Modeling the Impact of Agricultural Terrace Walls on Spatial Patterns of Erosion and Landscape Evolution



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Research Objectives

1. Implement terrace walls within a landscape evolution model

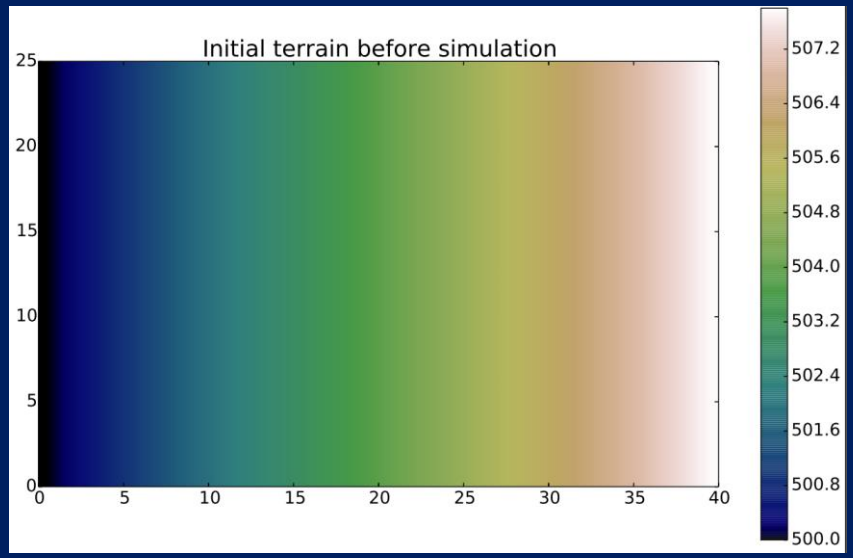
2. Test the impact of human intervention with the terrace walls
   a. Interval between checking the wall for maintenance
   b. Time since abandonment of terraced land

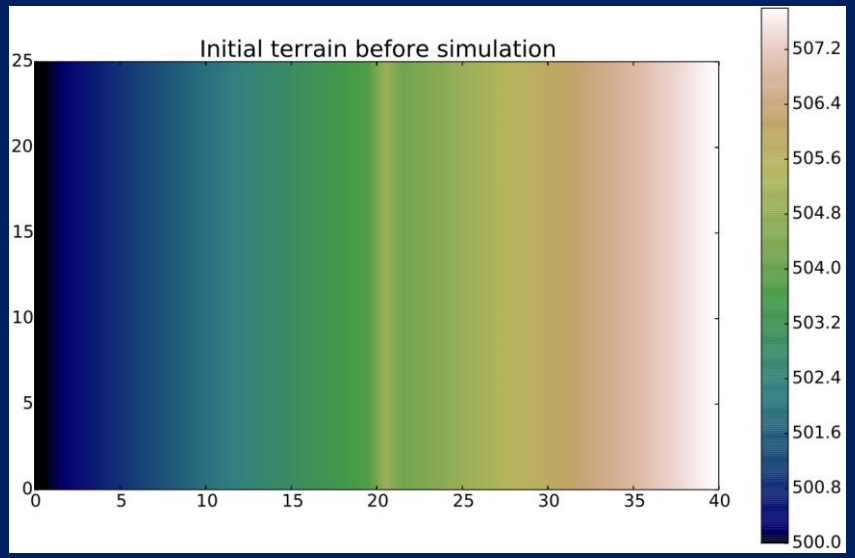
Model

Landscape evolution model from Chen et al. (2014); implemented in Python using Landlab components (Tucker et al. 2013)

- Eq. 57: Water transport and conservation
- Eq. 58: Terrain elevation change
- Eq. 59: Sediment transport and conservation

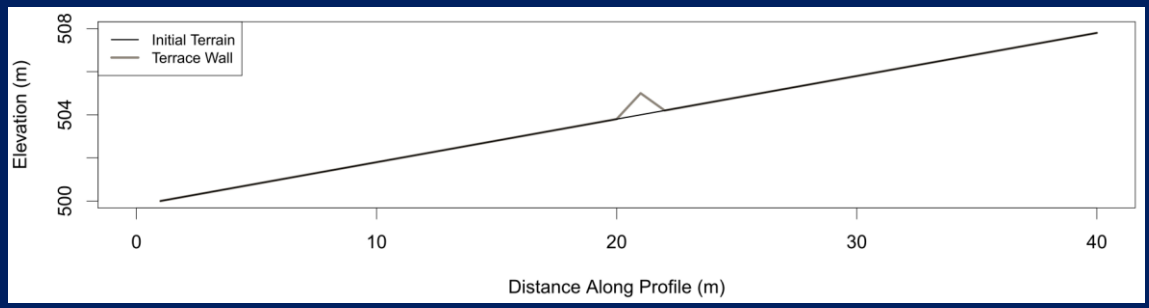
Terrace wall elevation added to DEM





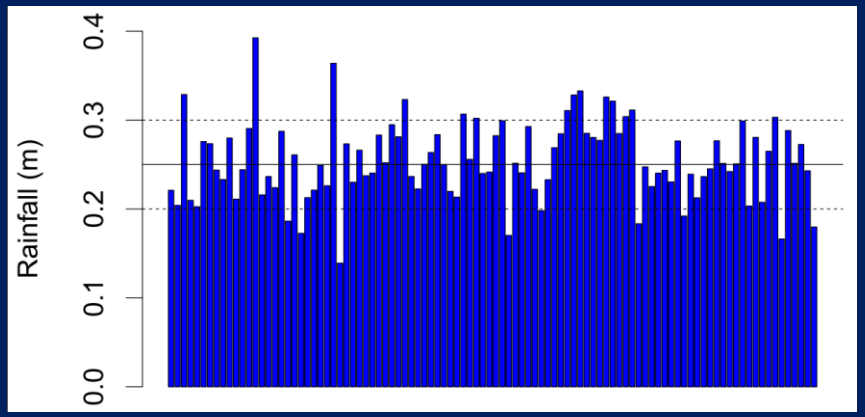
Simulations

Synthetic hill with 20% slope



1.0 m high terrace added

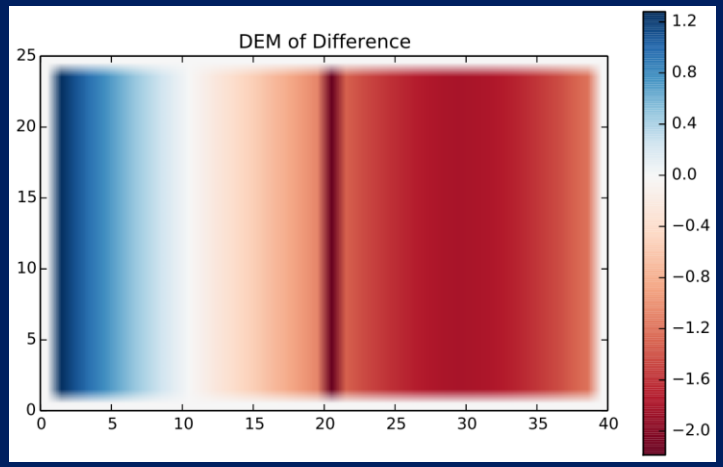
100 years of simulated time



Rainfall distribution; runoff coefficient of 0.1

Human intervention scenarios:

- Maintenance check interval
  - 1 or 4 years
- Time until land abandonment (end of maintenance)
  - 0, 20, 50, or 100 years



Results and Conclusions

1. Implement terrace walls within a landscape evolution model (LEM)
2. Test the impact of human intervention with the terrace walls
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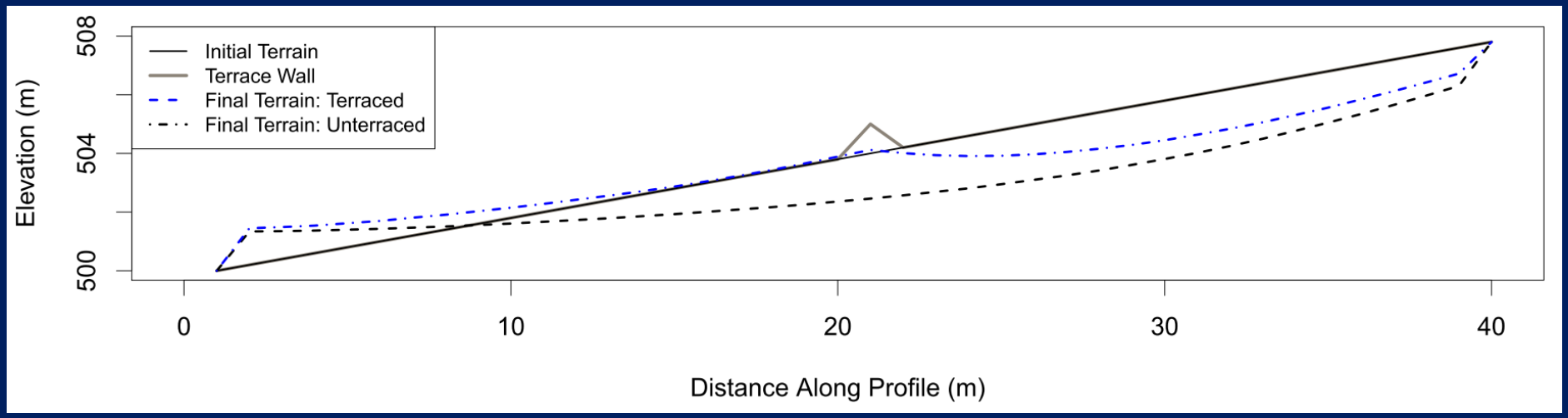

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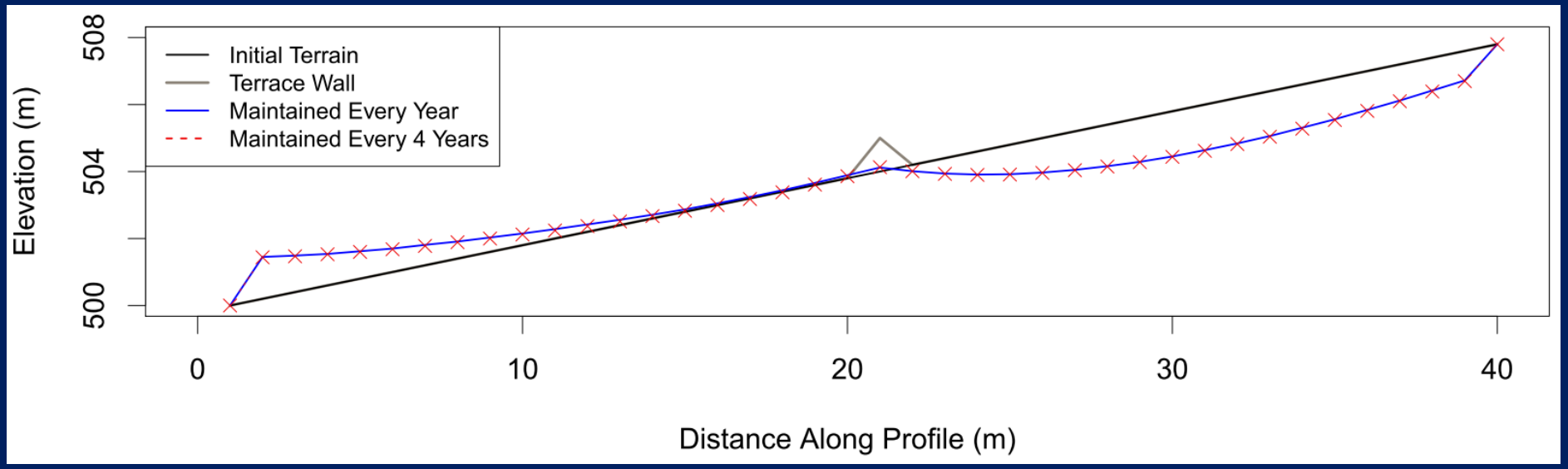

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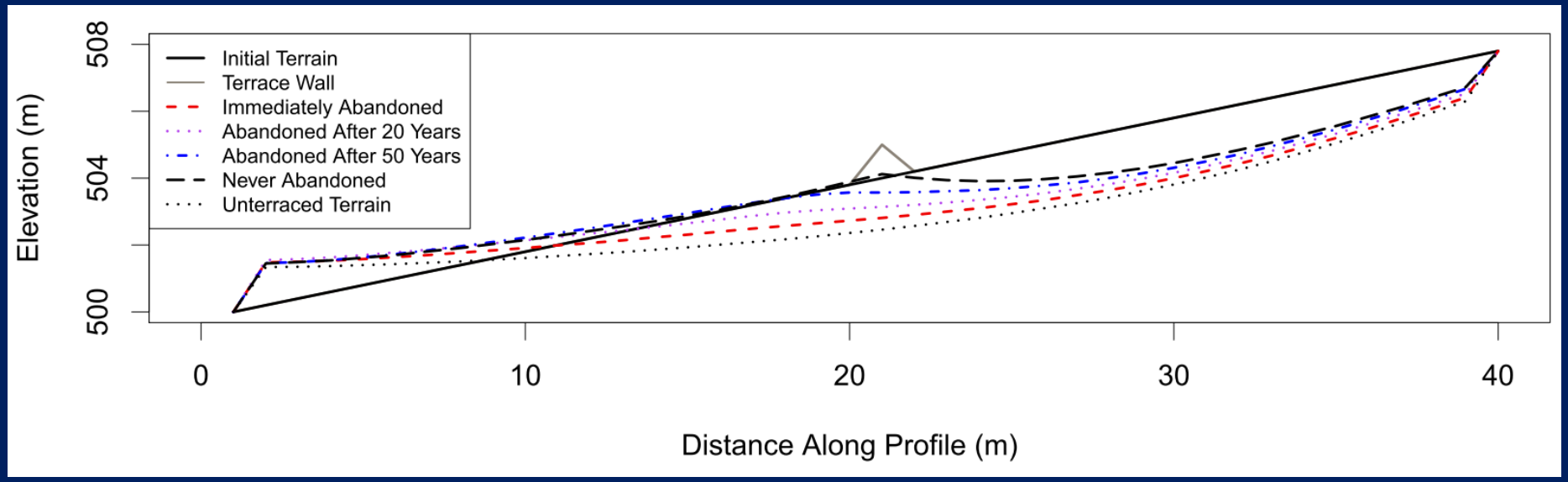
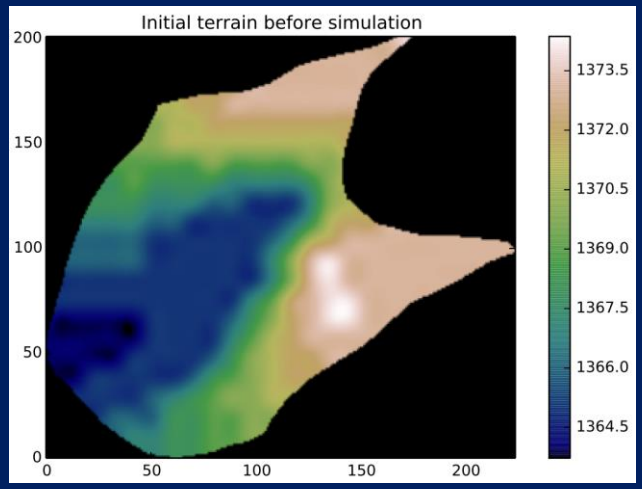
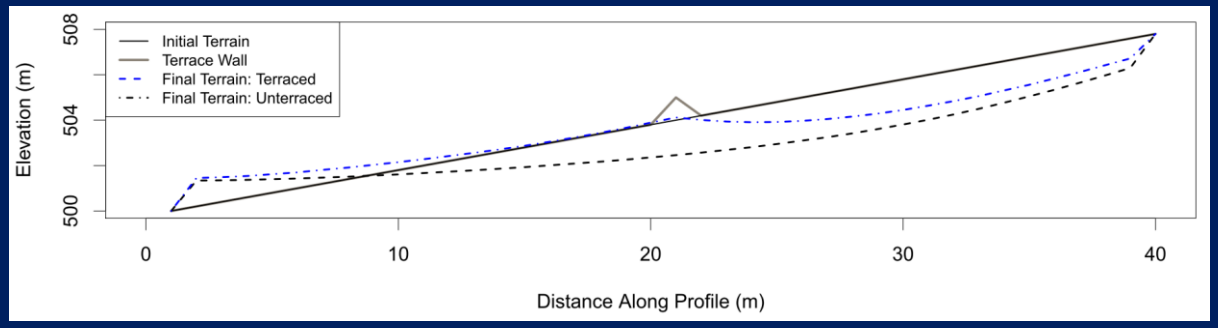


Future Directions

Calibrate the model for Walnut Gulch Experimental Watershed (WGEW) in southern Arizona



Modify model for stone terrace walls



Comments or Questions?
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