Identification of dyad movement patterns from fisher trajectory data

Rocio JOO, Nicolas BEZ, Marie-Pierre ETIENNE, Stephanie MAHEVAS

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Identifying **collective behaviour (joint mov.)** from **trajectories**?

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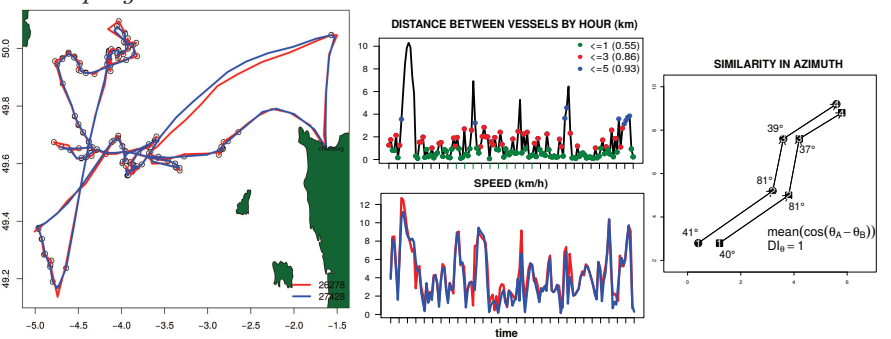
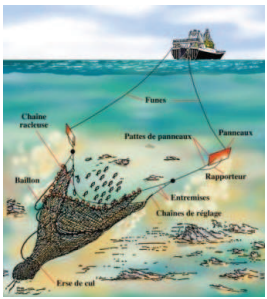
Developing ***indices***



Typologies of interactions : dyad clusters

Large bottom otter trawl



- Not bound to fish with another
- Large : > 12m and trips > 20h
- Vessels : 263
- Dyads : 45650
- Duration : 66h [16,164]

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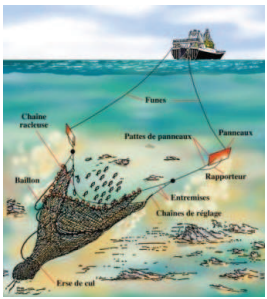

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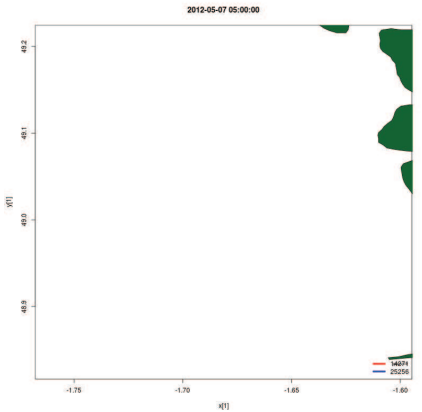
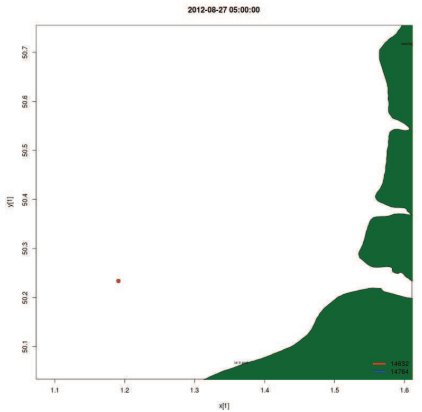
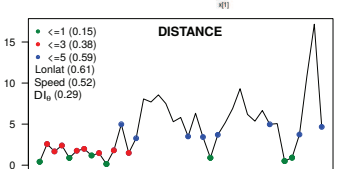
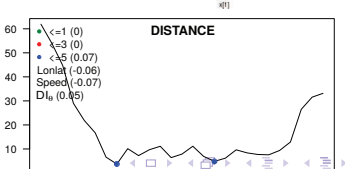
Results : 3 clusters (high joint-movement - **4%** ; medium - 40% ; low - 56%)

Large bottom otter trawl : opposed cases









Some conclusions...

- Indicators → different joint-movement patterns among dyads
- Small percentages of dyads moving together
- Different gears → movement strategies ?

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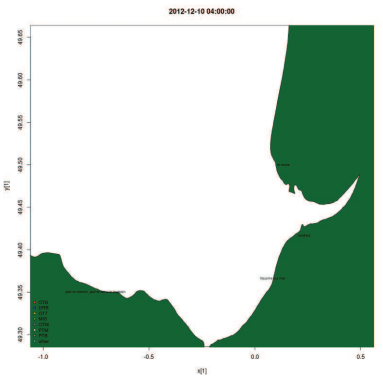
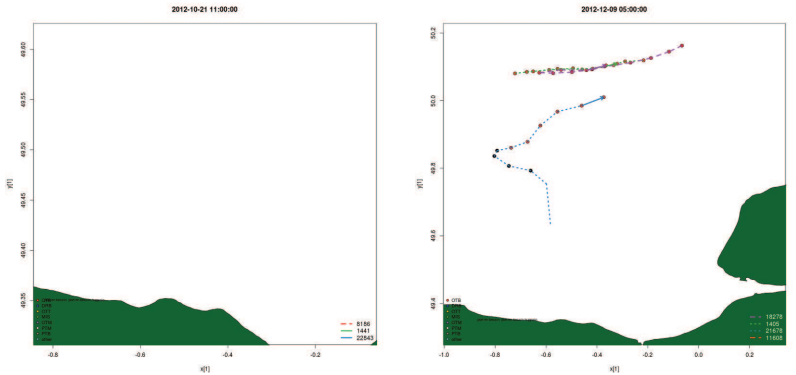


...and perspectives



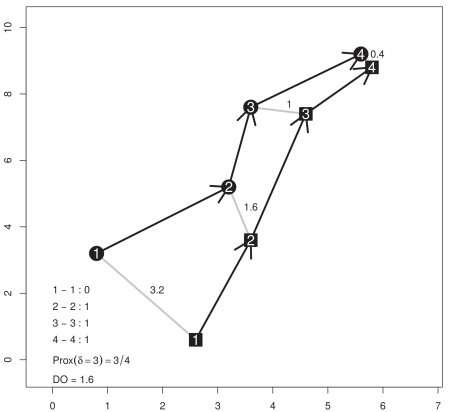
- Lagged-follower behaviour : scales ? tools ?
- Both types of behaviour : sequences of collective-behavioural modes
- Indices as model inputs (e.g. DI_θ)

Extra : Prox

$$Prox = \Big(\sum_{t=1}^{T} K_\delta(t) \Big) / T$$

$$K_\delta(t) = \mathbb{1}\{dist(A_t, B_t) < \delta km\}$$

- proportion of simultaneous fixes that are proximal
- min : 0 (no proximity)
- max : 1 (always close)
- Issue : δ



Extra : correlation

r : Pearson or Spearman correlation (e.g. speed, lon, lat)

- min : −1 (opposition)
- max : 1 (coordinated movement)

Extra : DI_θ

DI_θ **: dynamic interaction in azimuth**

$$f_t = \cos(\theta_t^A - \theta_t^B)$$

DI_θ : mean(f_t)

- min : -1 (opp. direct.)
- max : 1 (same orient.)