



CUMIN – DILAN & SARA

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Experimental Data Processing and Analysis of Nissan Leaf Driving Tests

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Outline



Context and objective



Vehicle, trips and data acquisition



Data classification and analysis



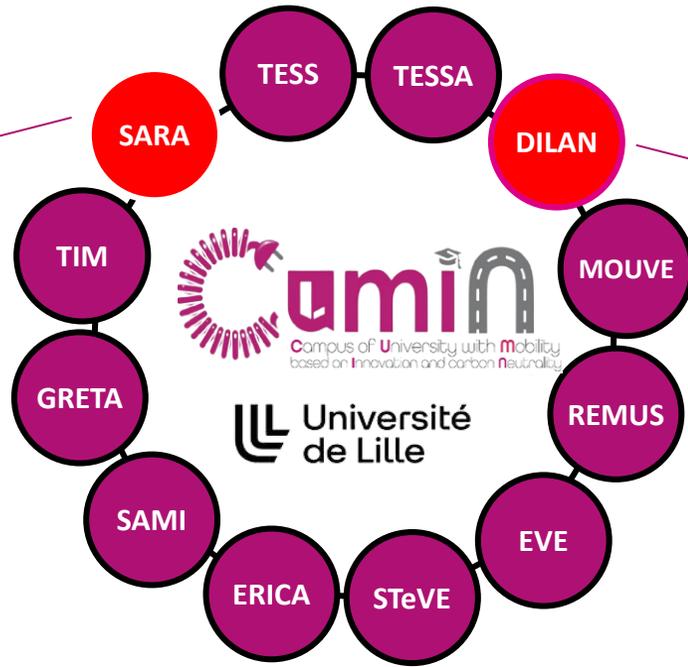
Conclusion



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Context and objective

Context



Social **A**cceptance
of electric vehicles
in **R**estricted **A**reas



Driving tests of Nissans Leaf
and surveys of campus users

Driver **I**n the Loop
Application for **N**ew
e-vehicles



Driving tests of Nissans Leaf
for calibration of the DIL platform

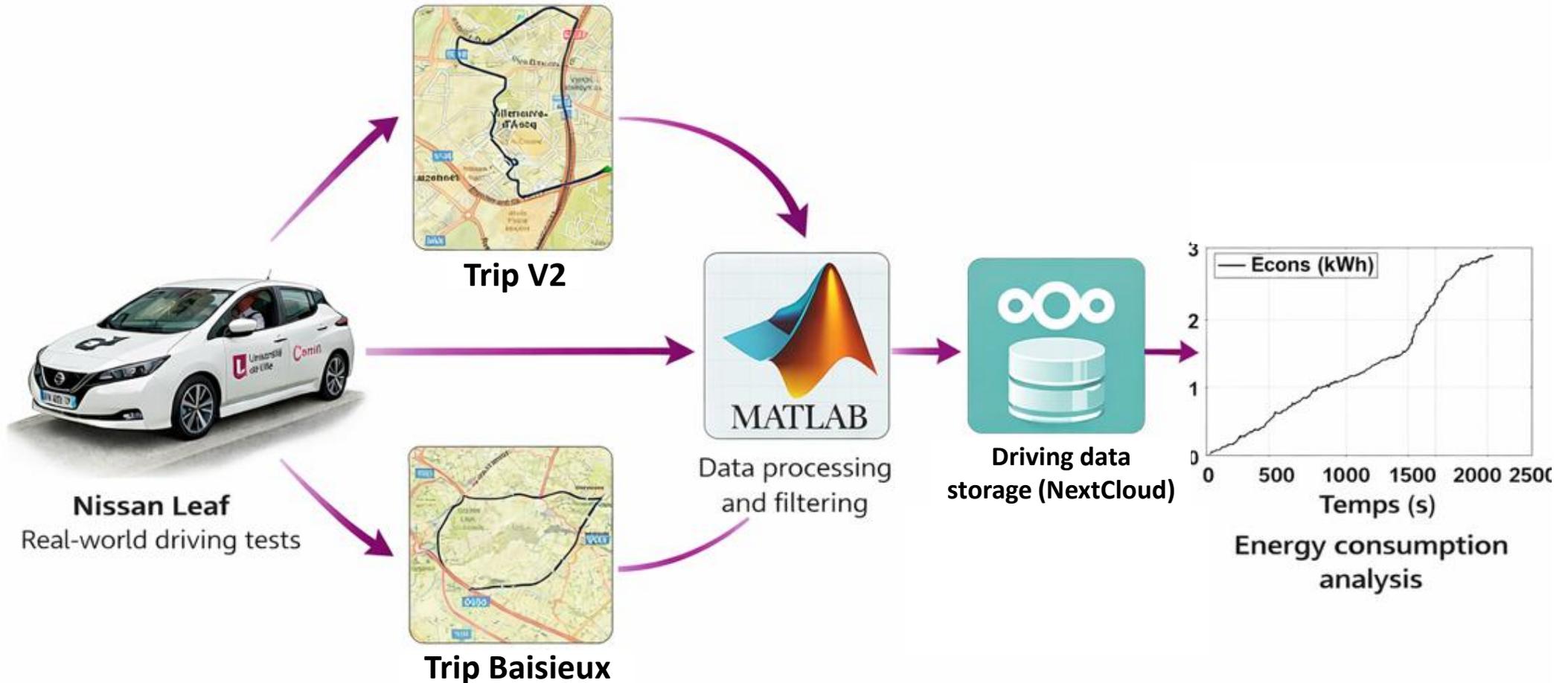
Solid and systematic
data acquisition
for driving tests

as a background for

E-mobility **D**ata for
Interdisciplinary **S**tudies

Objective

build and exploit a structured database of real-world driving tests to analyze energy consumption on selected routes





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Vehicle, routes and data acquisition

Vehicle and trips

Vehicle: instrumented Nissan Leaf

Driving tests were conducted on two representative trips:

- **Trip V2**

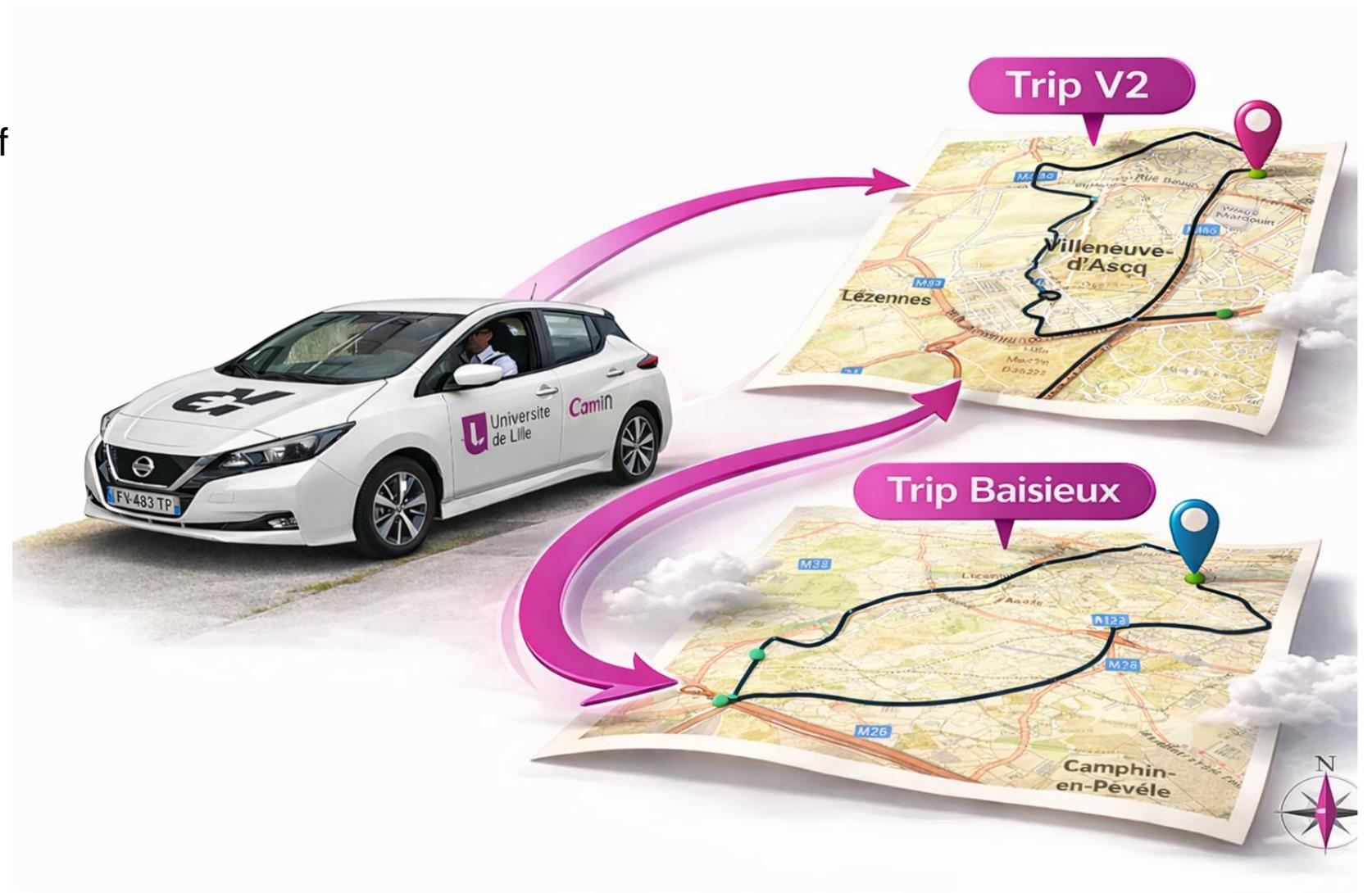
Distance: 10 km

Duration: 20 to 40 min

- **Trip Baisieux**

Distance: 21 km

Duration: 40 to 70 min



Data acquisition and collection

How data are collected?

The answer:



Selected signals for energy analysis

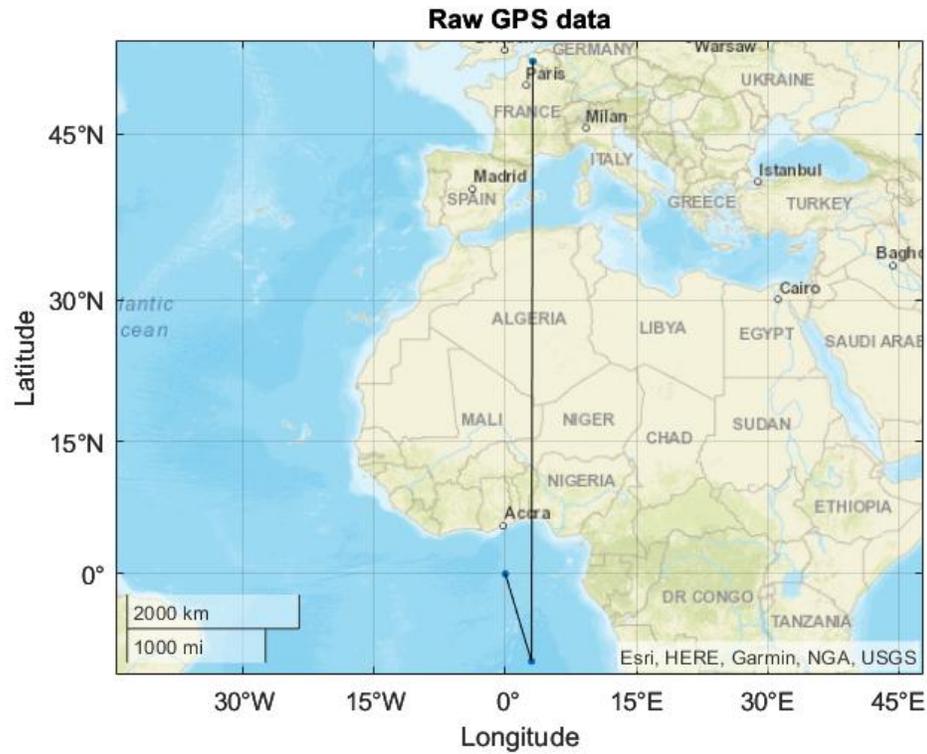
- ✓ Vehicle speed
- ✓ Motor torque
- ✓ Battery voltage and current
- ✓ Auxiliary system
- ✓ HVAC system



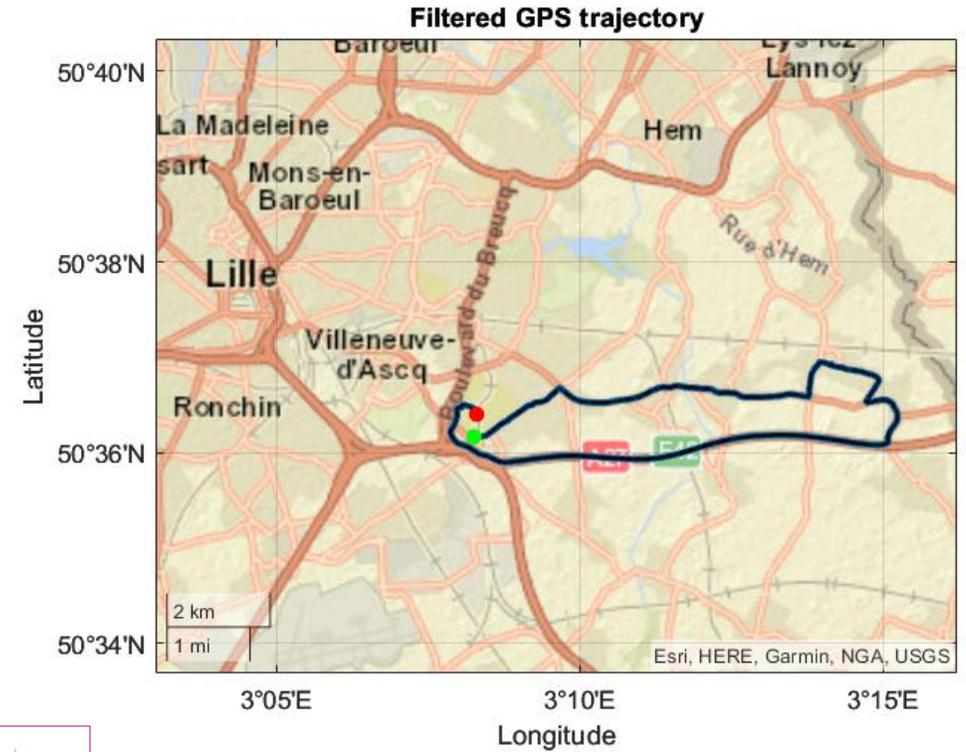
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Data classification and analysis

Data processing



Filtering and
cleaning

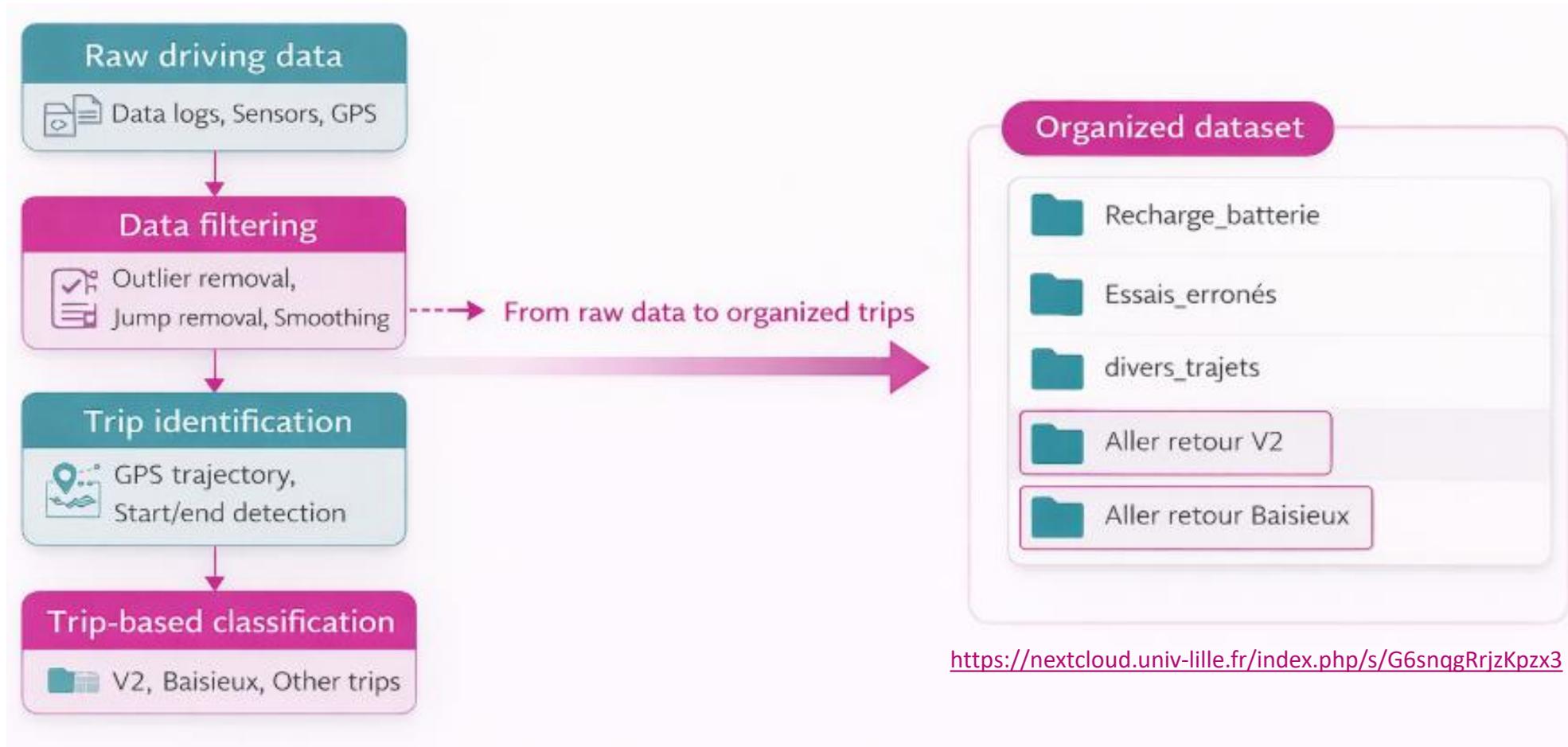


GPS filtering:

- Validation,
- Jump removal,
- Outlier removal,
- Smoothing.

Trip-based data classification

Filtered data are organized and classified according to driven trip.



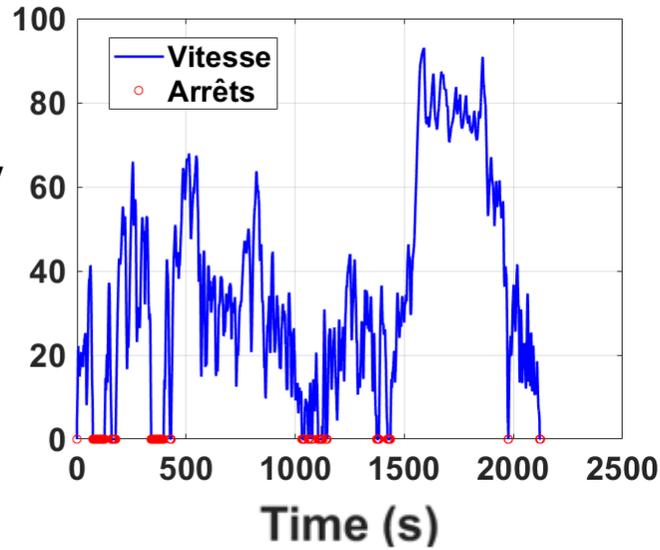
Visualized indicators



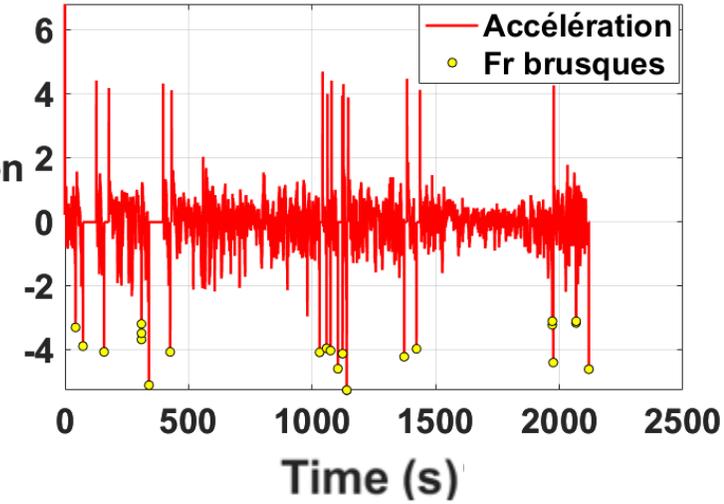
Distance: 21 km

Duration: 40 to 70 min

**Velocity
(Km/h)**

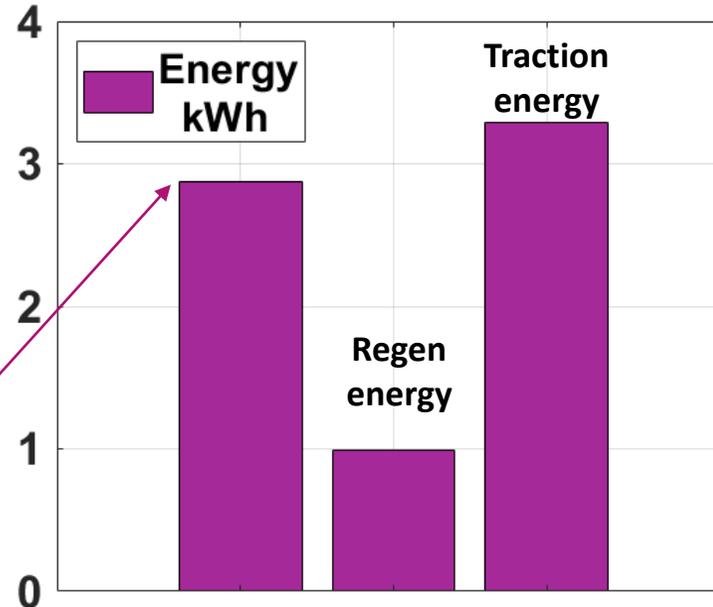


**Accélération
(m/s²)**

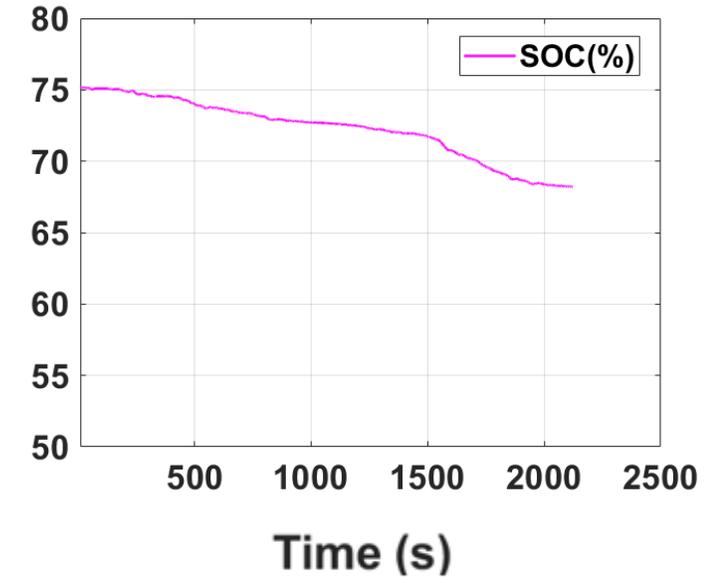


**Energy
(kWh)**

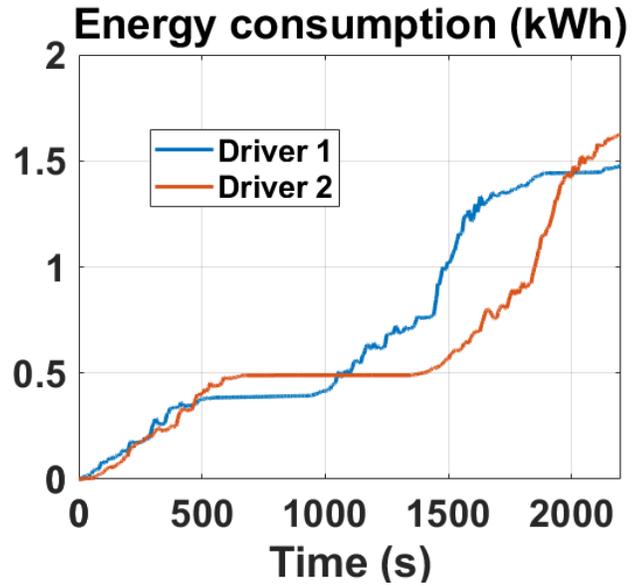
Consumed energy



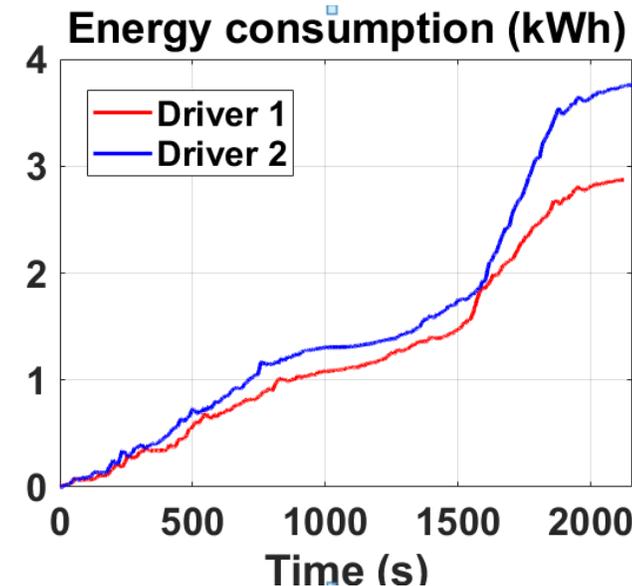
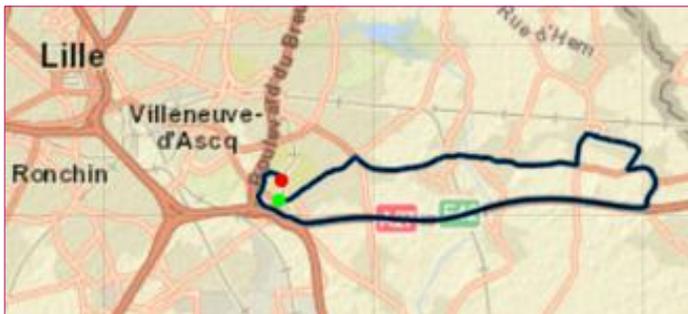
**SOC
(%)**



Comparison between drivers



Variation of energy consumption of 20% for V2



Variation of energy consumption of 31% for Baisieux



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Conclusion

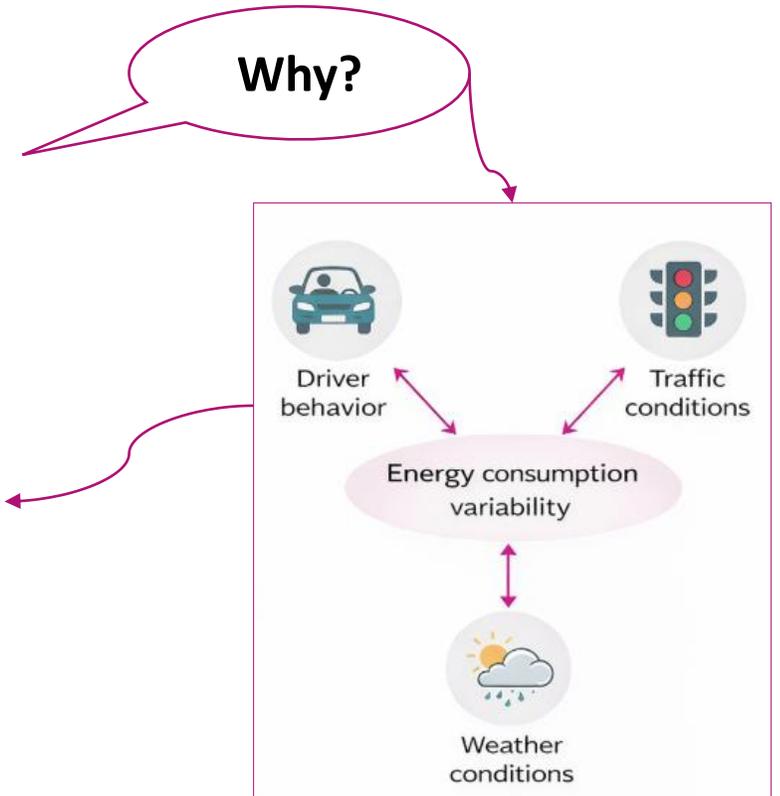
Conclusion

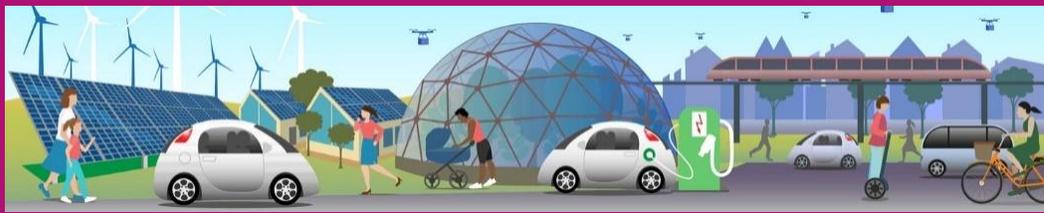
Developed work:

- a systematic data acquisition procedure
- needs of filtering
- classification and storage of the file
- for the same trip, important difference in terms of energy consumption

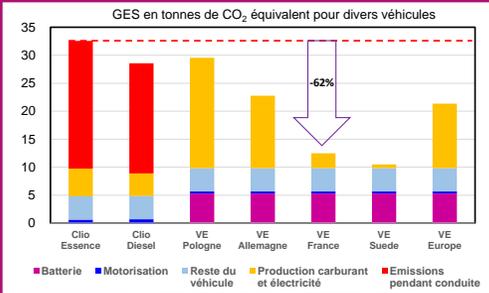
Perspectives:

- **SARA**: increase the number of trips by campus users
- **DILAN**: validation of the DIL + separate studies of traffic and weather
- **EDIS**: contribution to data collection process





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Our university as an exciting living lab towards eco-cities through an innovative transdisciplinary framework !

