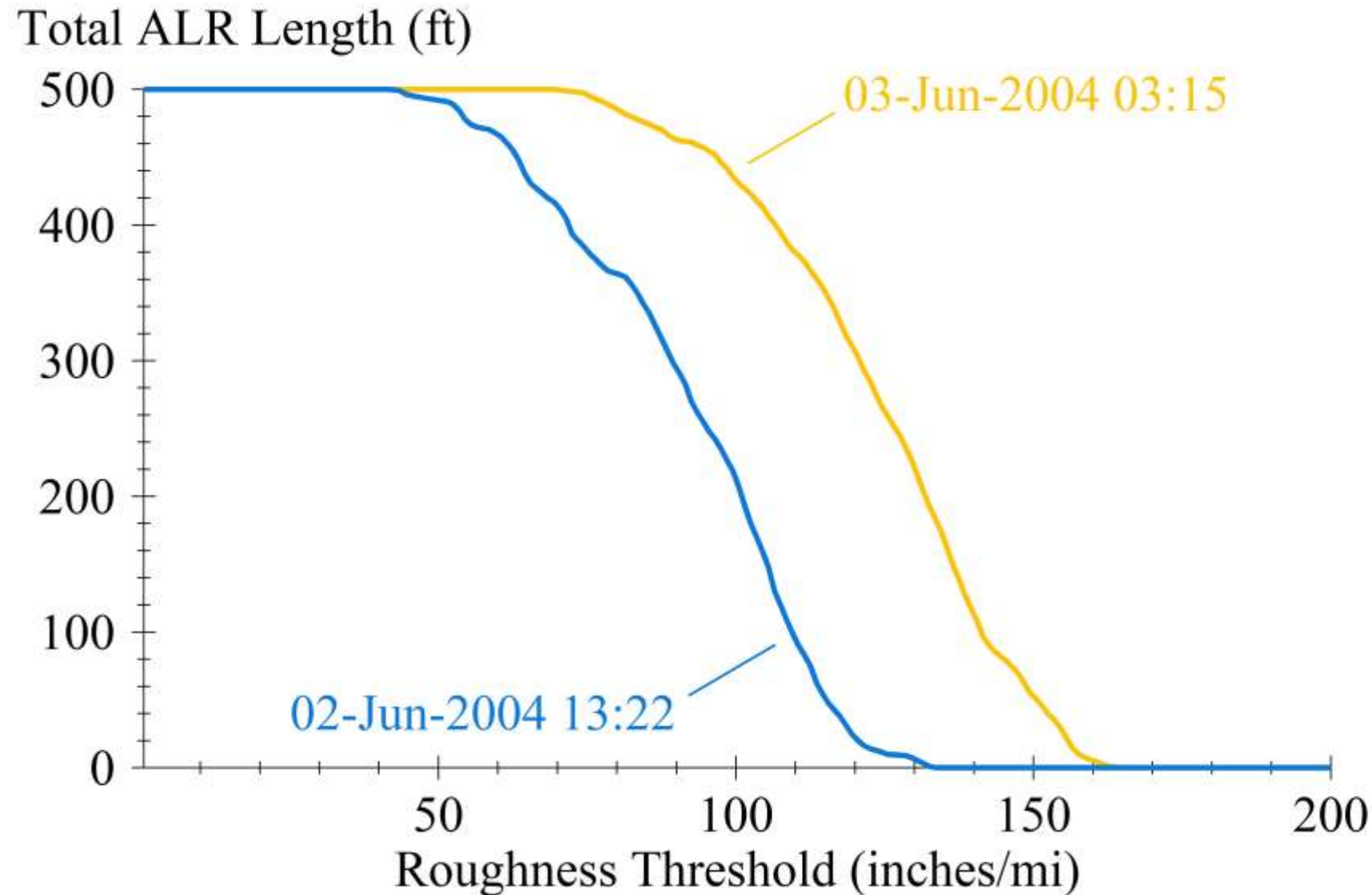
# Excess Roughness

Roughness Range (inches/mi)	Length (ft)	Roughness Above Threshold (inches/mi)	Roughness-Weighted Length (ft•inches/mi)	Excess Roughness (inches/mi)
150-155	11.06	2.5	27.6	0.055
155-160	11.96	7.5	89.7	0.179
160-165	5.34	12.5	66.7	0.133
165-170	6.94	17.5	121.5	0.243
170-175	3.86	22.5	86.8	0.174
175-180	2.76	27.5	76.0	0.152
> 150	41.91	—	468.4	0.937

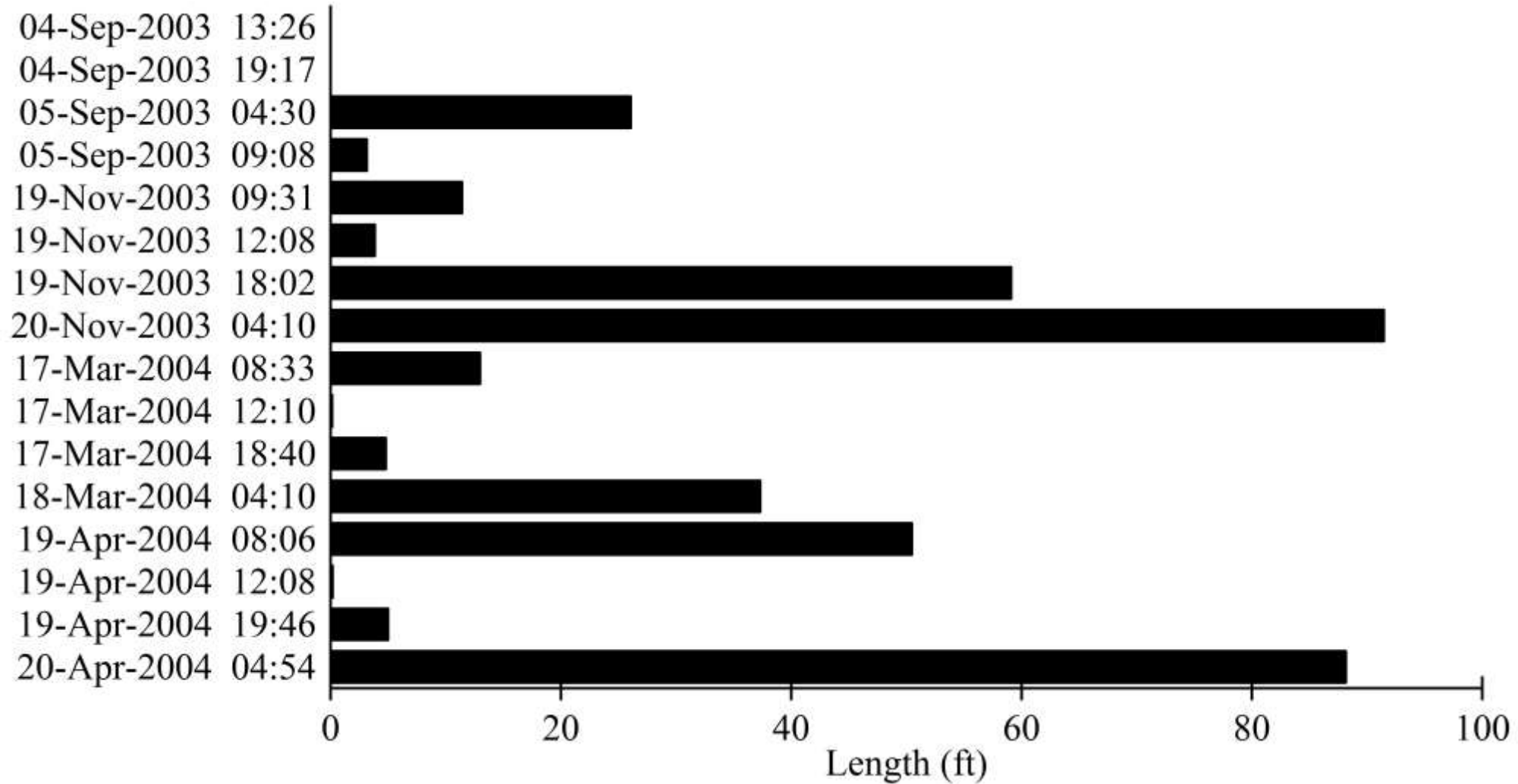
# Diurnal and Seasonal Changes



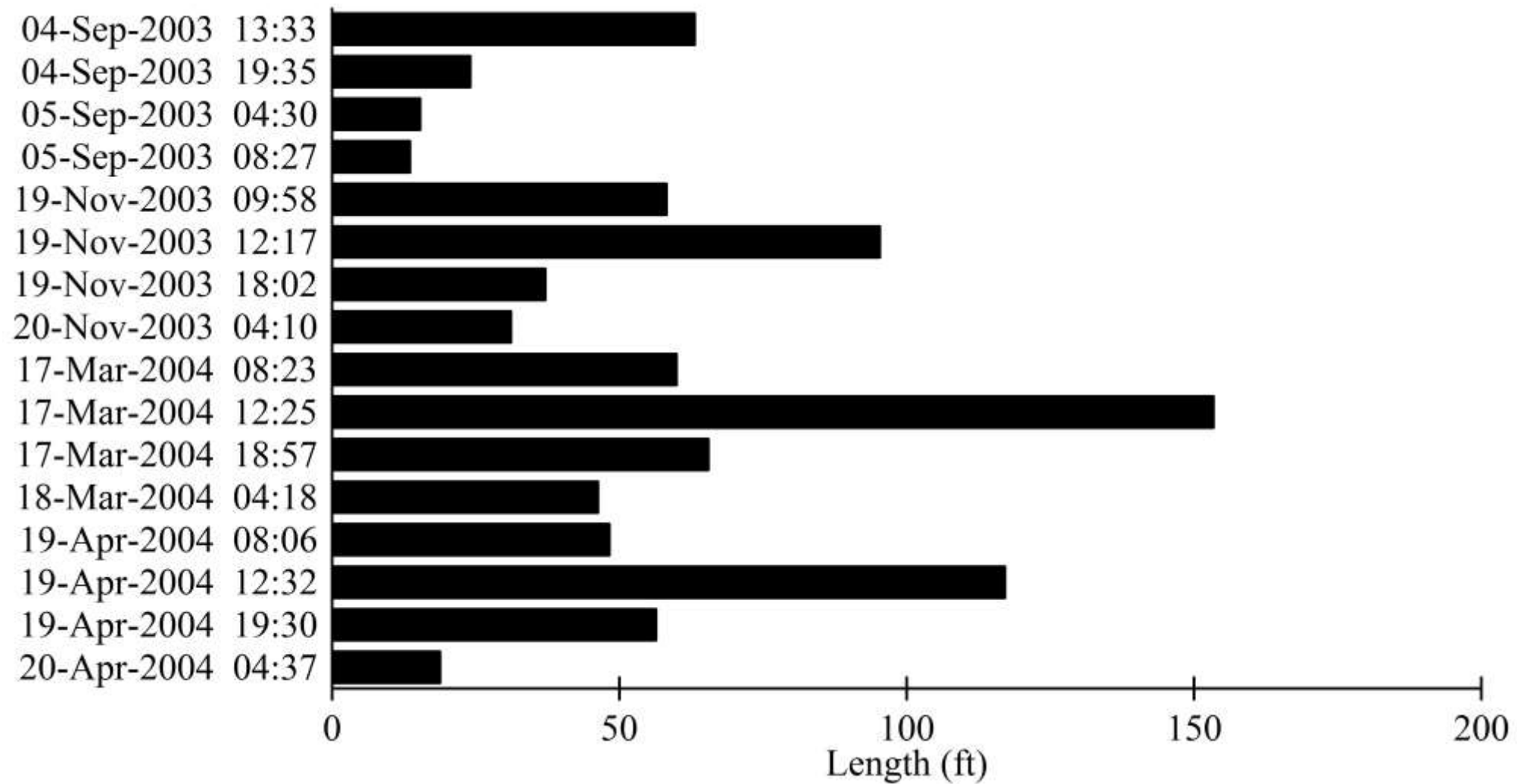
# Diurnal and Seasonal Changes



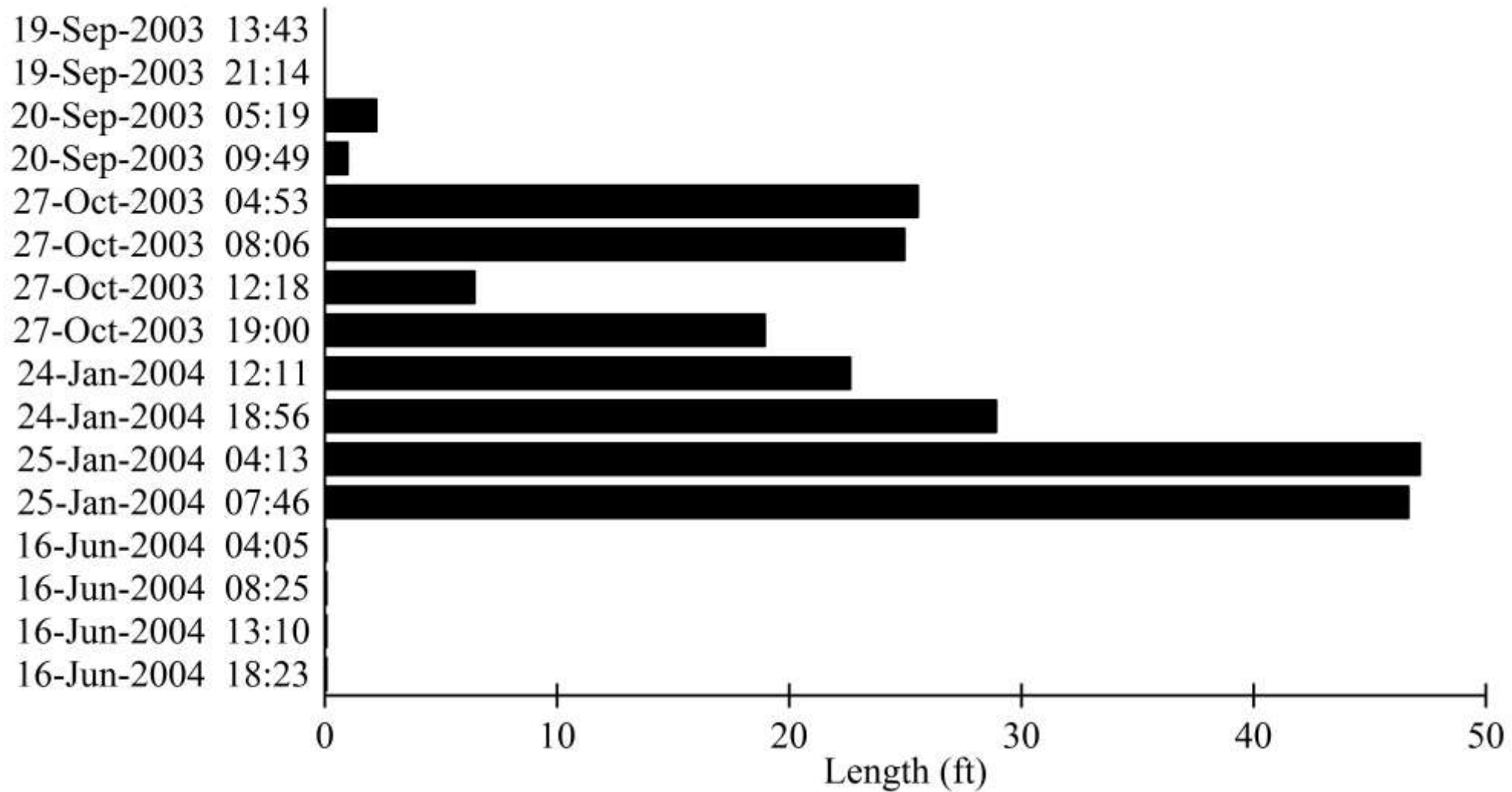
# Diurnal and Seasonal Changes



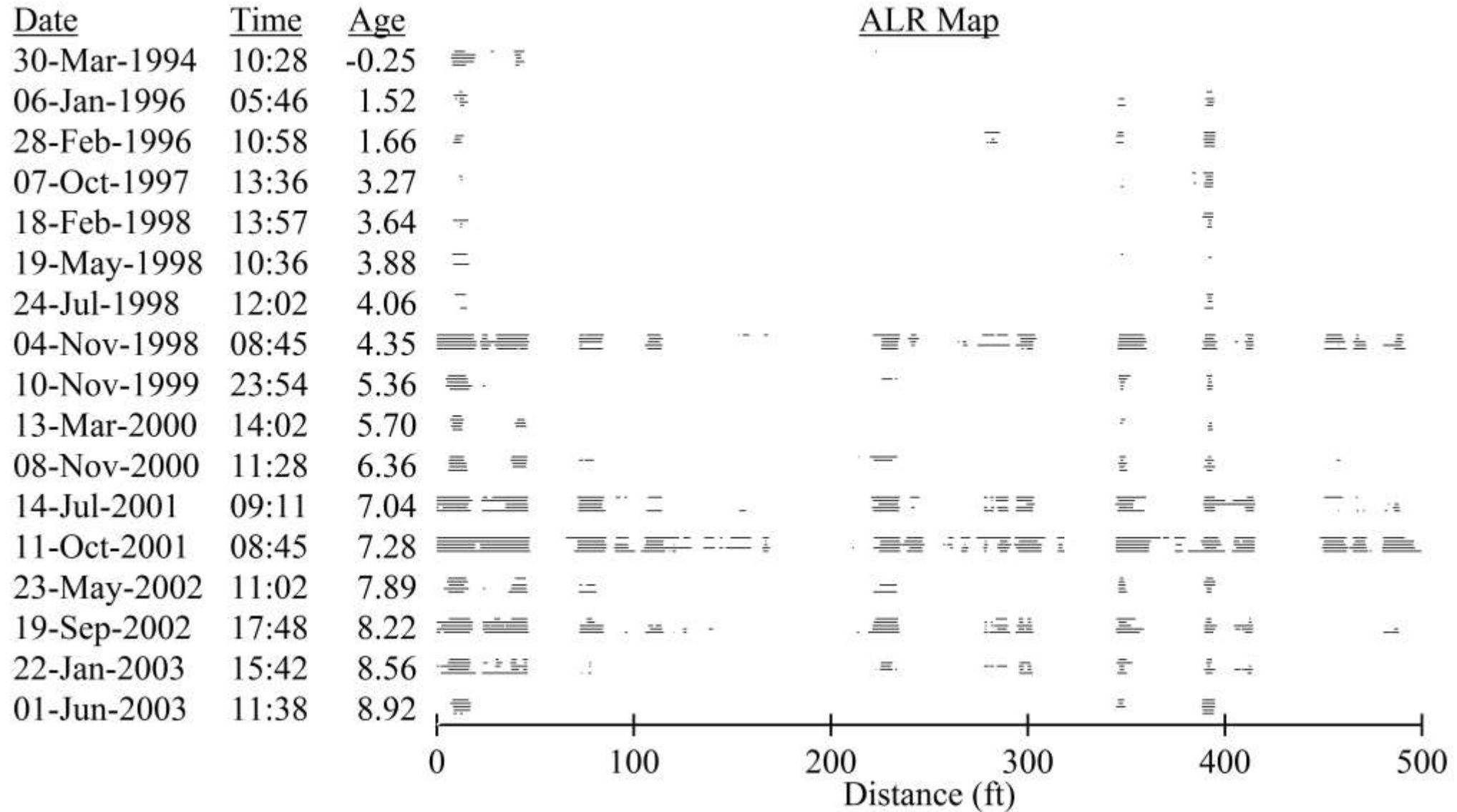
# Diurnal and Seasonal Changes



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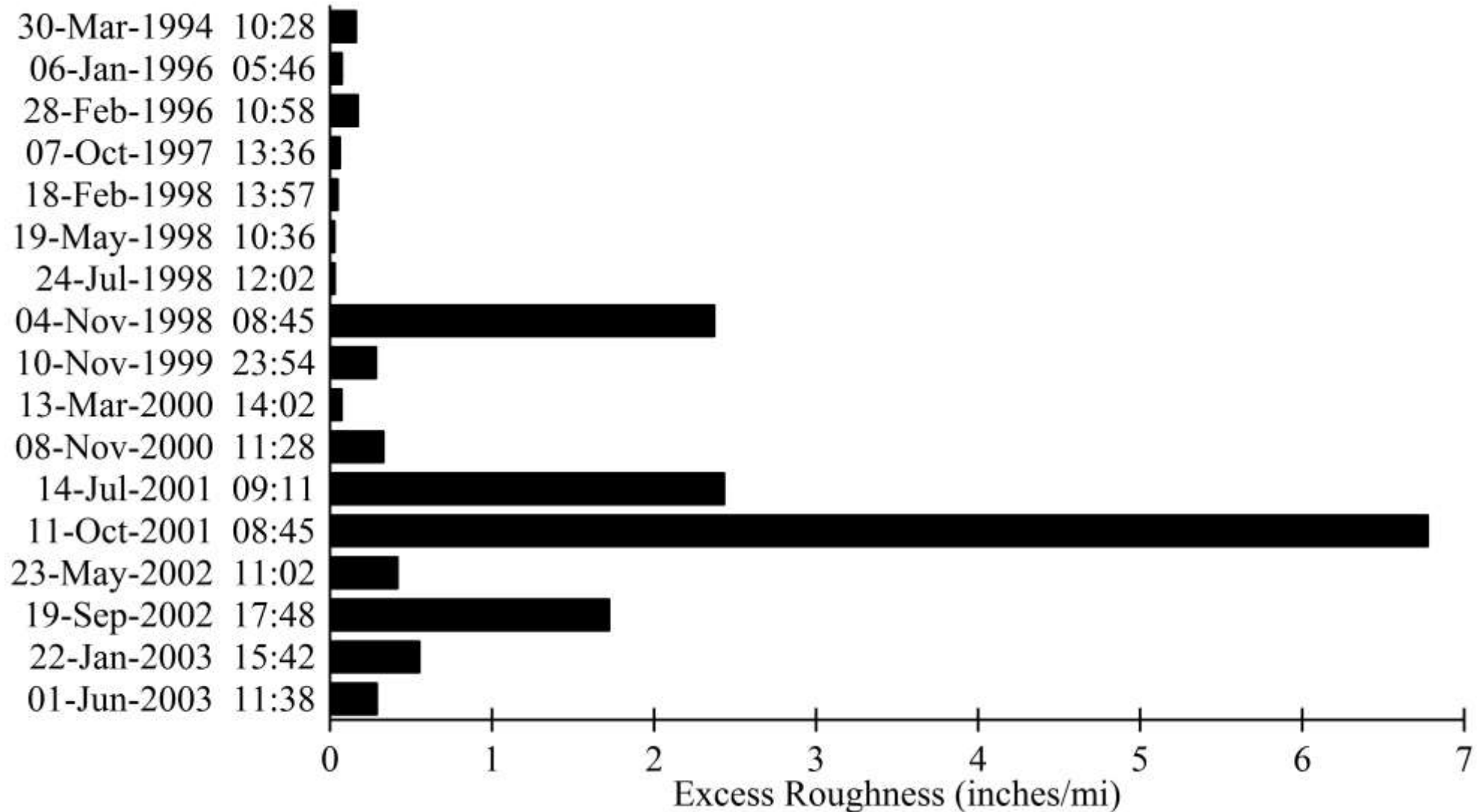


# Long-Term Changes: ALR Map

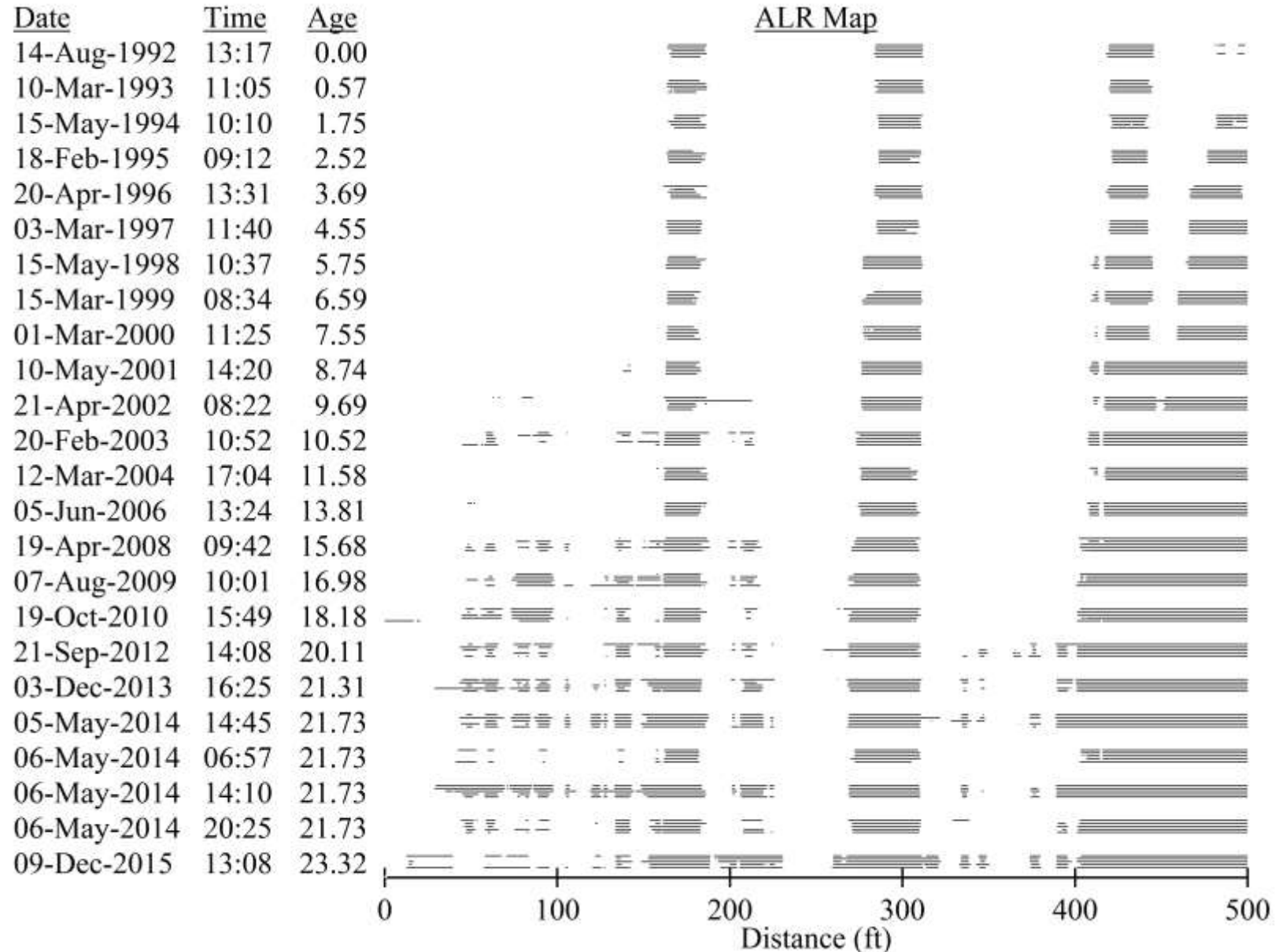




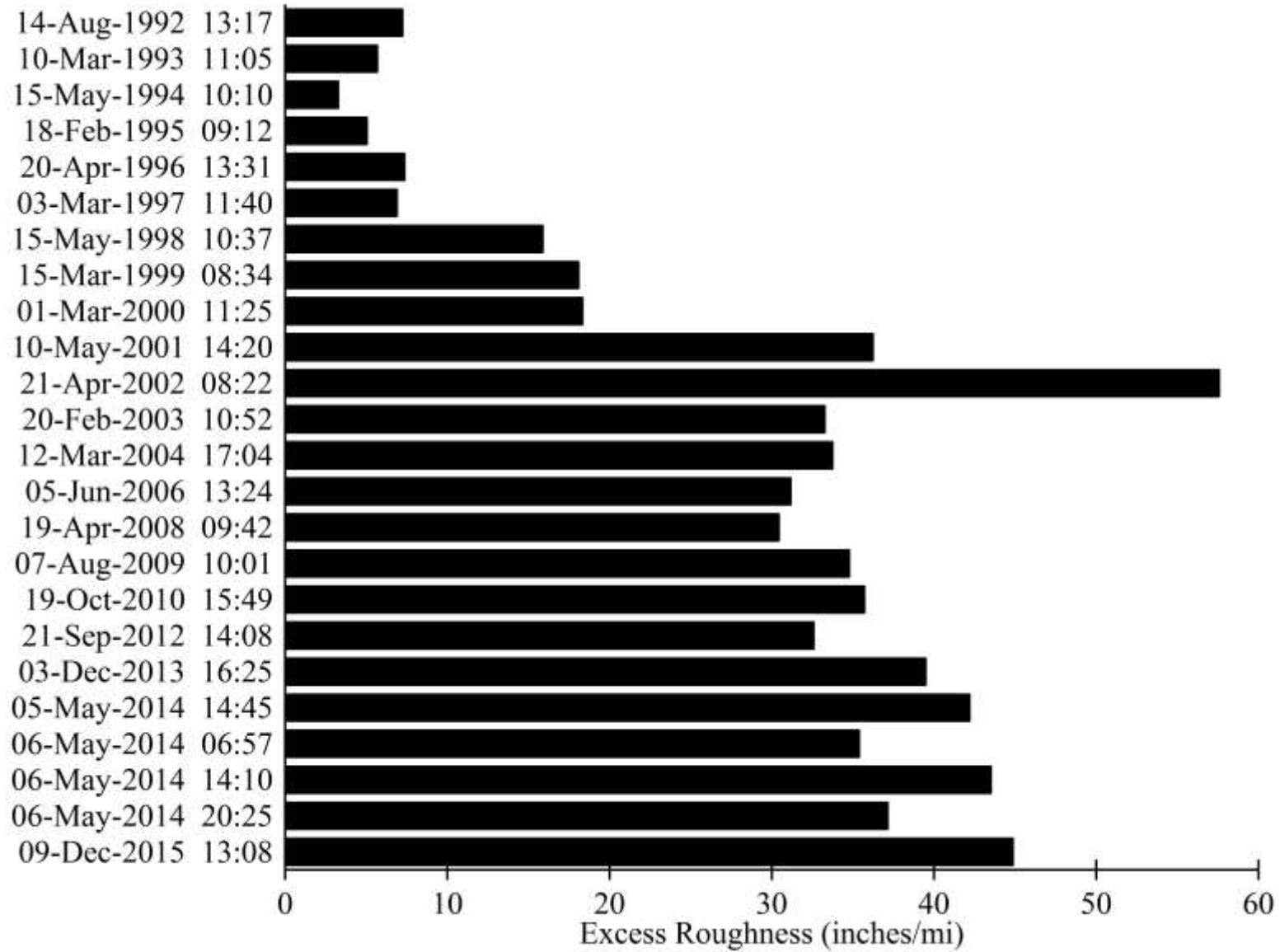
# Long-Term Changes: ALR Severity



# Long-Term Changes: ALR Map



# Long-Term Changes: ALR Severity



# Long-Term Changes, Observations

ALR of test sections varied in the following ways:

- Little or no ALR.
- Stable ARL.
- ALR growth with age.
- Confounded ALR growth.

# The Report.....

- Provides more background.
- Addresses base length, index type, and roughness threshold.
- Addresses repeatability more formally.
- Includes several additional examples.

Thank you!!!!