What is Geographic Information Science (GISc)?

GISc Forum October 15th 2013

1. What is Geographic Information Science?

(a) The science of handling spatial data.

(b) GISc underpins any scientific research where the characteristics of **places** and **spatial relationships** between places are important for:

- description;
- Explanation (modelling);
- prediction (including interpolation);
- tactical or strategic policy related activity.

(c) Not the preserve of any one discipline.

2. The "science" in GISc.

Preconditions for a science	**….for GISc**
Good quality *data* (fit for purpose).	….including the geo-coded data (locational referencing).
Well defined *questions* or hypotheses capable of being subject to rigorous testing.	….with a locational or geographical dimension.
Rigorous *methodology* (e.g statistics)	….(e.g spatial statistics; spatial data analysis)
Technology to support work attaining satisfactory levels of precision (e.g computers)	….GIS + specialist statistics packages

3. Some areas of GISc: thinking spatially

(i) Constructing explanations.

Places: by possessing different levels of important explanatory variables they sometimes constitute a “natural experiment” (e.g. air quality and health outcomes).

Outcomes in different places may not just be a consequence of their “place-based” or “internal” characteristics.

Outcomes may also be a consequence of relational or wider ‘contextual’ influences:

Spatial relationships: the location of places relative to one another.

- distance to a specific place (e.g to city centre; from pollution source);
- attribute differences ("gradients") between places (e.g.rich/poor neighbourhoods);
- spatial configuration of attributes (e.g. concentrated v dispersed poverty; the geographical clustering of economic activity).

Two (or more) places may be identical in terms of their internal (*place-based*) characteristics but if they differ in terms of their *relational* properties they may experience different outcomes.

Generic spatial processes:

- diffusion processes
  - Spread of disease
- exchange and transfer (or mixing) processes
  - Trade flows
- interaction processes
  - Price competition
- dispersal processes
  - Migration flows

(ii) Problem solving:

- Small area estimation

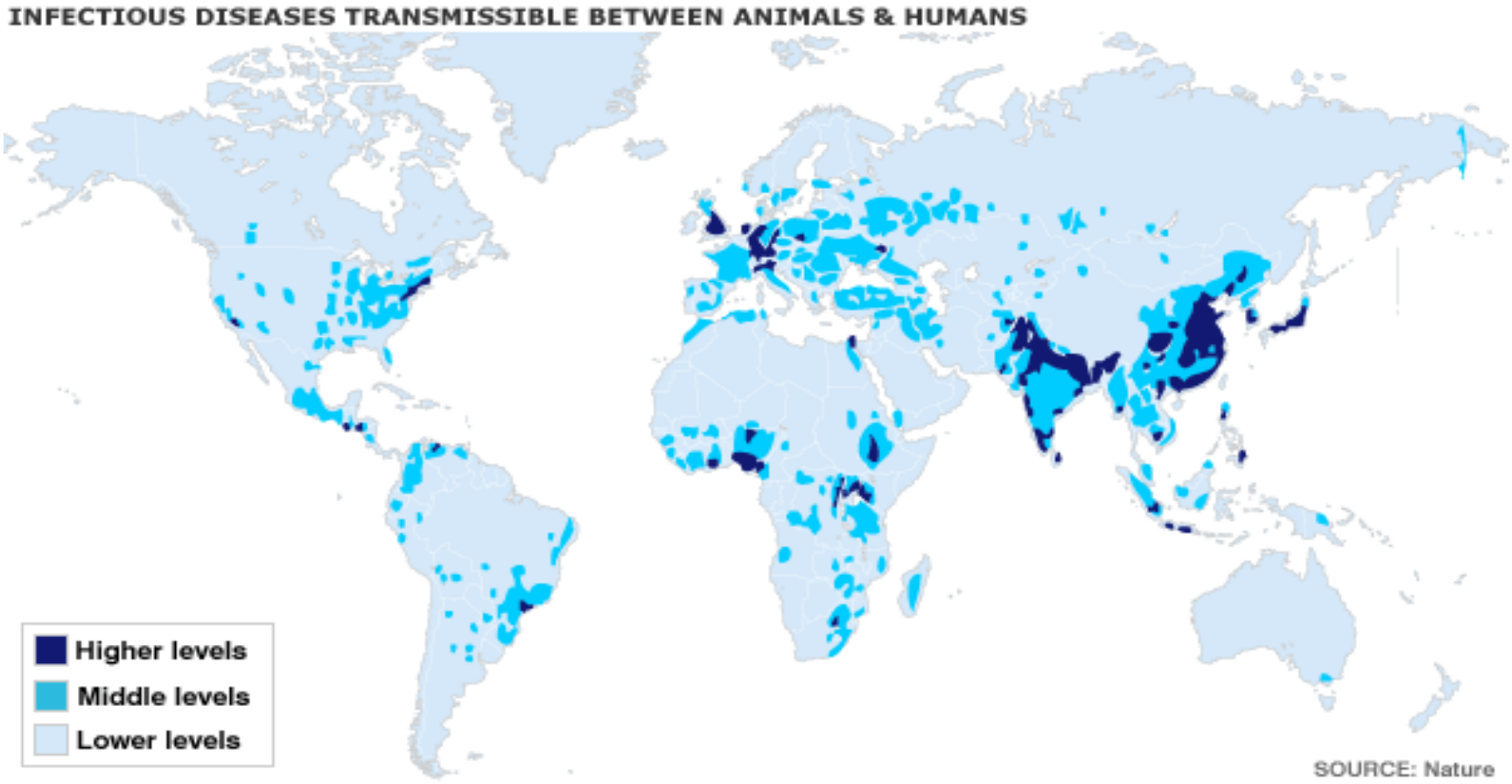
  (e.g. risk estimation).

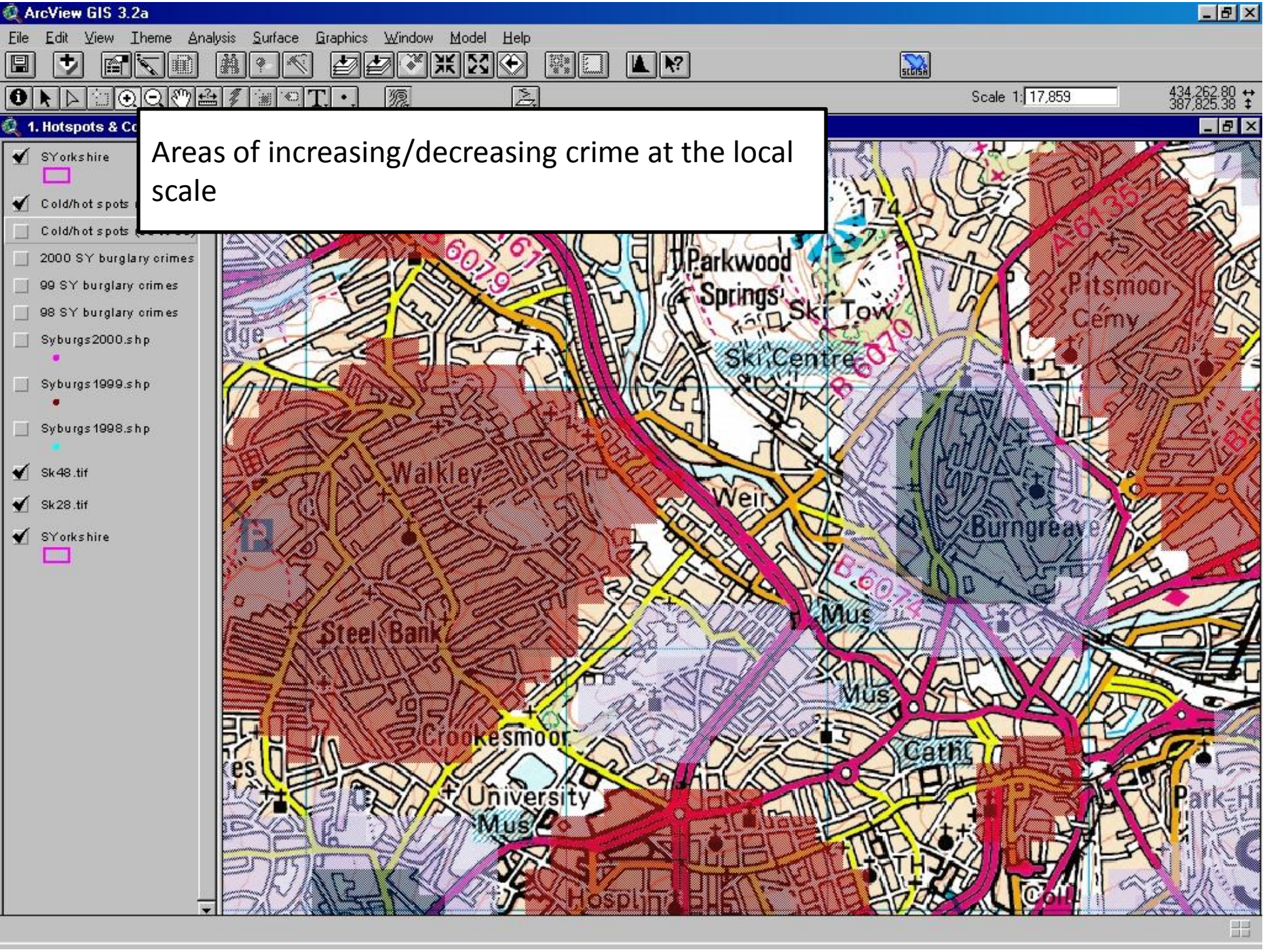
- Spatial interpolation

  (e.g. mapping from sample data; missing data estimation).

(iii) Policy related questions.

A. Better targeting of resources: infectious disease hotspots at the global scale.




ArcView GIS 3.2a
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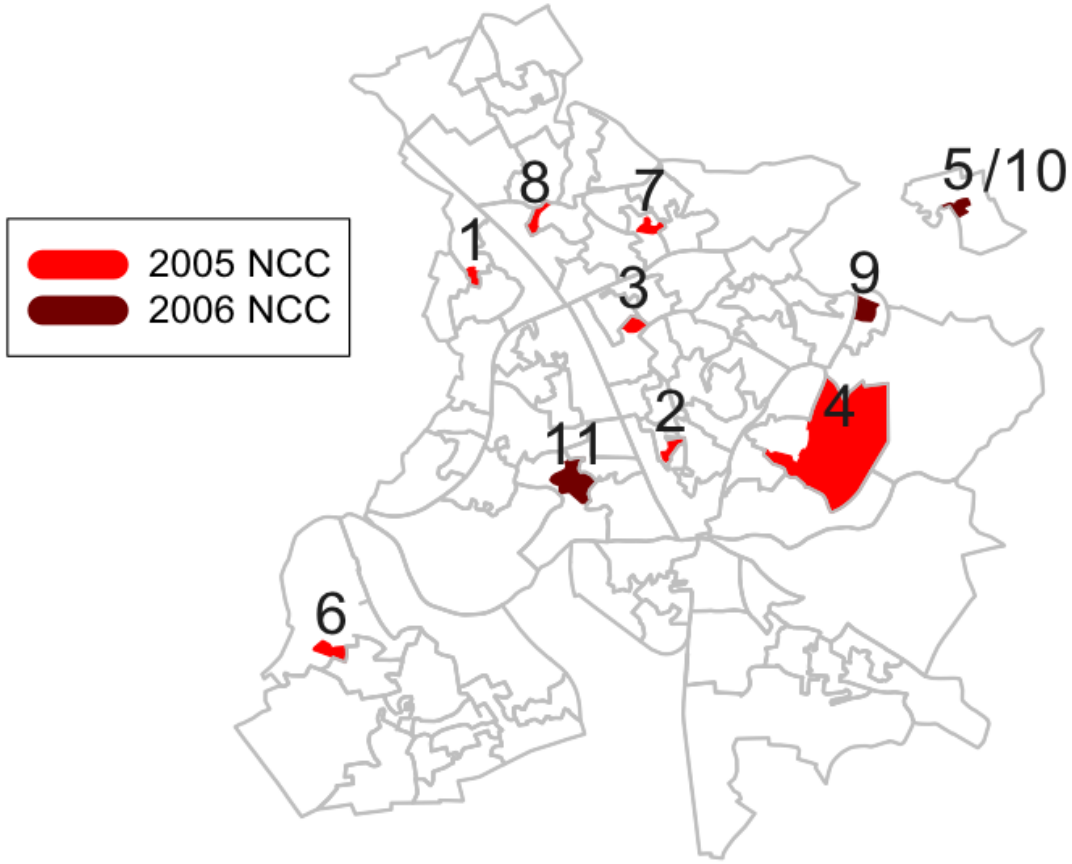
1. Hotspots & Co
SYorkshire
Cold/hot spots
Cold/hot spots
2000 SY burglary crimes
99 SY burglary crimes
98 SY burglary crimes
Syburgs2000.shp
Syburgs1999.shp
Syburgs1998.shp
Sk48.tif
Sk28.tif
SYorkshire
Areas of increasing/decreasing crime at the local scale
Parkwood Springs
Ski Tow
Ski Centre
Pitsmoor Cemy
Walkley
Weir
Burngreave
Steel Bank
Crookesmoor
University
Mus
Cath
Hospl
A6135
B6070
B6074
6079

B. Evaluating the impact of local area initiatives: No cold calling areas in Peterborough, England.



Some references:

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Aims in starting up the GISc Forum:

- an opportunity for staff and students of the University whose work involves the collection, storage, analysis and presentation of spatially referenced quantitative data to meet to discuss topics of mutual interest;

- learn about research in this area in the University;

- share knowledge (conceptual and technical).

…….

Meetings (1 hour max; 3 times a term max) can be:

- a project you are currently working on;

- a methodological discussion;

- an interesting paper for discussion;

…….