Combining three different methodologies to quantify N_2O emissions at the landscape scale on the OS² INGOS site (Central France)

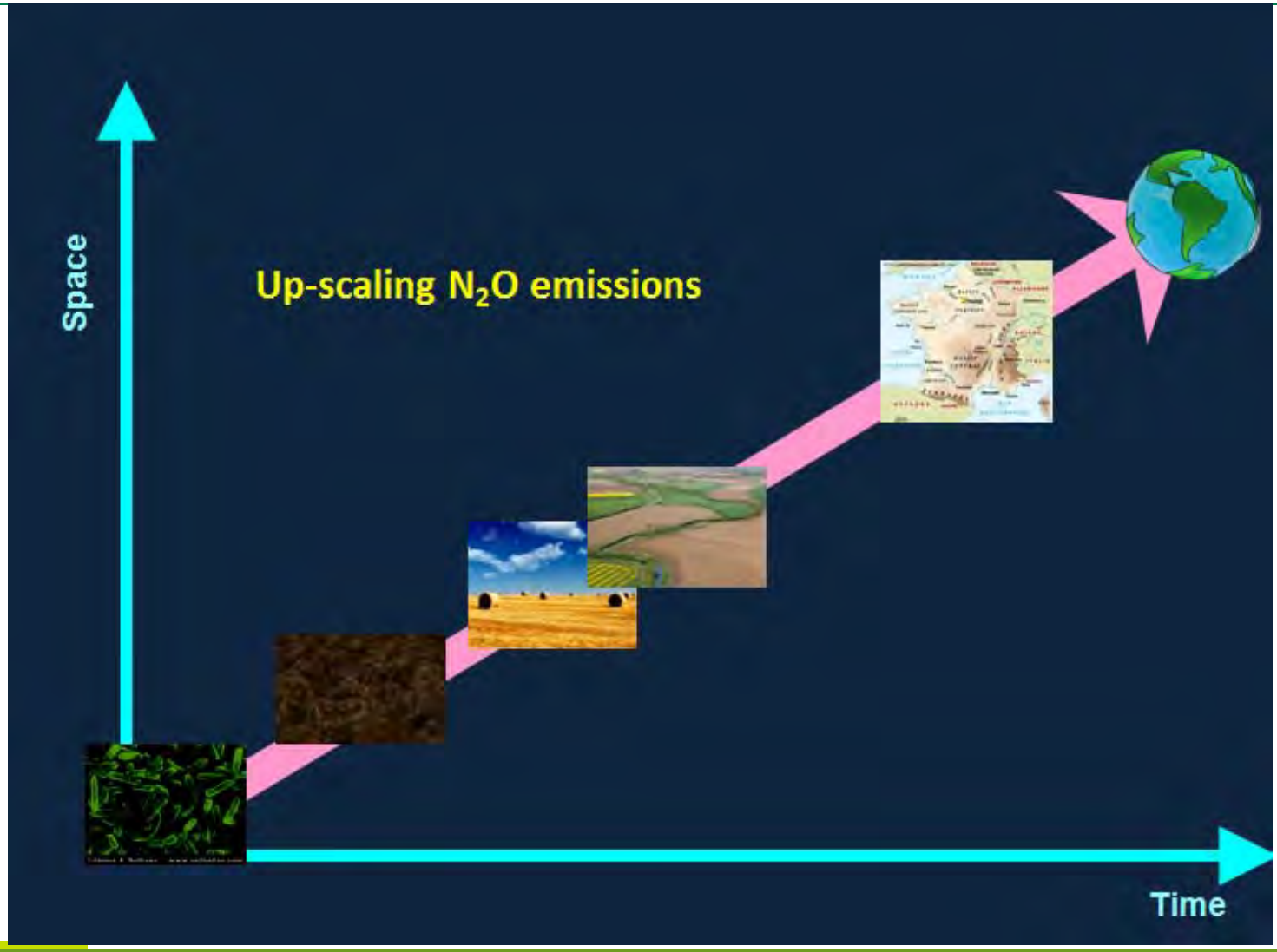
Jordan Bureau [a] , Agnès Grossel [a], Benjamin Loubet [b], Patricia Laville [b], Raia Massad [b] , Edwin Haas [c], Klaus Butterbach-Bahl [c], and Catherine Hénault [a]

[a] INRA, UR 0272 Science du sol, Centre de recherche d'Orléans, CS 40001 Ardon, 45075 Orléans cedex (France)

[b] INRA, UMREcoSys, F- 78850 Thiverval-Grignon (France).

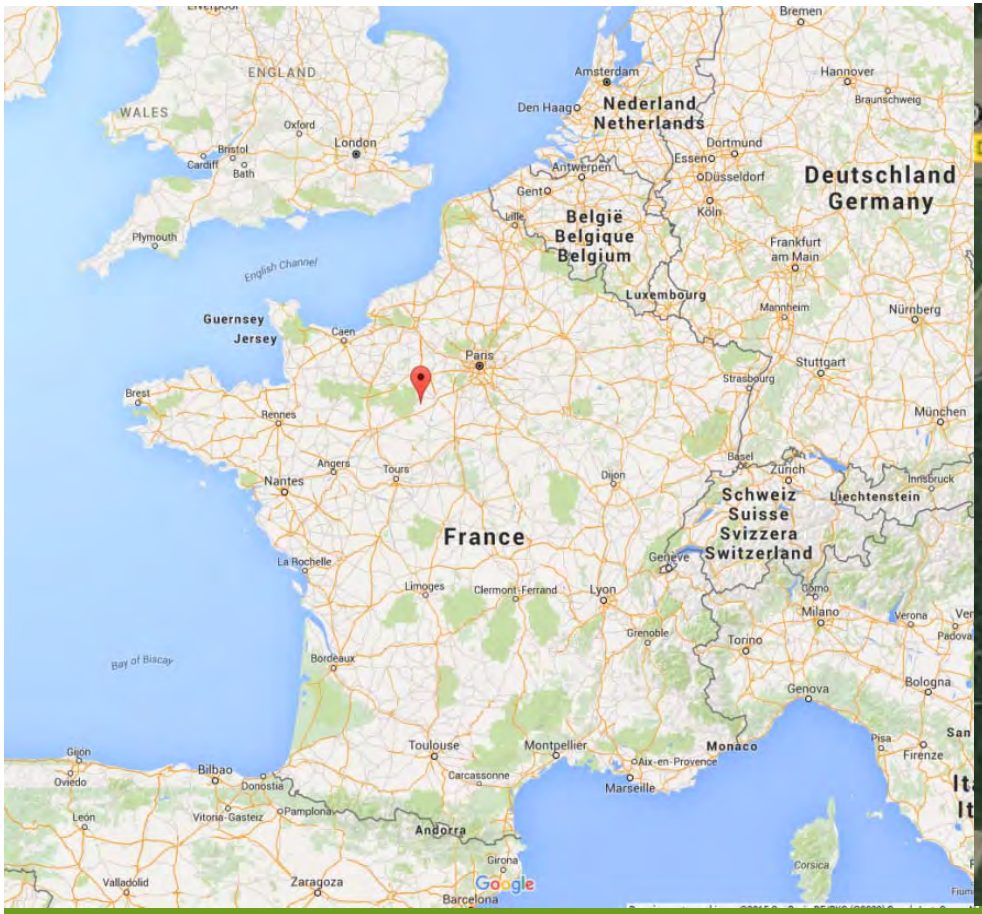
[c] IMK-FSU, KIT Garmisch Partenkirchen (Germany)

Introduction



Introduction

- Agricultural site with crops and forest



Introduction

- From 16th March to 19th May 2015

Automatic chambers

Mast

Fastbox

Materials and methods

Materials and methods

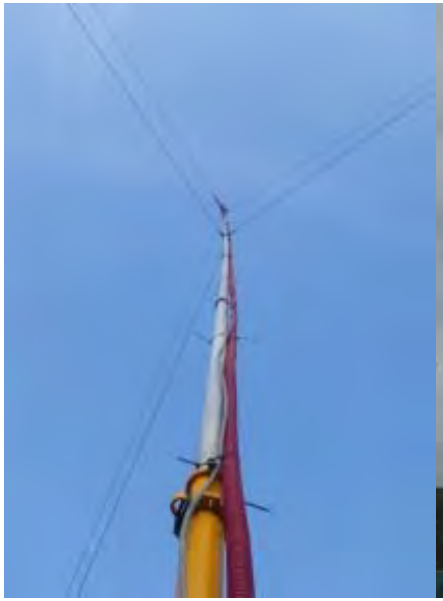
Materials et methods

Fastbox

Lab-built QCL : SPIRIT

Materials and methods

15 m mast



Anemometer + inlet

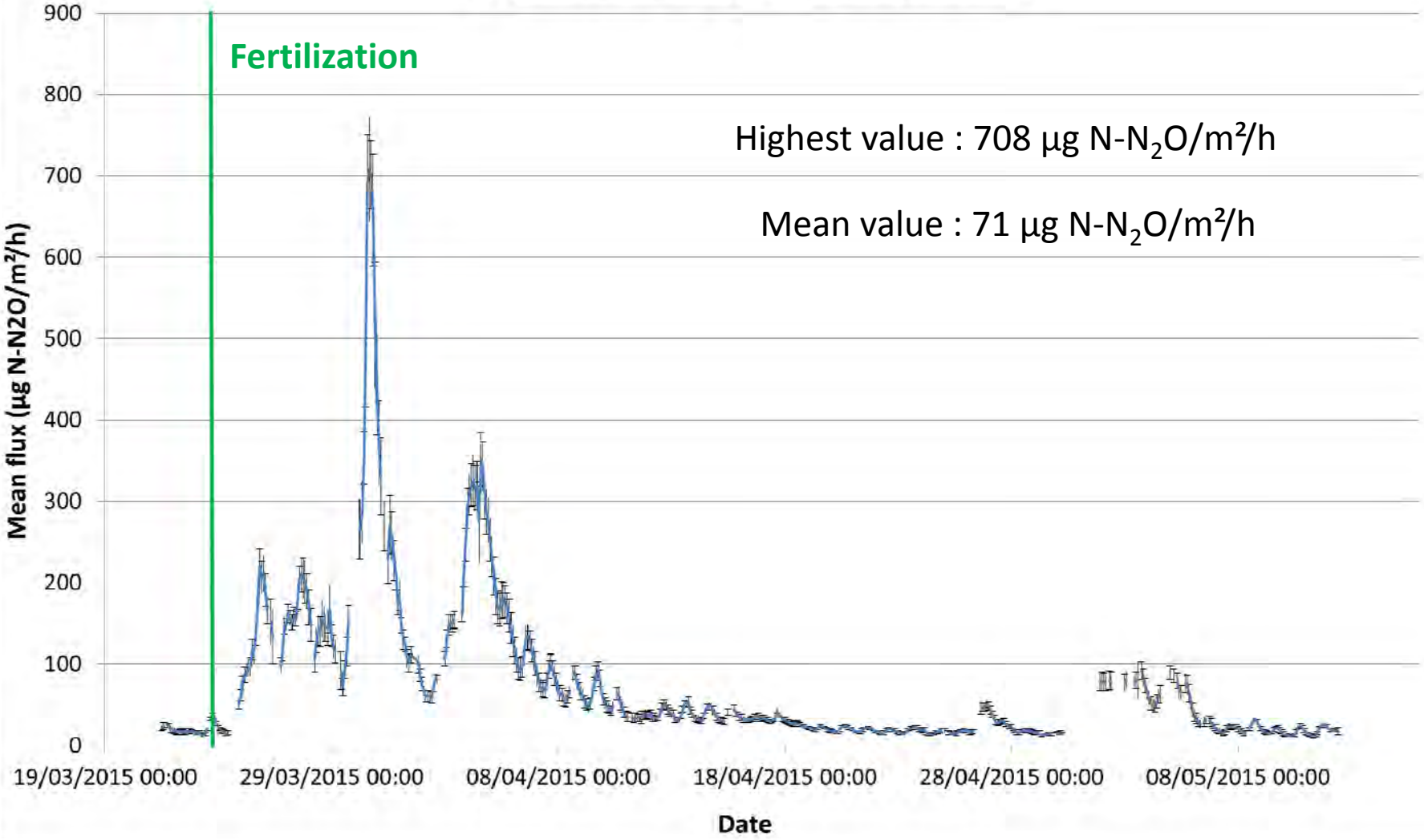
QCL

Integration

Results & comparisons

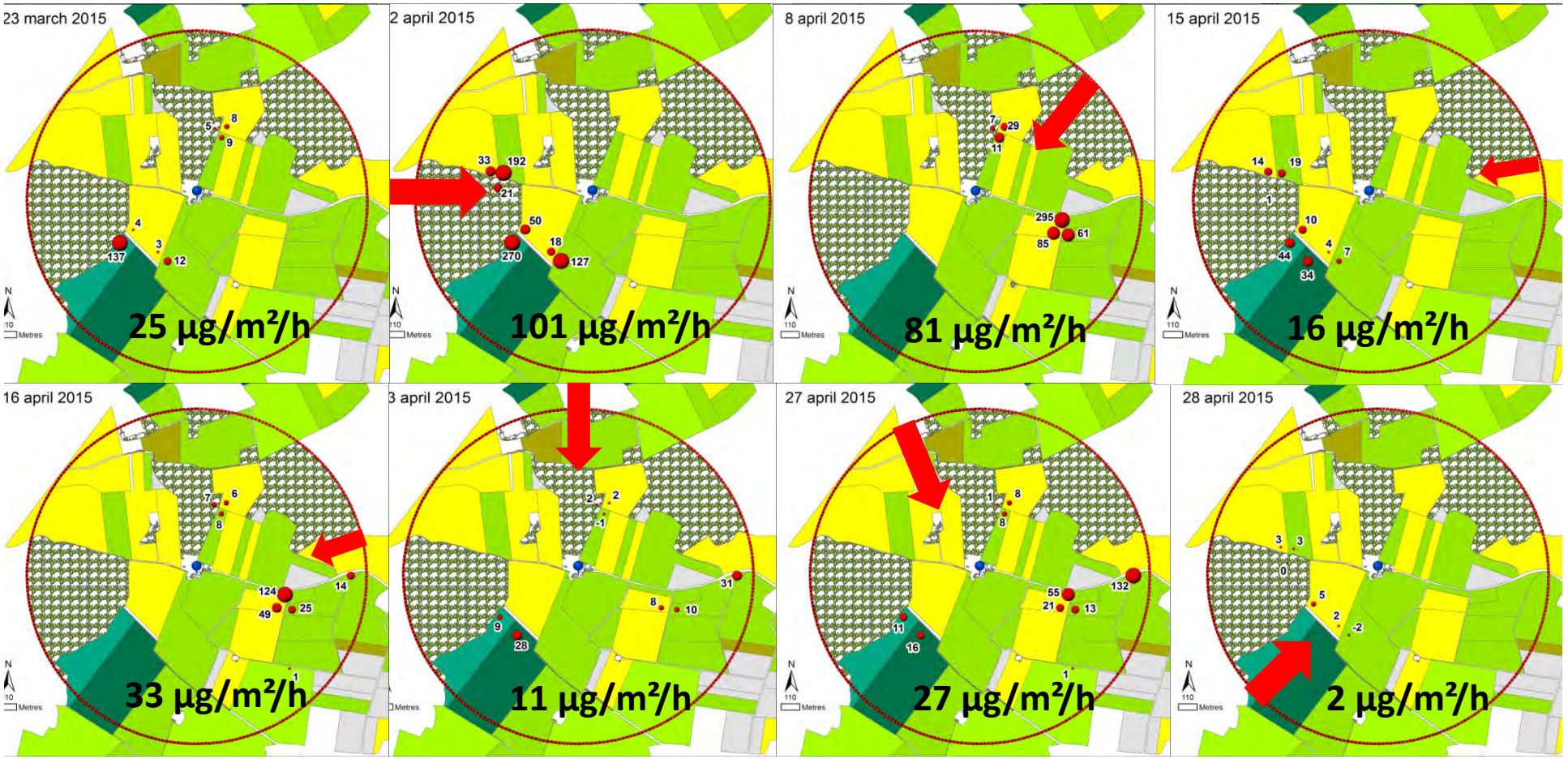
Results

N_2O mean flux during the campaign



Results

Mean value : 37 µg N-N_2O/m²/h



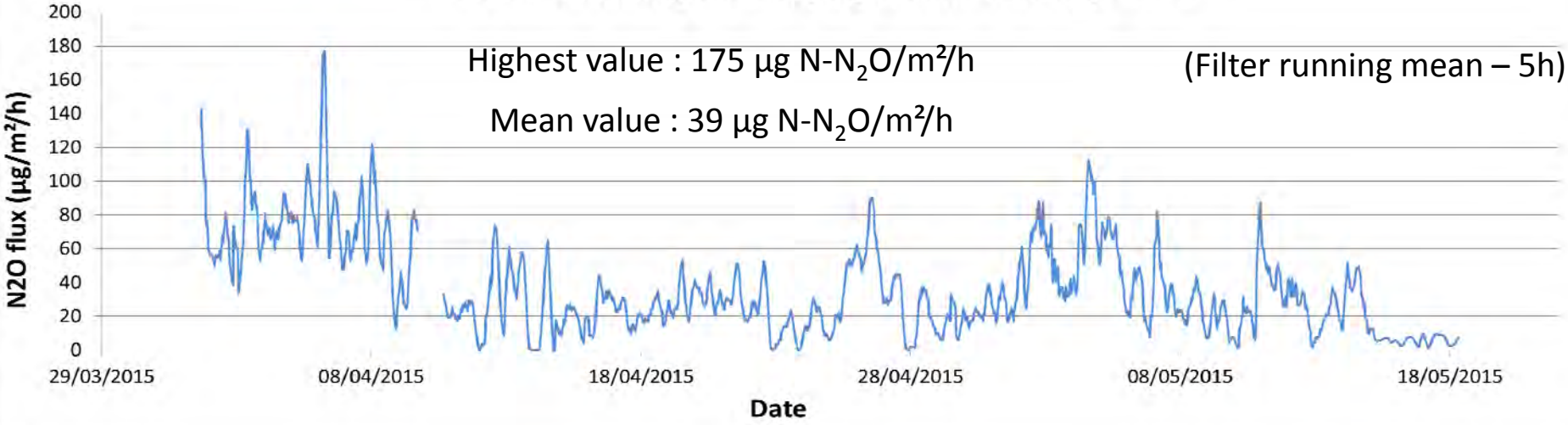
Results

N2O flux during the campaign at the landscape scale

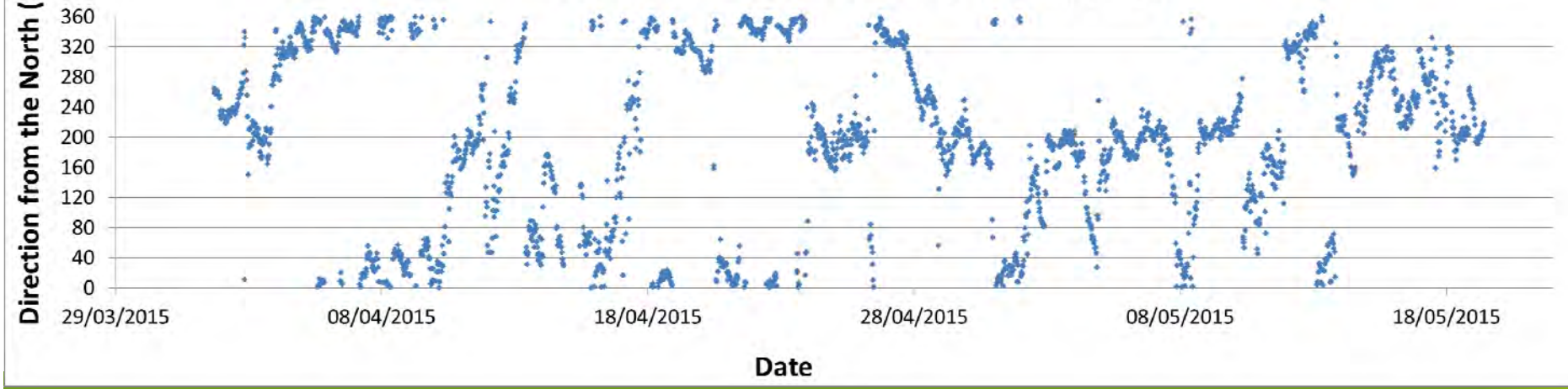
Highest value : 175 µg N-N_2O/m²/h

Mean value : 39 µg N-N_2O/m²/h

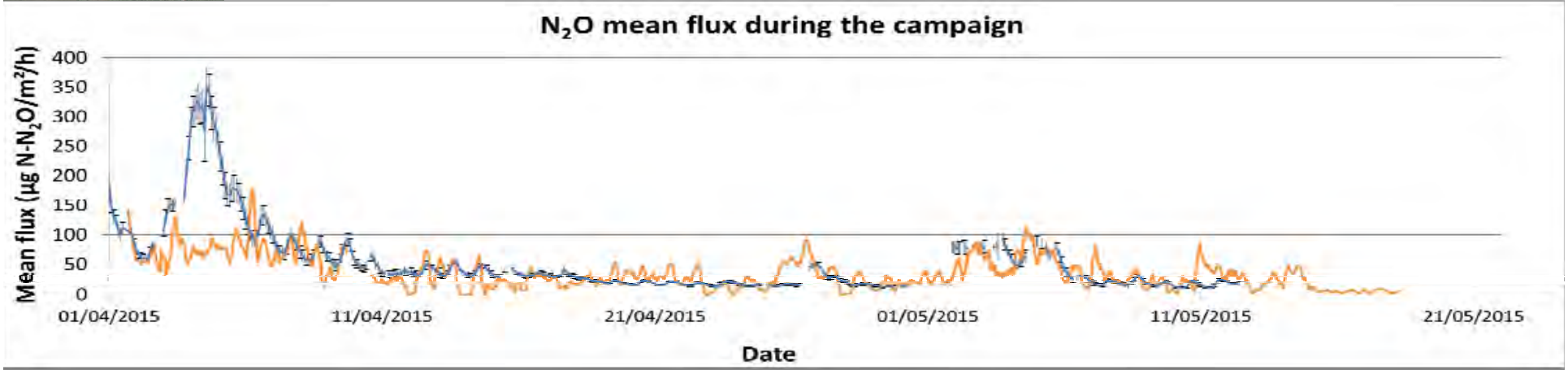
(Filter running mean – 5h)

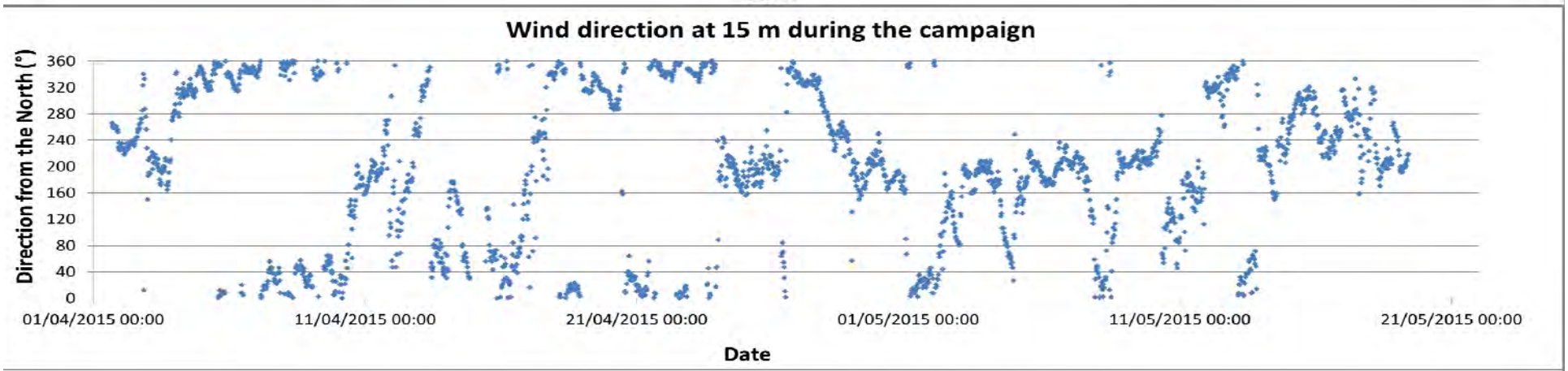


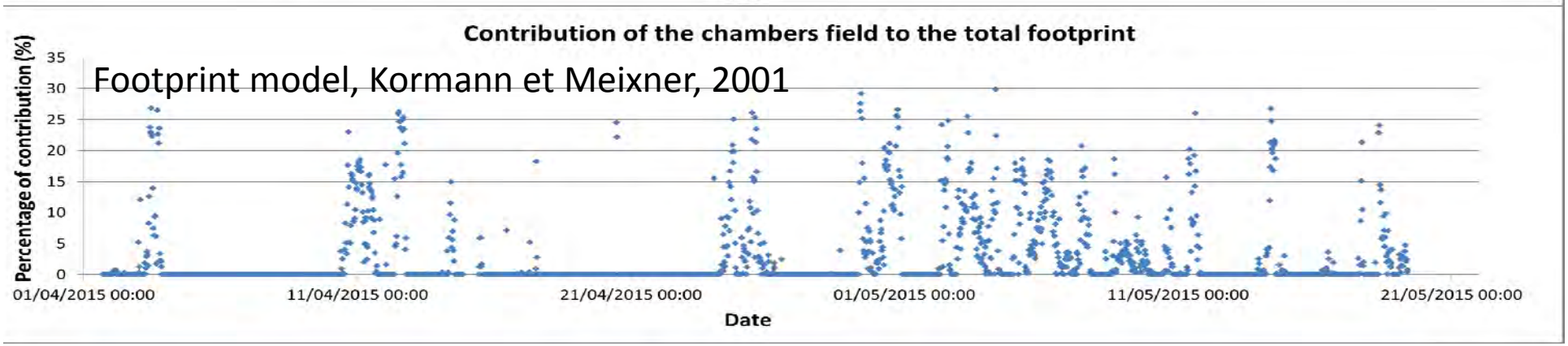
Wind direction at 15 m during the campaign



Comparisons

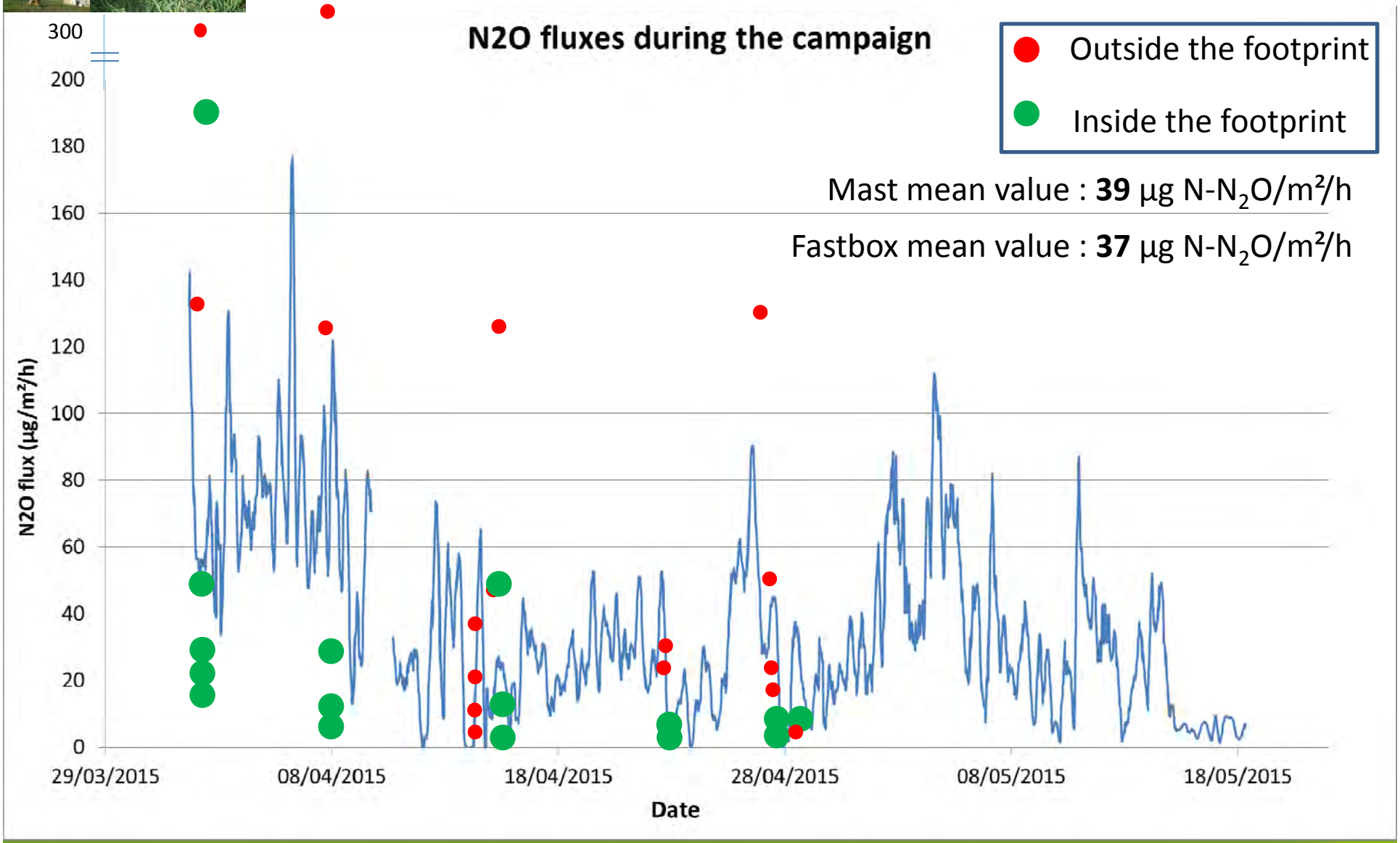






Footprint model, Kormann et Meixner, 2001

Comparisons



Conclusion

- 3 methodologies → consistant results (same pattern, close values)

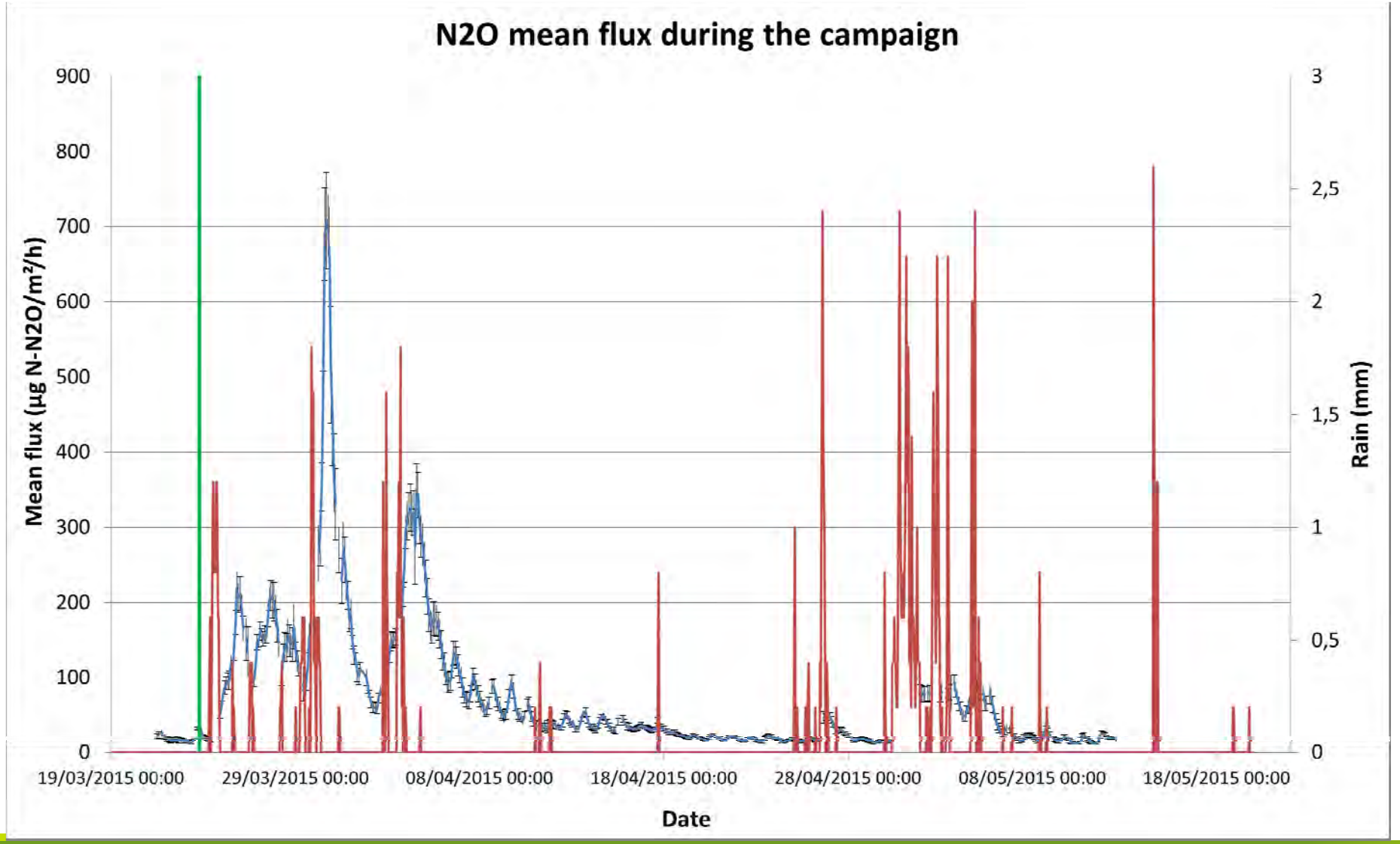
- Discrepancies : generally linked to the method caracteristics

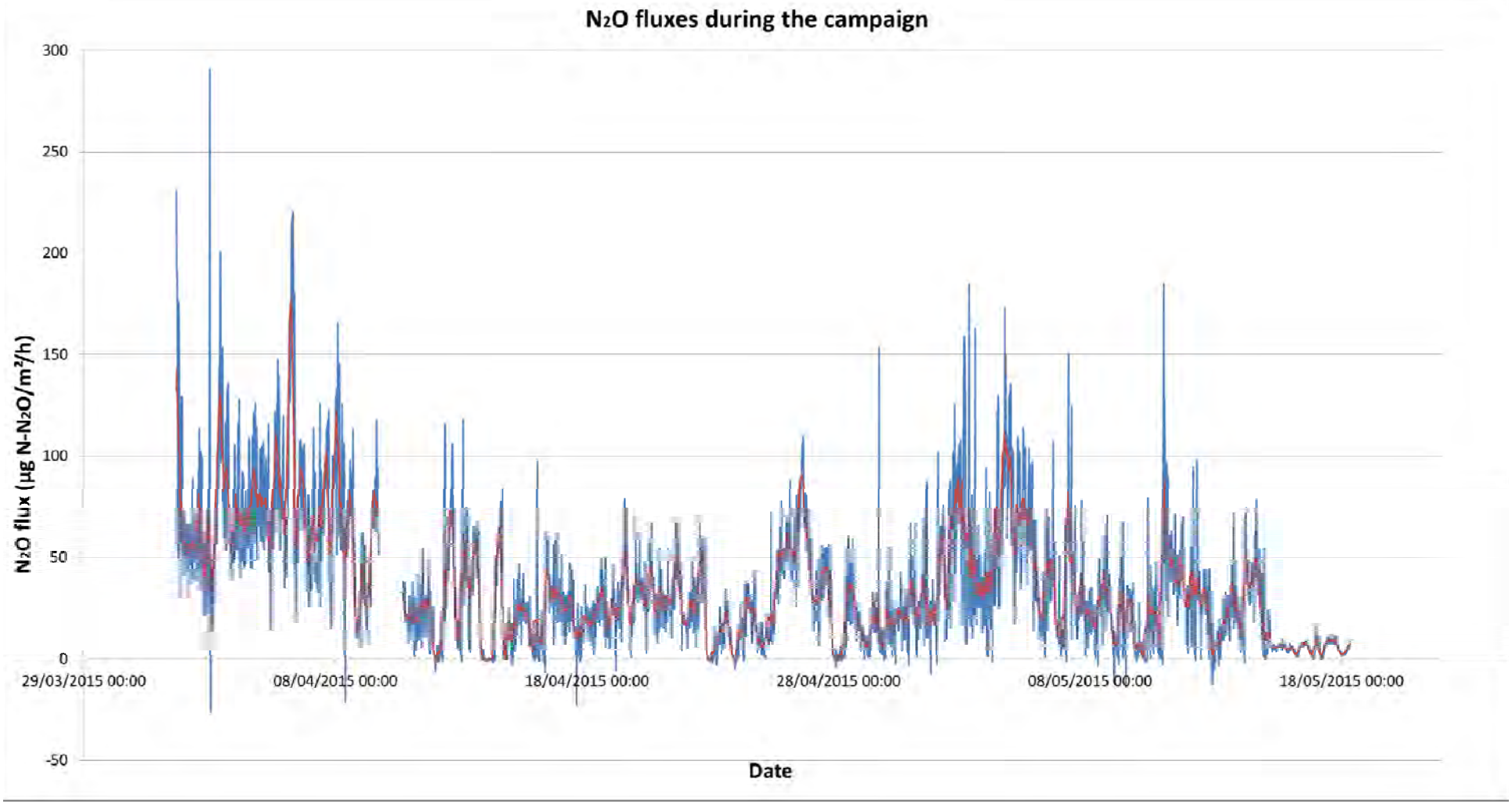
- Analyses ongoing

- Next step :
  - Environment factors (WFPS, nitrogen, pH, etc)
  - Modeling : Bottom-up (landscape DNDC, CERES-NOE)
    Top-down (footprint model)

Thank you for your attention

Any questions ?


N2O mean flux during the campaign
Mean flux (µg N-N2O/m²/h)
Rain (mm)
Date
900
800
700
600
500
400
300
200
100
0
3
2,5
2
1,5
1
0,5
0
19/03/2015 00:00
29/03/2015 00:00
08/04/2015 00:00
18/04/2015 00:00
28/04/2015 00:00
08/05/2015 00:00
18/05/2015 00:00


N2O fluxes during the campaign
300
250
200
150
100
50
0
-50
N2O flux (µg N-N2O/m²/h)
29/03/2015 00:00
08/04/2015 00:00
18/04/2015 00:00
28/04/2015 00:00
08/05/2015 00:00
18/05/2015 00:00
Date