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# Spatial Healthcare Access through the focal coherence radius model

- › Expected Access  $\neq$  Observed Access.
- › Scale sensibility  $\rightarrow$  Multiscale framework.
- › Urban vs. Rural: require to consider the density discrepancy and physical distances.

- › Provide an index which measure the Healthcare Access by municipality.
- › Focus on hospital care.
- › Question: At what spatial scale does observed hospital utilization align with expected utilization?

- › Unit of observation = patient, not stay: a patient admitted several times is counted once.
- › The data are aggregated according to three dimensions: age group, sex, PMSI geographical code (municipality level).
- › Expected hospitalizations: national rates by age and sex applied to the local demographic structure.
- › Change of residence during the year: assigned to the location of the first admission.
- › PMSI codes used as areal unit : districts of Paris, Lyon and Marseille.
- › Postal codes for distances: one-to-many correspondence in both directions.

- General setting: units  $i \in I$ , distance  $d_{ij}$ , quantities  $OBS_i$  and  $EXP_i$ , dissimilarity  $m$ .
- Aggregation over concentric disks of radius  $r$ : the scale parameter is a distance, directly read as the distance a patient must travel to obtain care.
- Trajectory  $m_i(r) = \max(0, (EXP - OBS)/EXP)$ , recentred by subtracting the terminal value.
- Focal coherence radius  $FC_i(\delta) =$  smallest radius at which the trajectory falls below tolerance  $\delta$ .
- Distortion coherence scale  $\Delta_i^{FC} = \int_0^\infty FC_i(\delta) d\delta$ .

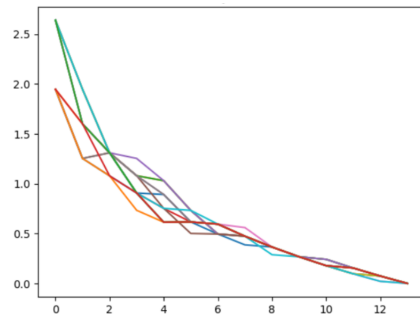


Figure: Trajectories of a few municipalities

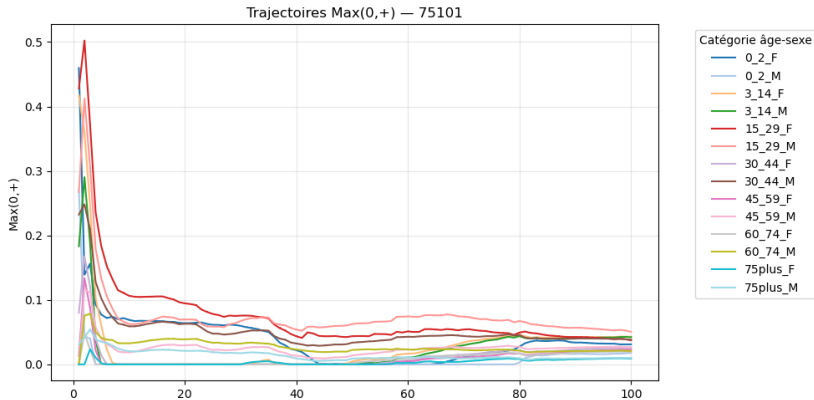


Figure: Trajectoires Paris 1er arrondissement

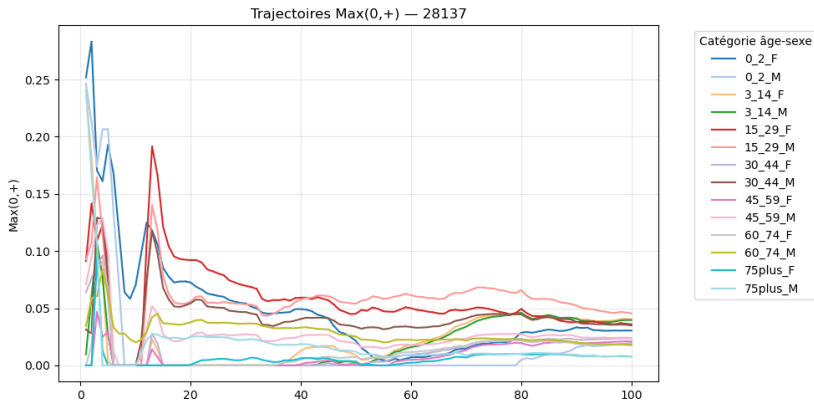
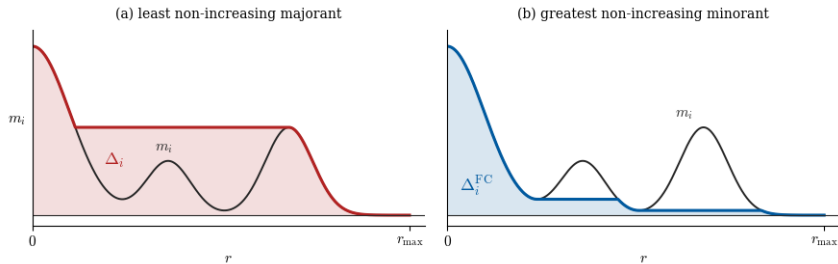


Figure: Écrosnes (Eure-et-Loir)



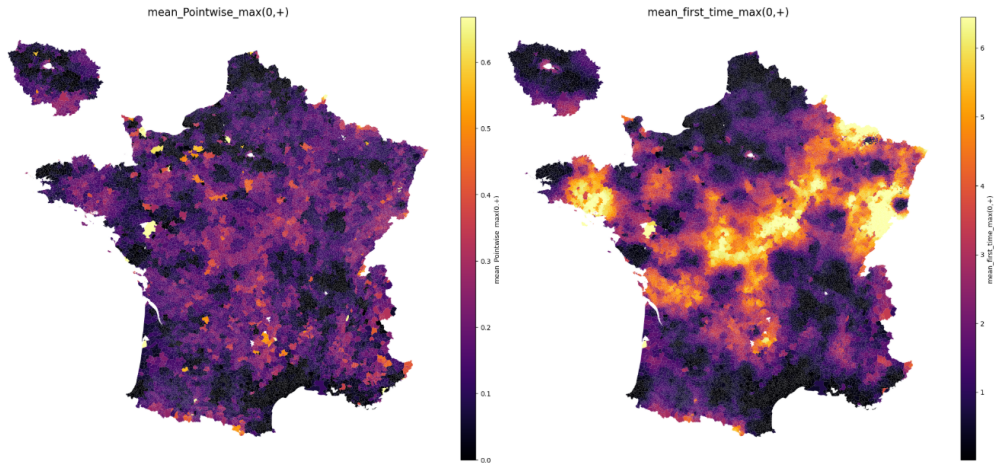


Figure: Pointwise vs. Coherence radius

- Preprint: end of 2026.
- With Céline Gauthier-Maxence, we are also working on using this model to measure population representativeness.