
Issues in Spatially Explicit Modeling

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What does it mean to be spatially explicit?

- The invariance test
 - spatially explicit models are not invariant under relocation
- The representation test
 - spatially explicit models include spatial representations in their implementations
- The formulation test
 - spatially explicit models include spatial concepts in their formulations
- The outcome test
 - spatial structures of inputs and outcomes are different

Why make models spatially explicit?

- Part of the formulation is spatially explicit
- Boundary/initial conditions vary in space
- Processes are non-stationary in space
 - first-order effects
- Processes are formulated to include spatial concepts
 - second-order effects
 - distance, adjacency, connectivity
 - spatial convolution

Modeling LUCC

- Many inputs, component processes are not spatial
 - but many are
- Spatial aspects of outputs are critically important
 - research questions are about spatial structure of outcomes

The spatial toolkit

- CA
 - rules based on adjacency, connectivity, distance
- Agent-based models
 - may be spatial
- Spatial regression, econometrics
 - models with spatial, temporal lags
- Summary statistics
 - fragstats, geostatistics, ...

Spatial issues

- Scale
 - extent, resolution
- Temporal scale
- Spatio-temporal scale
- Distinct ontologies
 - fields, objects
 - scales

Objects

- Have integrity, persistence
 - under motion and editing
- Organisms, patches, watersheds, parcels
- Spatial interaction models

Fields

- Functions of location
 - $z(x,y)$ or $c(x,y)$
- Population density, soil class, land ownership, mean rainfall, soil organic content
- Smoothly varying
 - geostatistics
- PDEs, spatial lags, convolutions

Editor

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Untitled - ArcMap - ArcInfo

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Layers

- uscnty



Tools

- [Zoom In] [Zoom Out]
- [Full Screen] [Full Screen Extent]
- [Hand] [Home]
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- [Identify] [Identify All]
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119°25'10.18"W 34°41'9.73"N


Editor

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Untitled - ArcMap - ArcInfo

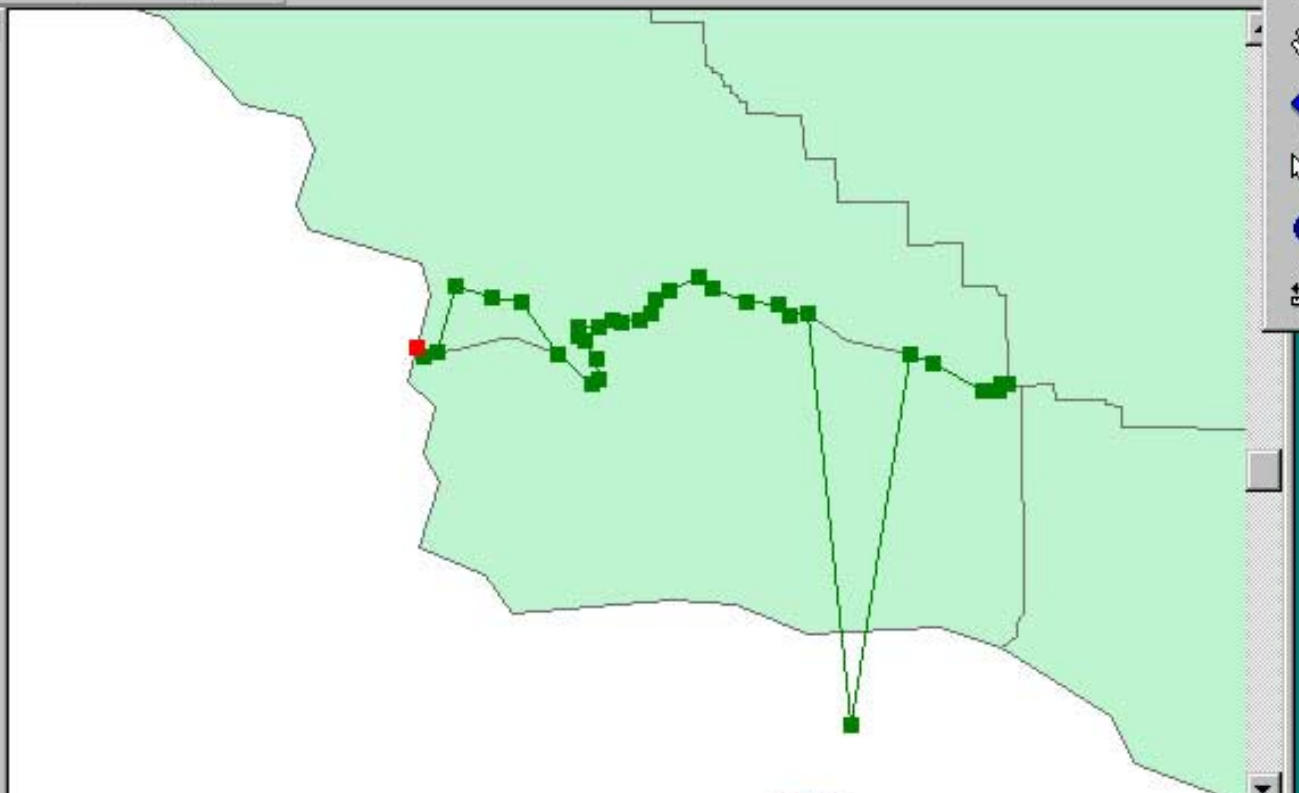
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Layers

- usgeog polygon



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121°17'17.34"W 34°12'12.74"N

Tools

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Hybrid models

- Organisms that behave in response to fields
 - people responding to crowding, neighborhood quality
- Role of scale in definitions of objects, fields