Analyzing and Influencing Carbon Sequestration in Harvested Wood Products

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Abstract

WOODCARB3 expands the capabilities of the WOOD-CARB2 spreadsheet model by changing to an R package platform. The conversion brings increased capability for data manipulation, analysis, and reporting. It also increases the ease of integration with other datasets. This poster describes some of the results and demonstrates some of the potential for the WOODCARB3 model. Examples of the types of analysis possible include uncertainty analysis, sensitivity analysis, alternate model dynamics, alternate pathways.

Introduction

WOODCARB2 is the current tool used by the US Forest Service to document and calculate the total carbon stocks from harvested wood products (HWP). The statistics package R, being open source in a very active engaged community, is one of the dominant platforms and offers a wide variety of tools and interfaces with other software packages.

Sequestration of carbon in forests accounts for 87% of total CO_2 removals in 2014. Carbon mitigation efforts have thus focused much attention on reforestation, forest management, and forest based products. According to the most recent report to the **UNFCCC**, an estimated 18.7% of the total carbon in woody materials is contained in harvested wood **(HWP and SWDS).**

The amount of carbon in **HWP** and **SWDS** depend on how much wood is harvested, what types of products are produced, how the products are use, the lifetime of the wood products, and how the wood is processed at the end of its primary product lifetime.

Sources of Data and Equations

I. WOODCARB II Software in Microsoft Excel®
   Note: Base level data was given in spreadsheet.
II. Harvest Quantities:

$$E = mc^2 \tag{1}$$

III. Imports, Exports, etc.:
IV. Decay of HWP:

Methodology (what we did)

- We have translated WOODCARB3 spreadsheet models into an R package.

Uncertainty Analysis

- Information is intended to aid in international discussions and any agreements about managing greenhouse gas emissions and sinks.
- Also provides national level methods and estimates of carbon sinks and emissions associated with HWP.
- The package provides quick accessibility, allowing data to be updated, modified, and manipulated with ease.
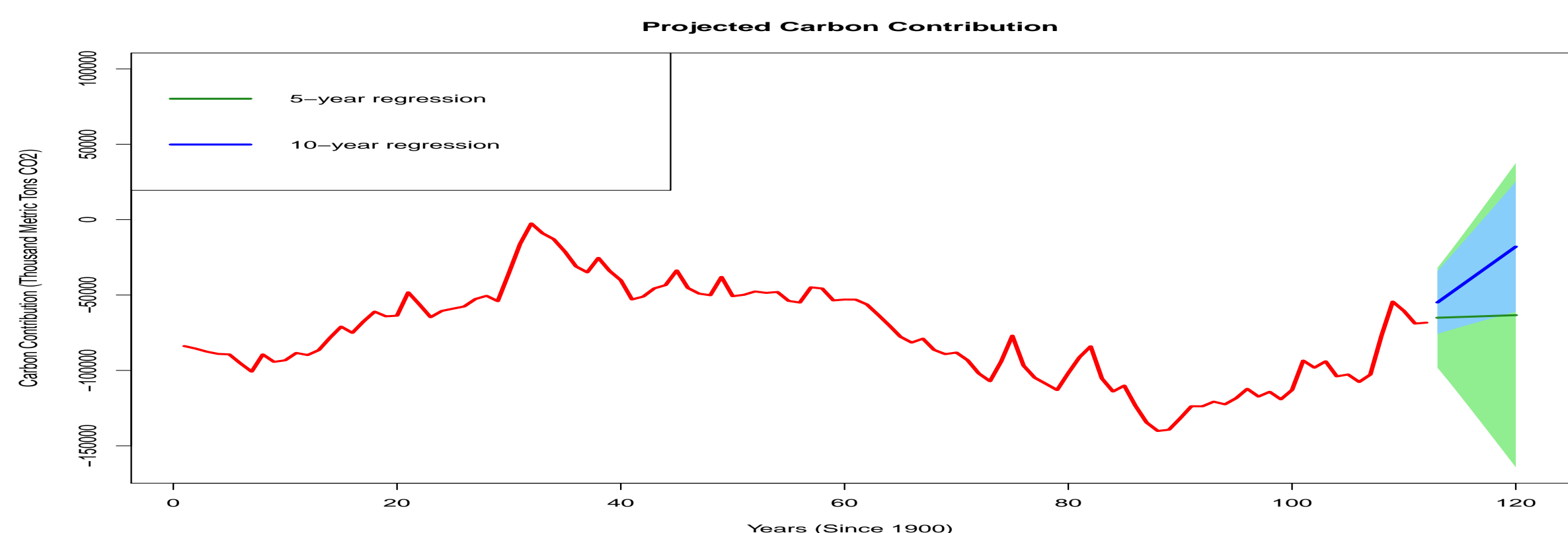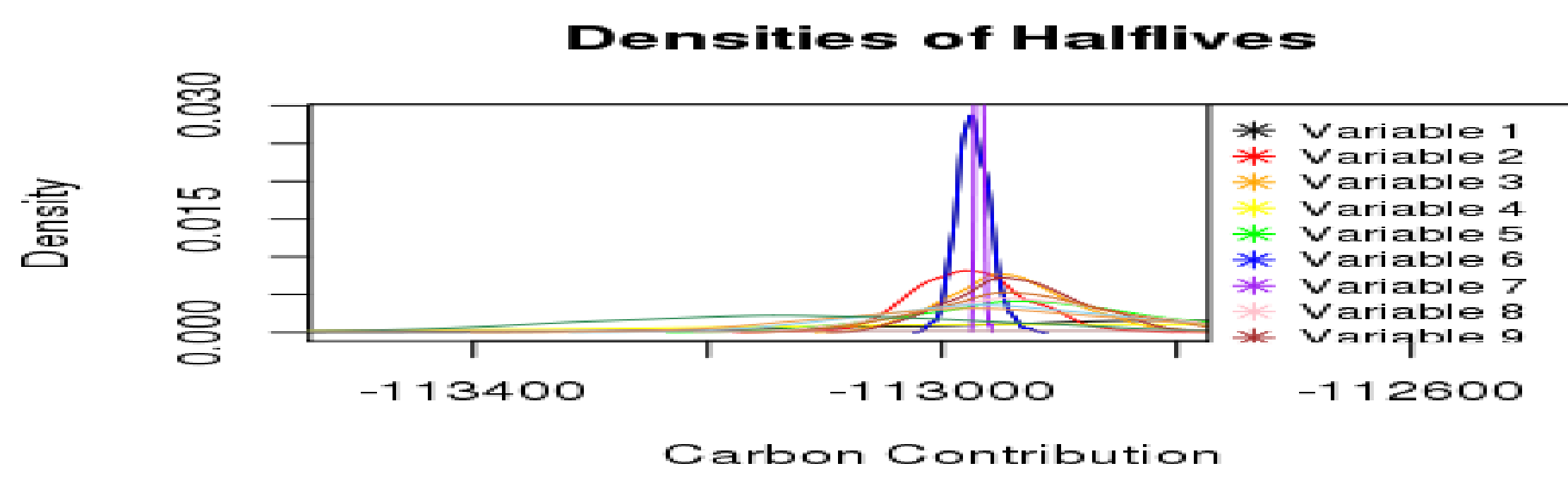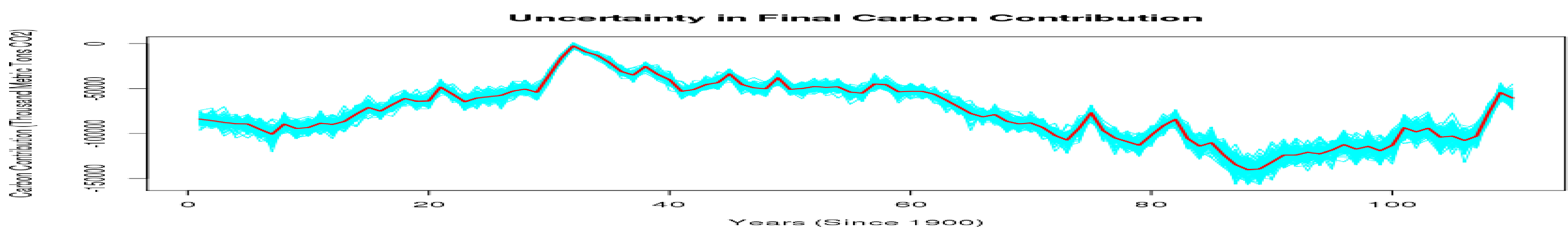
Total HWP Carbon Stocks with Uncertainty

Figure: this is the caption that shows what is in the figure that explains the plot of HWP stocks and provides and envelope of uncertainty around it this is the caption that shows what is in the figure that explains the plot of HWP stocks and provides and envelope of uncertainty around it

Decay

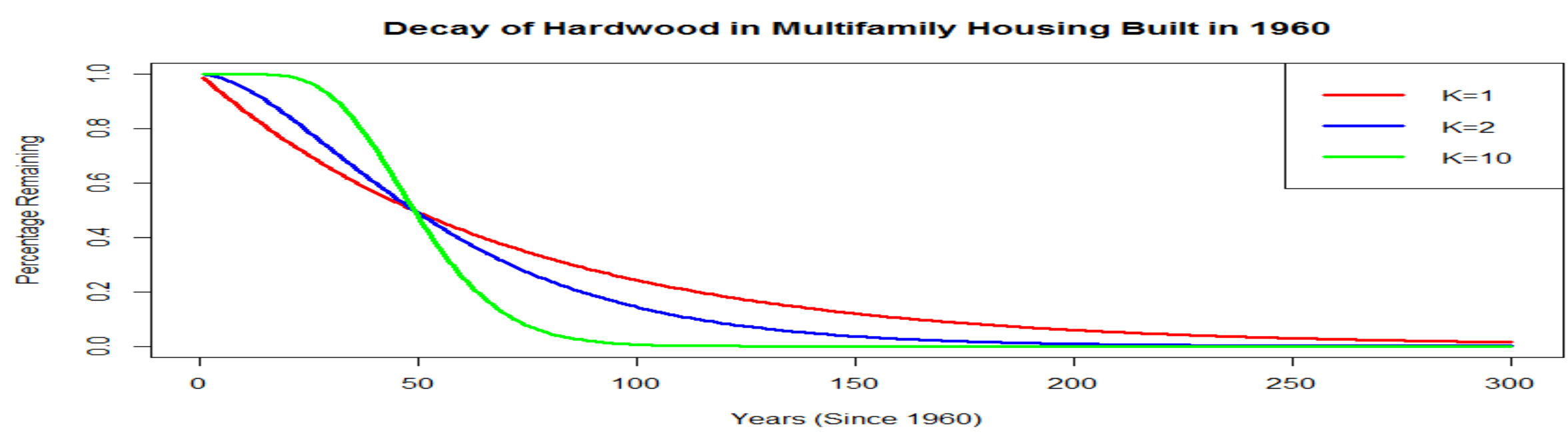## Decay of Hardwood in Multifamily housing

Figure: This figure shows the over effect of the decay function on multifamily housing built in 1960
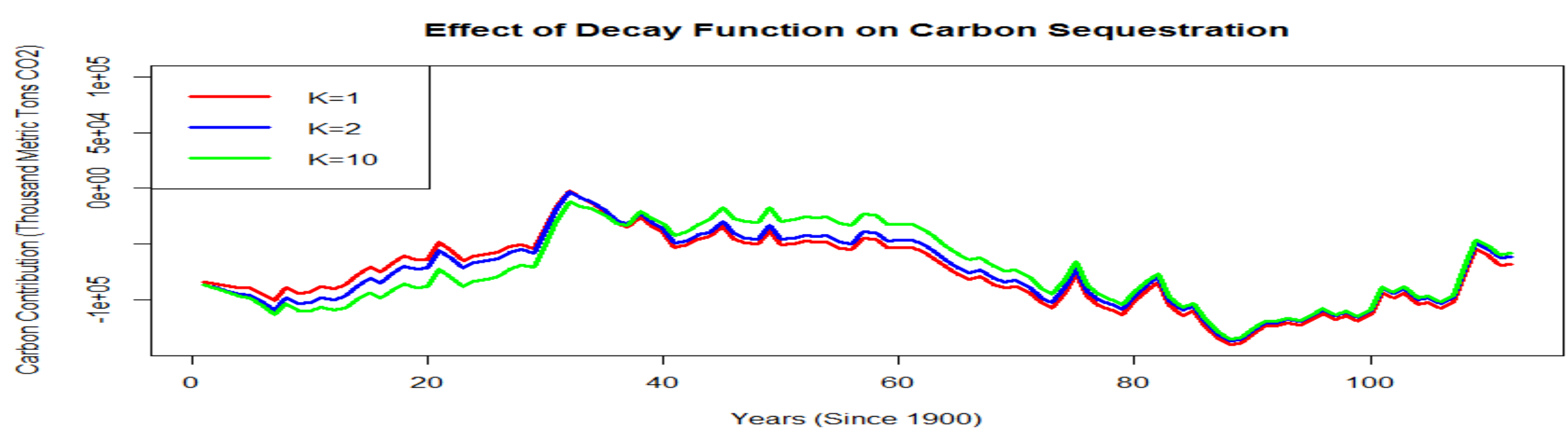
Overall Decay

Figure: This figure shows the over effect of the decay function on Carbon Sequestration

Projected Carbon Contribution

Figure 1: Projected carbon contribution based on five and ten year regressed projections.

Halflife Table

CopyOfHLTable2.pdf

Figure: Figure caption

Sensitivity Analysis

- Information is intended to aid in international discussions and any agreements about managing greenhouse gas emissions and sinks.
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Sensitivity Plot

Figure: Figure caption

Discussion

- Targeted changes in average half life can increase total stocks.
- End of life dynamics make a big difference in stock size.
- Sensitivities help channel reductions in uncertainty.

Acknowledgements

Contact Information and Package Access

- Email: marlandes@appstate.edu
- Online link: WOODCARB3R package