

Understanding Stripped Lines in Residual Plots of Stem Analyzed Dominant Height Modeling

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Outline

- Stem analyzed dominant heights are an important data source for site index modeling.
- We and other modellers have experienced that stripped lines appear in residual plots of stem analyzed heights.
- This short talk will present a quick statistical explanation to such stripped lines, which turns out to be a very natural phenomenon.

Stripped lines: lodgepole pine example (adapted from Huang 1997)

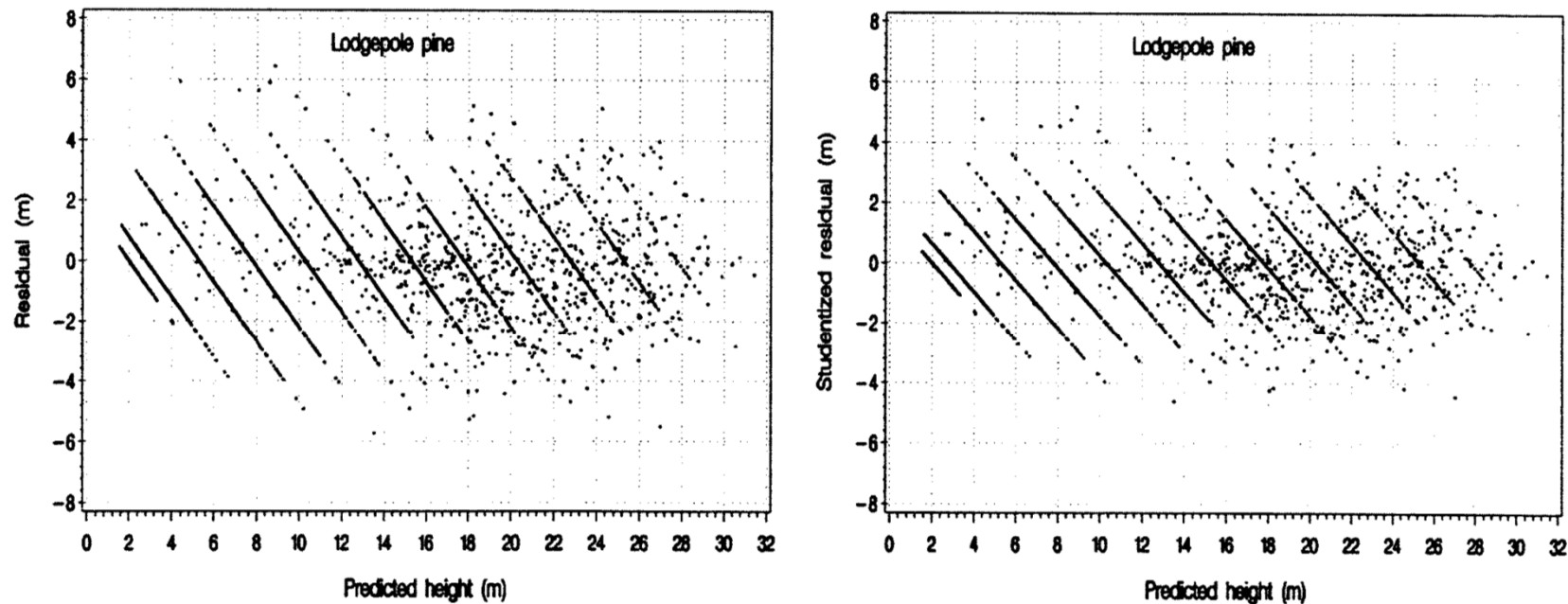
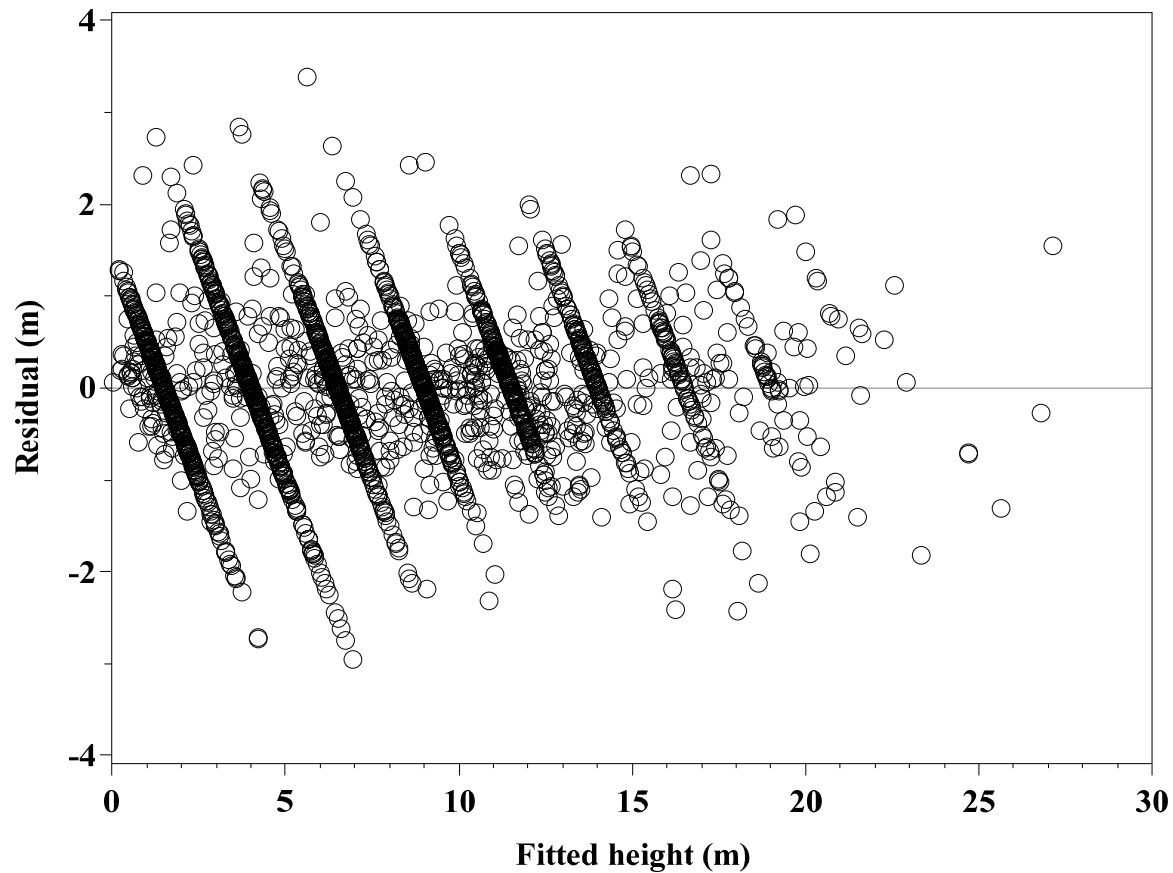


Figure 1. Residual and studentized residual plots from model [1] on the lodgepole model fitting data set.

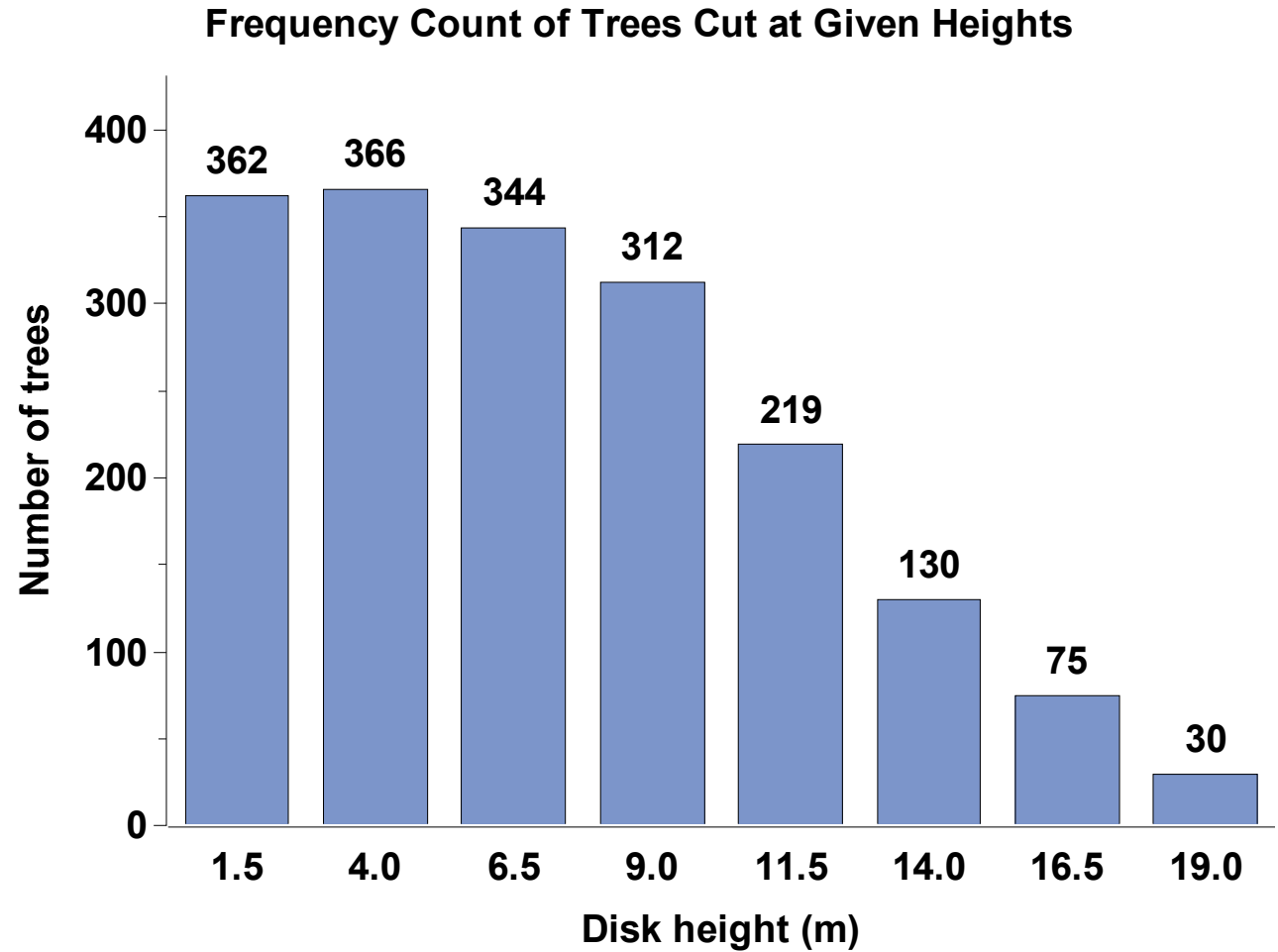
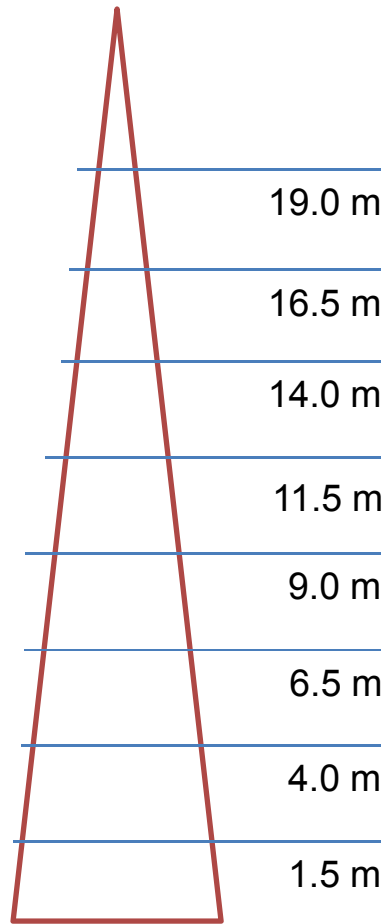
Huang, S. 1997. Development of compatible height and site index models for young and mature stands within an ecosystem-based management framework. In Proceedings of the Empirical and Process-based Models for Forest Tree and Stand Growth Simulation, 21-27 September 1997, Oeiras, Portugal. Edited by Ana Amaro and Margarida Tome. Technical University of Lisbon, Portugal. pp. 61-98.

Stripped lines: black spruce



Thanks to Dr. Shongming Huang for permission on use of the black spruce data, the same one used in Wang M., Bhatti J., Wang Y., and Varem-Sanders T. 2011 For. Sci. 57(3):241-251.

Stem analysis: black spruce (413 trees)



Parallel stripped lines: simple stat

- Scatterplots of residuals $H - \hat{H}$ versus estimated values \hat{H}
- Residual for any given height cookie, $H_c - \hat{H}$
- A number of cookies cut at the same height,

$$H_{ci} - \hat{H}_i = H_c + (-1)\hat{H}_i$$

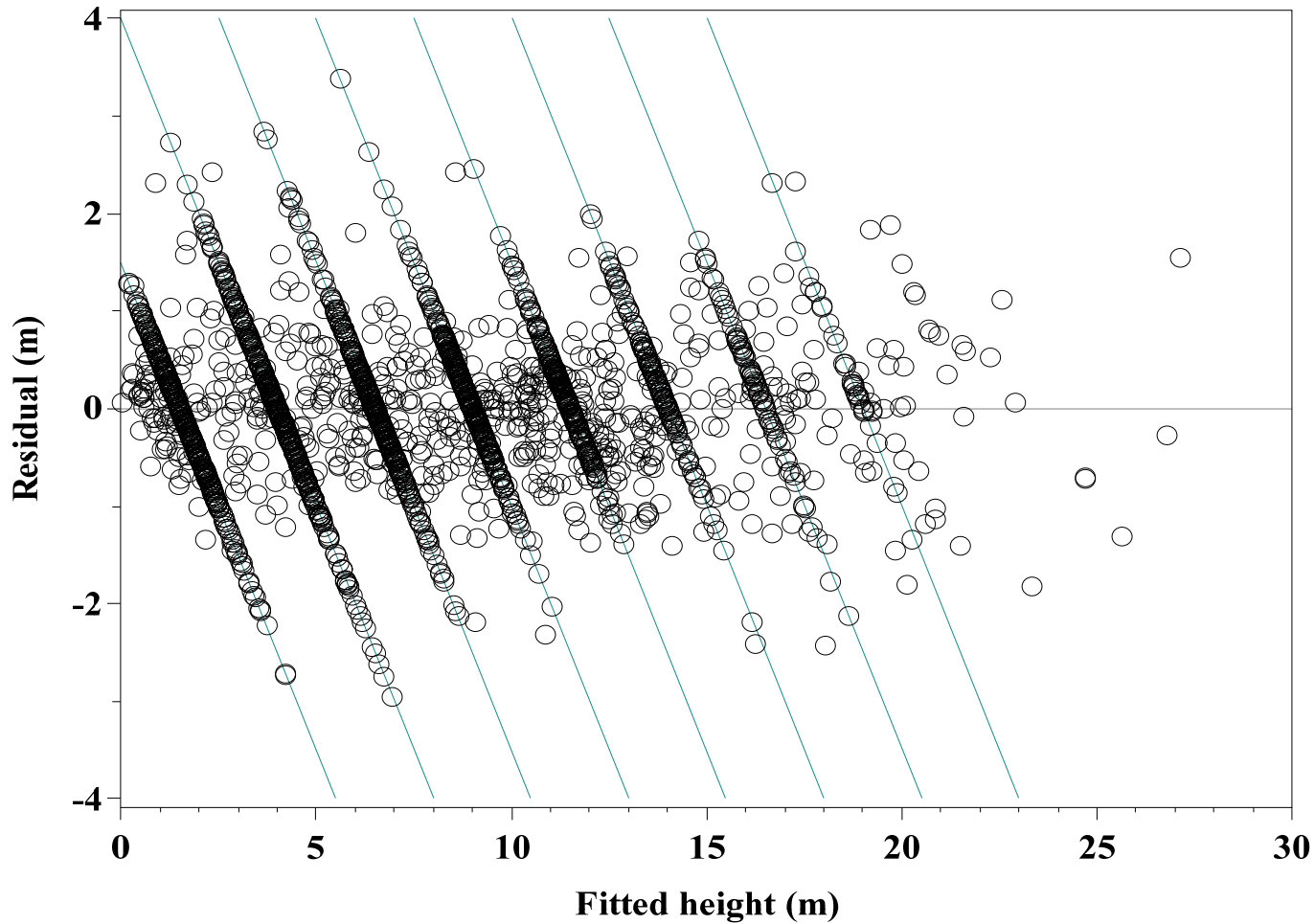
$$y_i = a + bx_i$$

$$y_i = H_c - \hat{H}_i, \quad x_i = \hat{H}_i$$

$$a = H_c, \quad b = -1$$

Parallel stripped lines

$$H_{ci} - \hat{H}_i = H_c + (-1)\hat{H}_i$$



Parallel stripped lines: in memory of Dr. S.R. Searle

- Thanks to the late Dr. S.R. Searle for his American Statistician publication “Parallel lines in residual plots” in 1988.
- <http://www.news.cornell.edu/stories/2013/02/professor-emeritus-shayle-searle-dies-84>

Comments, Questions?

