Scientific practices within the urban climate research field: "drastic interdisciplinary" between social and environmental sciences

Géraldine MOLINA, Anne BERNABE, Julia HIDALGO, Valery MASSON
Urban climate, an "hybride object"*

An evolution of scientifics practicies:
• transgression of disciplinar and professionnal boundaries
• interdisciplinare and interprofessional dynamics

Legend:
- phenomena
- issues
- acteurs

*Latour, 1999
Talk focus

Aim: explore science making mechanisms and drastic interdisciplinarity practices

Questions:
• challenges of new interdisciplinary consortiums
• lessons from the feedbacks of those collective adventures
• difficulties and facilitators of drastic interdisciplinary dynamics
Plan

1. Drastic interdisciplinarity practices in France
   → case-study, contexte, investigation methods

2. Disciplinary cultural differences
   → 1st set of results

3. Drastic interdisciplinarity in action
   → 2th set of results
1. Drastic interdisciplinary practices in France

case-study, contexte and investigation methods
## 1.2. Case-study: french interdisciplinary research

<table>
<thead>
<tr>
<th>NAME</th>
<th>TEMPORALITY, FINANCING</th>
<th>PROJECT HOLDER</th>
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</thead>
<tbody>
<tr>
<td>« VegDUD : Rôle du végétal dans le développement urbain durable ; une approche par les enjeux liés à la climatologie, l’hydrologie, la maîtrise de l’énergie et les ambiances »</td>
<td>2010-2014 : ANR : 1 550 000€</td>
<td>Marjorie Musy, IRSTV (CERMA)</td>
</tr>
<tr>
<td>« MUSCADE : Modélisation Urbaine et Stratégies d'adaptation au Changement Climatique pour Anticiper la Demande et la production Énergétique »</td>
<td>2010-2014 : ANR : 650 000 €</td>
<td>Valéry Masson, GAME</td>
</tr>
<tr>
<td>« URBIO : Biodiversité urbaine : vers une approche intégrée des services écosystémiques dans les aires urbaines »</td>
<td>2012-2016 : Région Pays de la Loire</td>
<td>Hervé Daniel, ACO</td>
</tr>
<tr>
<td>« Formes urbaines, modes d’habiter et climat urbain dans le périurbain toulousain »</td>
<td>2008-2010 : PIRVE CNRS : 10 000 €</td>
<td>Sinda Haouès-Jouve, LISST, LMTG</td>
</tr>
<tr>
<td>« IFU : Ilots de Fraîcheur Urbains »</td>
<td>2013-2015 : ADEME : 150 000 €</td>
<td>Frédéric Bonneaud, LRA Marion Bonhomme, LRA</td>
</tr>
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</table>
1.2. Investigation methods

- « observant participation » (Brewer, 2000)
  - official sessions
  - informal discussions: hidden side of scientifics practices

- researchers and urban stakeholders interviews (60)

→ cross with others results (Blanchard 2011)

2. Disciplinary cultures: radicals differences

First set of results
# 2.1. Definition of drastic interdisciplinarity

<table>
<thead>
<tr>
<th>Disciplinary culture: training, tradition, research objects, language, methodes</th>
<th>&quot;Proximate interdisciplinarity&quot;*</th>
<th>Drastic interdisciplinarity</th>
</tr>
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<tbody>
<tr>
<td>Neighbouring disciplines: proximate, familiar</td>
<td>Distanced disciplines: Drastic, radical differences</td>
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</table>

**Exemples**
- Atmospheric physicist + building thermal specialist
- Social geographer + anthropologist
- Atmospheric physician + anthropologist
- Building thermal specialists + sociologist

**Comparison:** intercultural couple

Weeding of 2 europeans + Weeding american - africain

*Jollivet, Legay, 2005*
2.2. Exemple 1: research objects

- **Peripheral objects**
  - Urban forms
  - Blind spots
  - Atmospheric and thermal phenomena - physical laws
  - Lifestyles (perception, representations, social practices)

- **Central objects**
  - Human Behaviours

- **Nucleus**
  - Blindness

- **Blindness**
  - Acuity
  - Physical laws

- **Physical laws**
  - Urban materiality: ground, materials

- **Actors, lifestyles, city’s production and governance process**

- **Physician researcher**

- **Social researcher**
## 2.3. Exemple 2: vocabularies

<table>
<thead>
<tr>
<th>Physical sciences</th>
<th>Social sciences</th>
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<tbody>
<tr>
<td><strong>City-town</strong></td>
<td>Territory (constructed and appropriate space):</td>
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<tr>
<td>Canopy, surface, urban morphology, built environnement (facade, roof, material,...) geometry (canyon),</td>
<td>- urbanization dynamics,</td>
</tr>
<tr>
<td></td>
<td>- actors system, production and governance process, policies</td>
</tr>
<tr>
<td></td>
<td>- lifestyles, inhabitants</td>
</tr>
<tr>
<td><strong>Climate</strong></td>
<td>Environment element of urban ways of living (feeling, perception, social practices)</td>
</tr>
<tr>
<td>Physical variables (temperature, humidity, wind speed), radiative, thermal, aerodynamic, hydraulic properties</td>
<td></td>
</tr>
<tr>
<td><strong>Energy</strong></td>
<td>Household energy uses and consumption, social uses knowledges, energy precarity, energy policies</td>
</tr>
<tr>
<td>Heat flow, energy transfert, energy balance, energy consumption</td>
<td></td>
</tr>
<tr>
<td><strong>Human</strong></td>
<td>Unhabitants, actors, appropriation, Urban ways of living, socio-spatial dynamiques</td>
</tr>
<tr>
<td>Human, microclimatique sensor, human presures, comfort parameters</td>
<td></td>
</tr>
<tr>
<td><strong>Meth.</strong></td>
<td>Statistical data, observation, interviews , questionnaires, commented routes, photos, terrain notebooks</td>
</tr>
<tr>
<td>Measurements, modelling, simulation, scenarios, evaluation, experimental approaches, wind/water tunnel studies</td>
<td></td>
</tr>
</tbody>
</table>
3. Drastic interdisciplinarity in action

2th set of results
3.1. Approaches

**Physical researcher**

- Physical laws
- Measurements
- Modelling
- Validation
- Analyse

**Social researcher**

- Hypothesis
- Terrain surveys
- Analyse
- « Models »

*Inductive-hypothetico-deductive*
3.2. Scales

Downscaling

Atmospherical phenomena

Urban climate:
meso-climate: urban heat island

Urban micro-climate

Upscaling

Globals
Planetary
Nation
Region

"Macro"
City

"Meso"
Area
Block
Street

"Micro"
Building
individu

Urbanization dynamics

Urban policies
Socio-economical characteristics
Ways of living

Perception, representations, social practices

Exemple:
PIRVE (2008-2010)
"Urban forms, lifestyles and climat in Toulouse’s suburban"
3.3. Combining methods

**Physician researcher**
- Equations
- Measurements
- Modelling

**Social scientist**
- Observation
- Field surveys
- Interviews
- Questionnaires

**Commented itineraries**
- Exemple:
  - EUREQUA (ANR 2012-2016)
  - multicriteria evaluation of area’s environmental quality
Conclusion: towards transdisciplinarity?

Schema: degree of the disciplinarian meeting

Strong interactions
Co-construction

Transdisciplinarity: collaborative process bursting discipline boundaries
Creation of a new meta-discipline

Interdisciplinarity: commun research objects, exchanges of tools, methods, concepts, etc.

Multidisciplinarity: commun research objects, no interaction

Pluridisciplinarity: coexistence, no interaction

For more information:

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Brouillons
Mon parcours

Mes objets de recherche

Expériences climatiques et énergétiques des acteurs des territoires

Professionnels  Habitants

Exemple : acteurs du bâtiment - performance énergétique

Projet TIPEE

Décalage entre performance théorique et réelle

Enquête acteurs chaîne du bâtiment

Conception  Mise en œuvre  Gestion-maintenance  Appropriation

1 Technological and Innovative Plateform for Environmental Efficiency