A FRESH LOOK AT PICKETT'S CHARGE

2021-11-16

Jonathan Poggie, Sorin Matei, and Robert Kirchubel

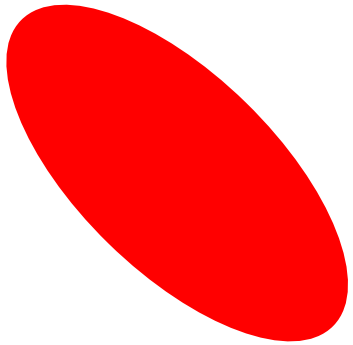
FORCES Initiative, Purdue University

PURDUE UNIVERSITY

Battle Flow: Alternative Perspective on Battles and Crises

- Conventional models: game pieces
- Discrete units: arbitrary aggregation
- Continuous flow may provide
  - More realistically portray troop motion
  - Intuitive understanding of momentum of conflict
  - Tool for training and decision making

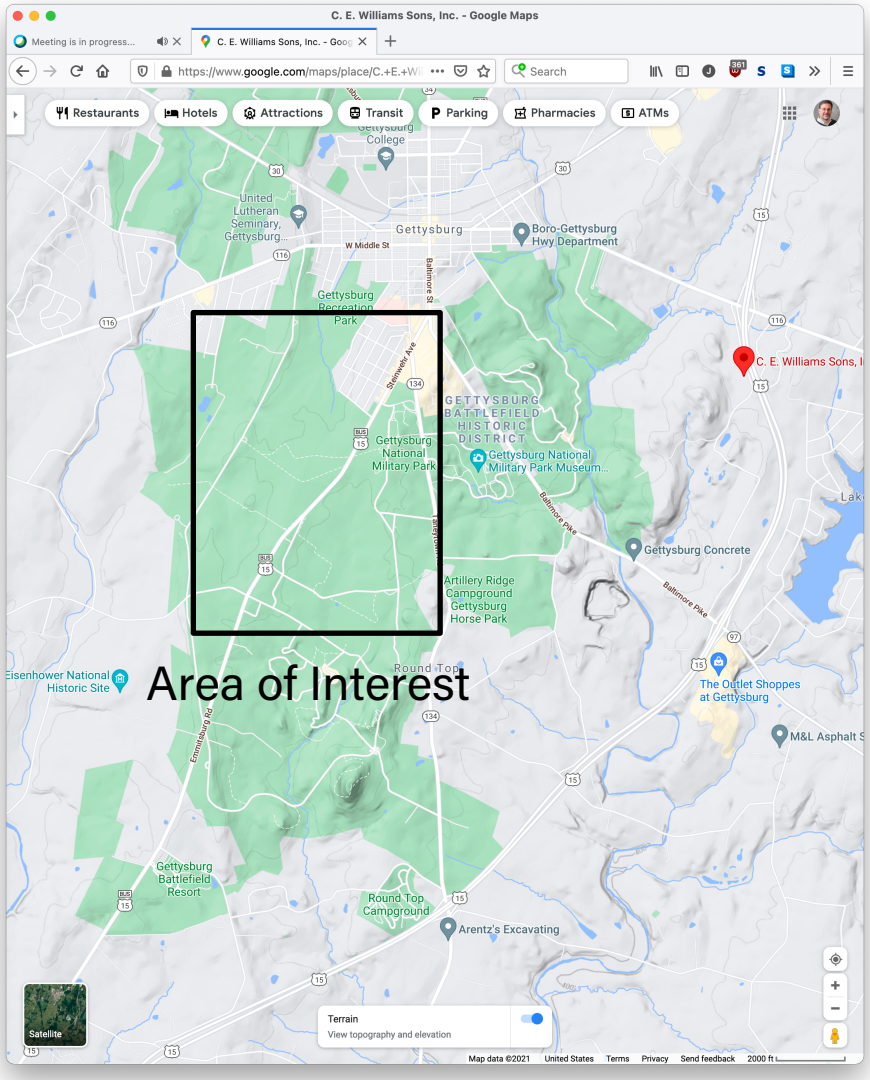
Rigid, Discrete
Game Counter



Continuous Density
Battle Flow Unit

Battle of Gettysburg: July 1-3, 1863

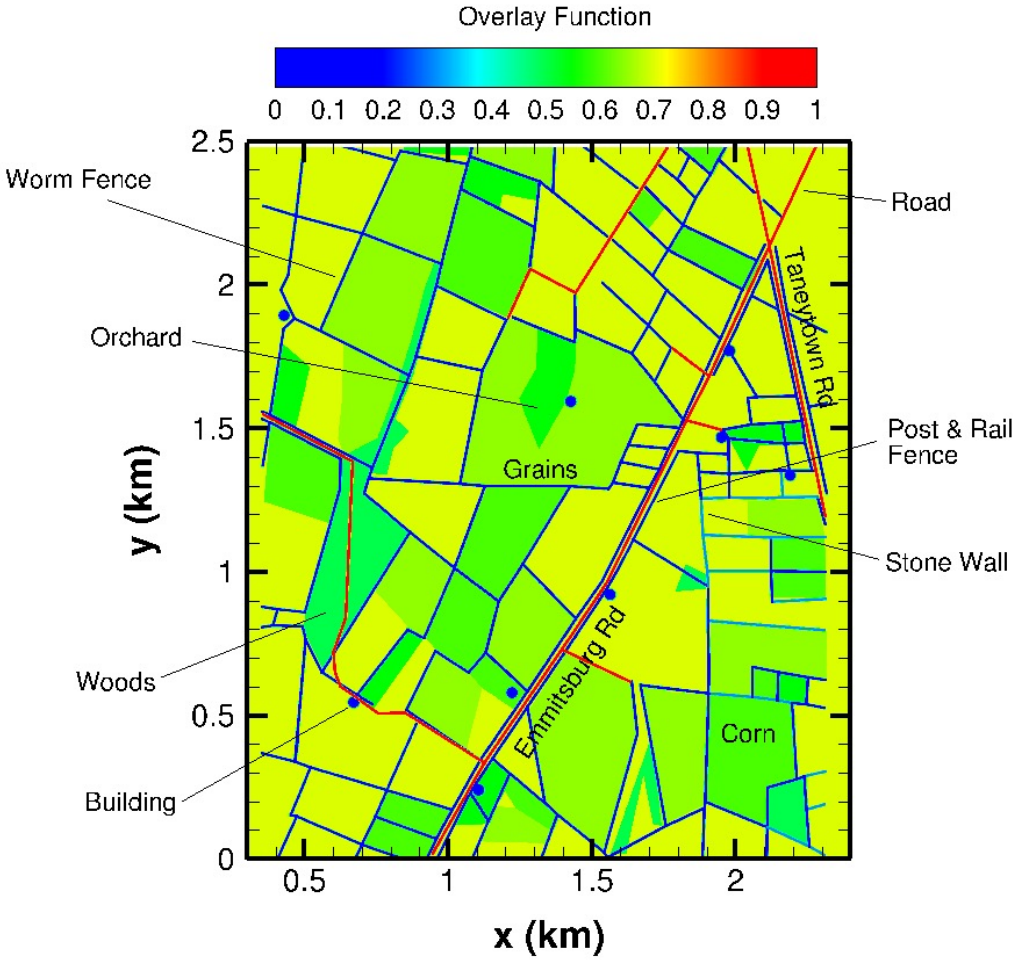
Modern Map



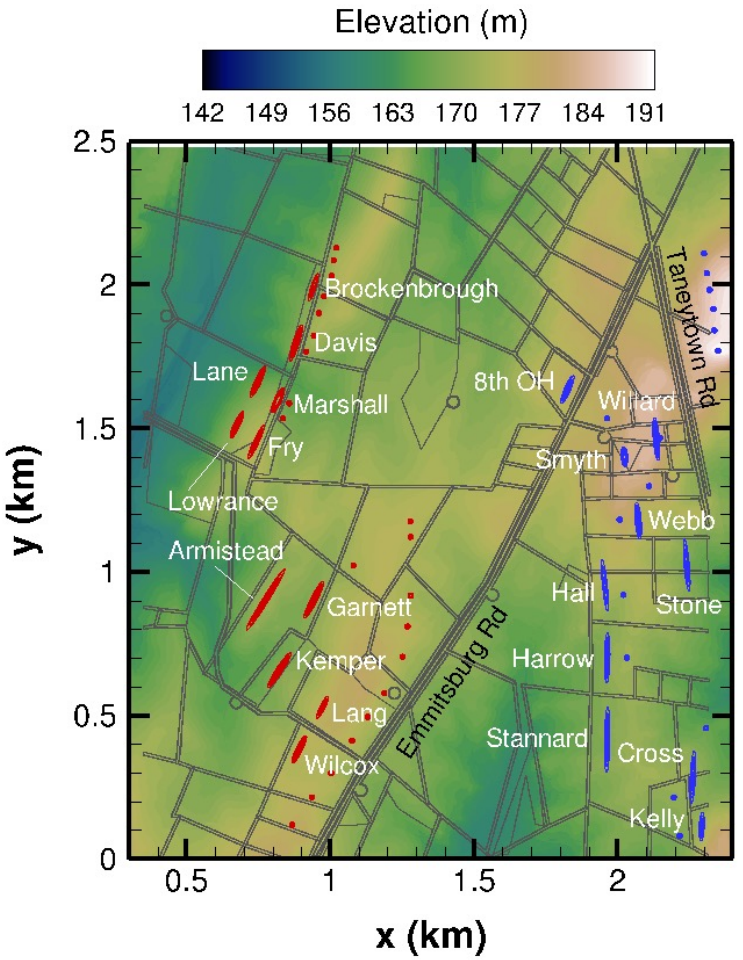
JP Photos

Pickett's Charge:
Day 3 of Battle of Gettysburg
July 3, 1863, about 2:30 PM
About one hour

Overlay Layer and Contour Map



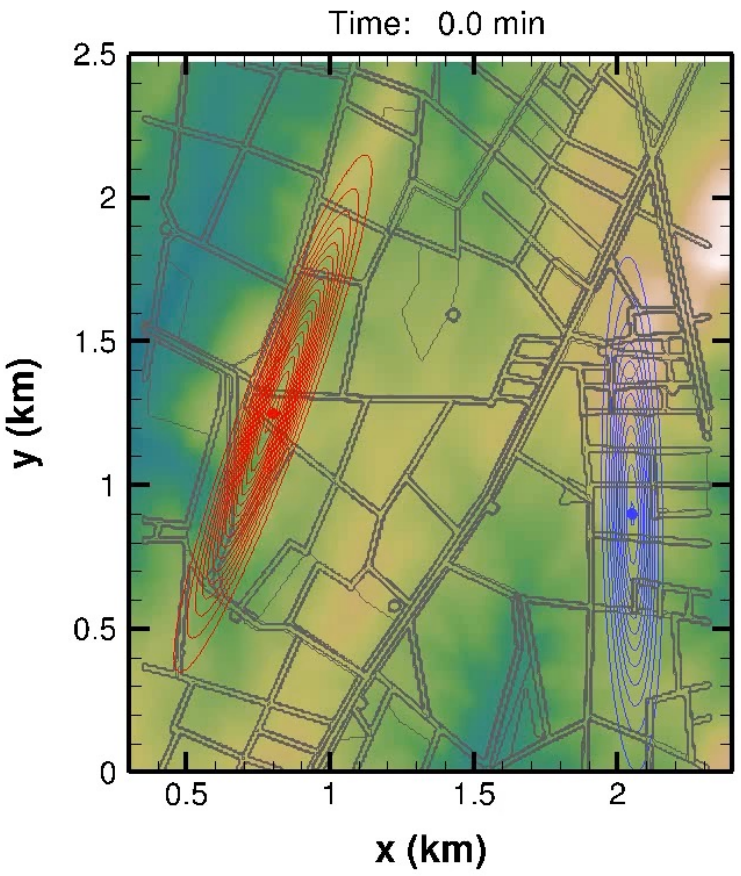
Collin Tofts (undergrad, CS)



Matthew Ellis (PhD student, Poli Sci)

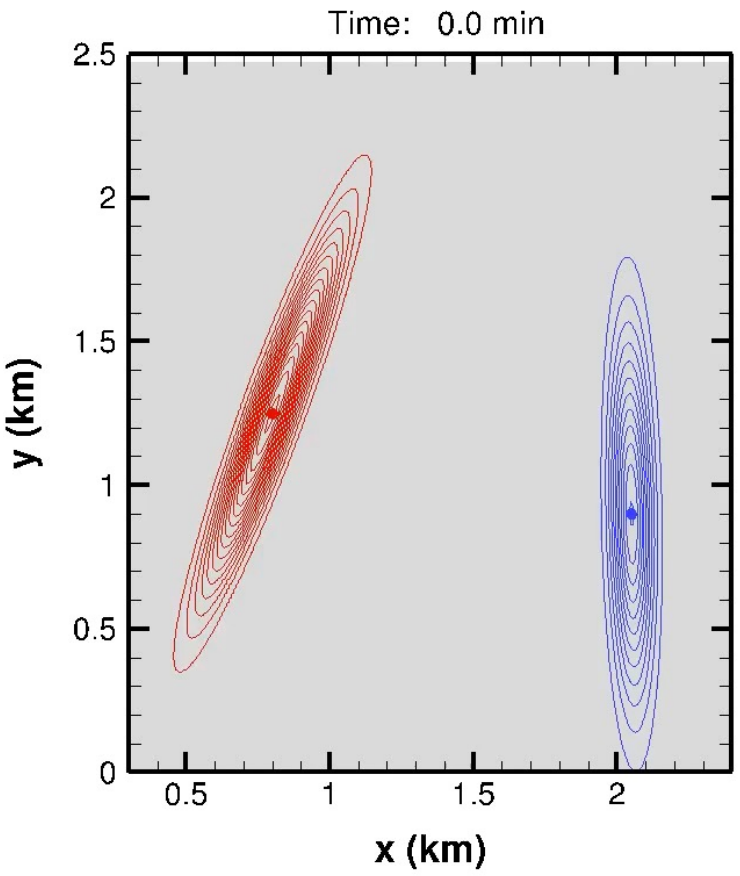
Army Level of Aggregation

Elevation and Terrain Included



https://engineering.purdue.edu/~jpoggie/battle_flow_model/armies.mp4

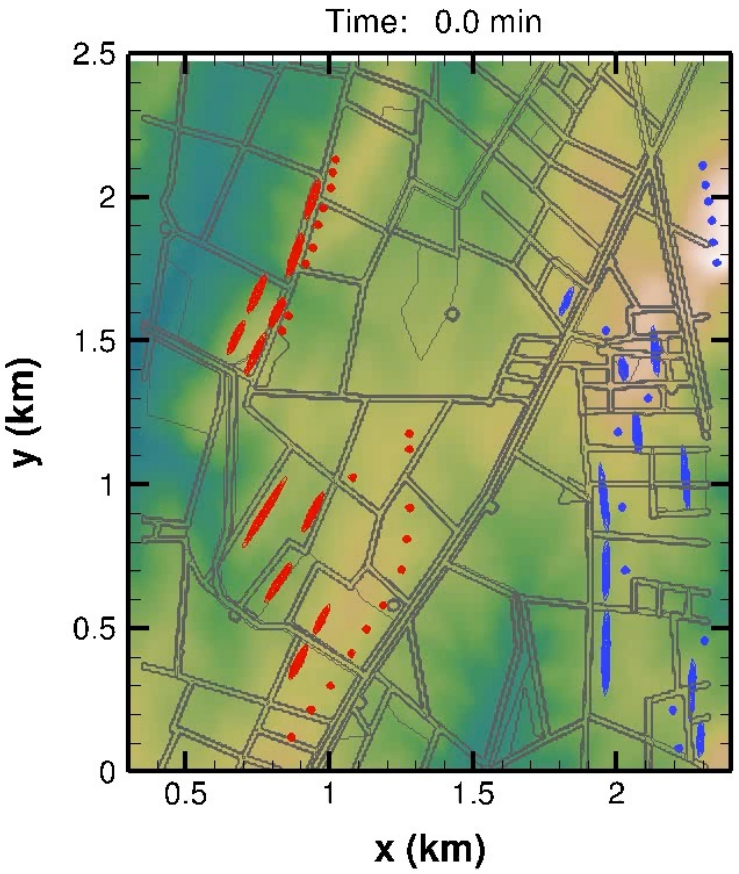
Perfectly Flat Landscape



https://engineering.purdue.edu/~jpoggie/battle_flow_model/armies_no_terrain.mp4

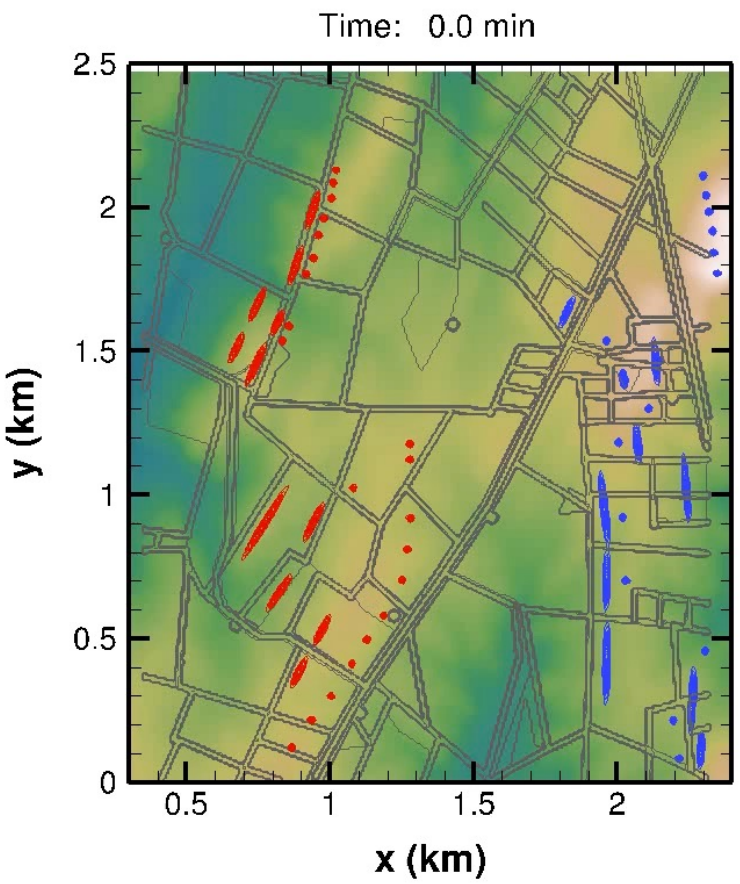
Brigade Level of Aggregation

Continuous Agents (Our Model)



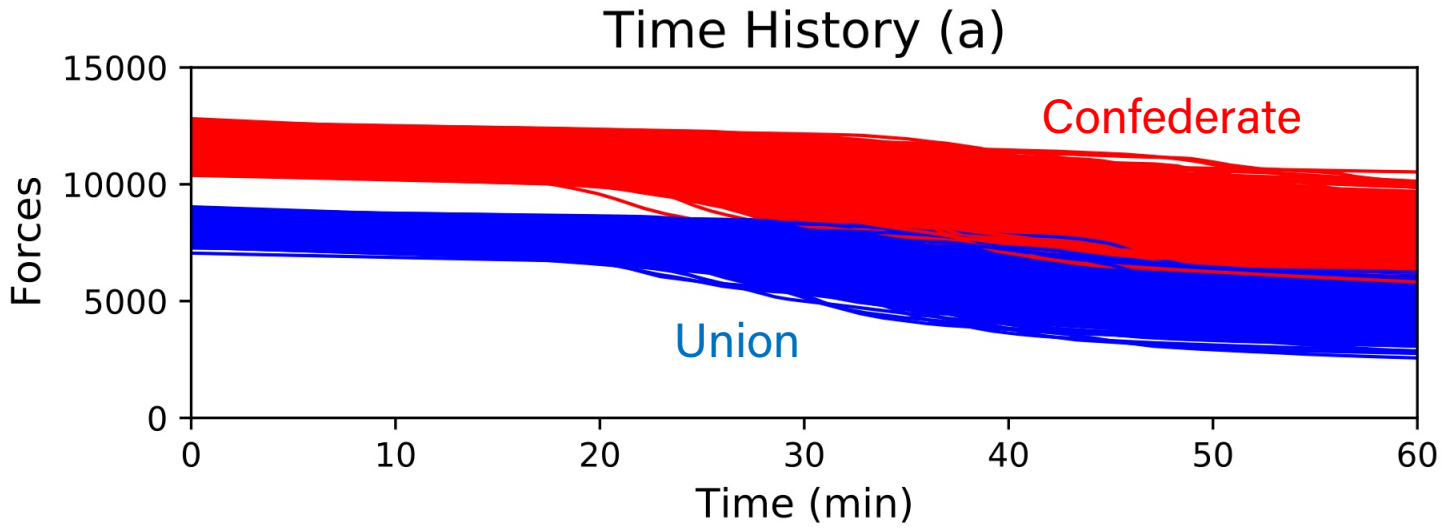
https://engineering.purdue.edu/~jpoggie/battle_flow_model/brigades_case0.mp4

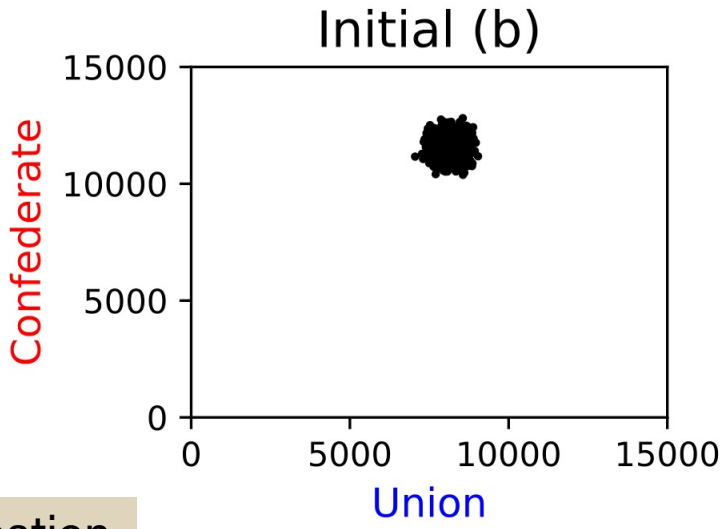
Discrete Agents (Traditional Model)

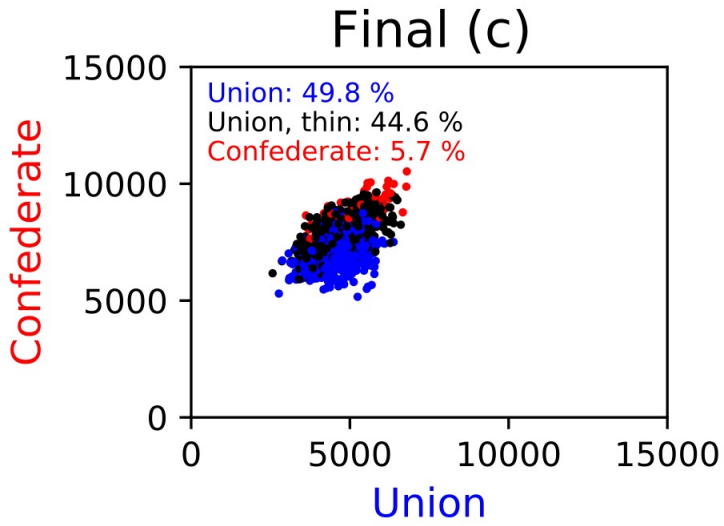


https://engineering.purdue.edu/~jpoggie/battle_flow_model/brigades_case0_discrete.mp4

Statistical Analysis







Confederates win only 6% of cases

Random model perturbation
1000 cases

Take Away Points

- Confederates cannot fire effectively while moving
- Terrain slows pace of battle and favors defenders
- Confederate victory in only 6% of cases
- Insufficient Confederate force to break and hold Union lines

PURDUE UNIVERSITY®

THANK YOU

Acknowldegements:

Matthew Ellis (grad student) helped with maps

Collin Tofts (undergrad) generated overlay layer

Prof. Carol Reardon provided historical context and tour

Dr. Anna Creese researched historical details, helpful discussions

Computer time on Purdue RCAC Halstead Cluster

PURDUE UNIVERSITY®