



# VOLATILES ORGANICS COMPOUNDS (VOCs) EMITTED FROM SOILS AMENDED WITH ORGANIC WASTES

Letizia Abis, Florence Lafouge, Raluca Ciuraru, Jean-Christophe Gueudet, Samuel Dequect, Sophie Sadet-Bourgeteau and Benjamin Loubet.

INTERNATIONAL CONFERENCE ON ECOLOGICAL SCIENCES  
Sfécologie 24<sup>th</sup> October 2016 – Marseille

# VOCs: Why are they interesting

## Environmental Effect

Precursor of :

- ▶ particulate matter;
- ▶ Tropospheric ozone.



**HIGH CONCENTRATION  
IN THE AIR**

**CARCINOGENIC OR MUTAGENIC ACTION**



**90% of the VOCs emissions come from NATURAL SOURCES**



LOW FLUX OF VOCs

AMENDED WITH  
ORGANIC WASTE



HIGH FLUX OF VOCs

(Twiggs et al.  
2011)

AIM

ORGANIC WASTE VOCs  
SIGNATURE

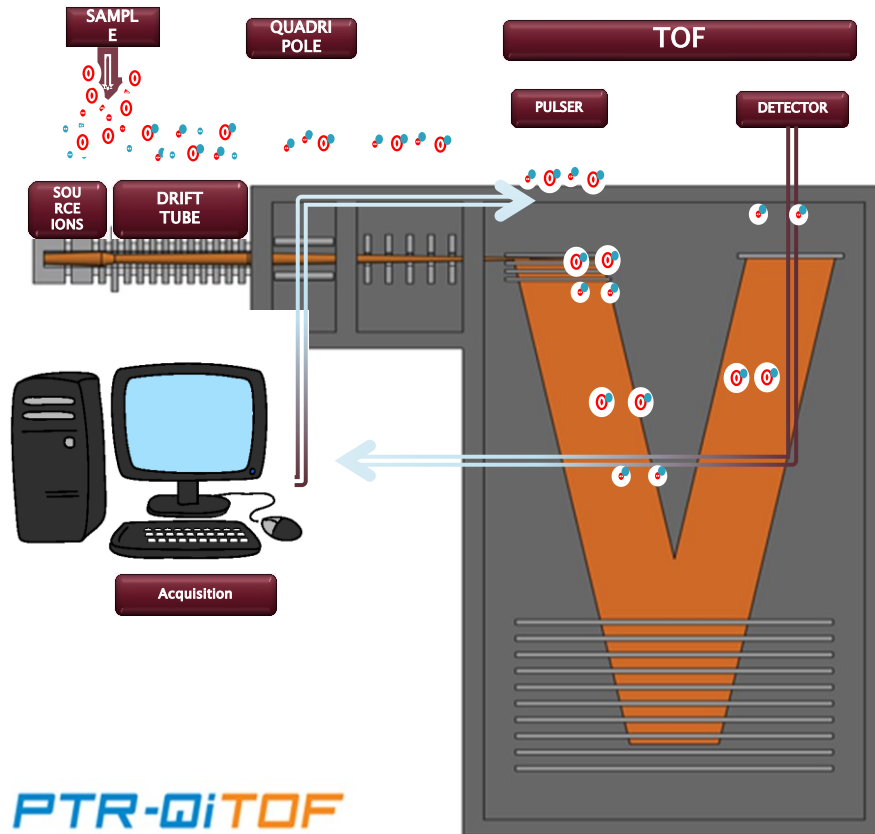
VOCs PROFILE  
DETECTED BY PTR-MS  
TECHNIQUE.

SPECIFIC COMPOUNDS  
FOR DIFFERENT ORGANIC  
WASTE

FOR 4 TYPES OF ORGANIC WASTE

# The PTR-MS

- $\text{H}_3\text{O}^+$
- Sample



## ADVANTAGES

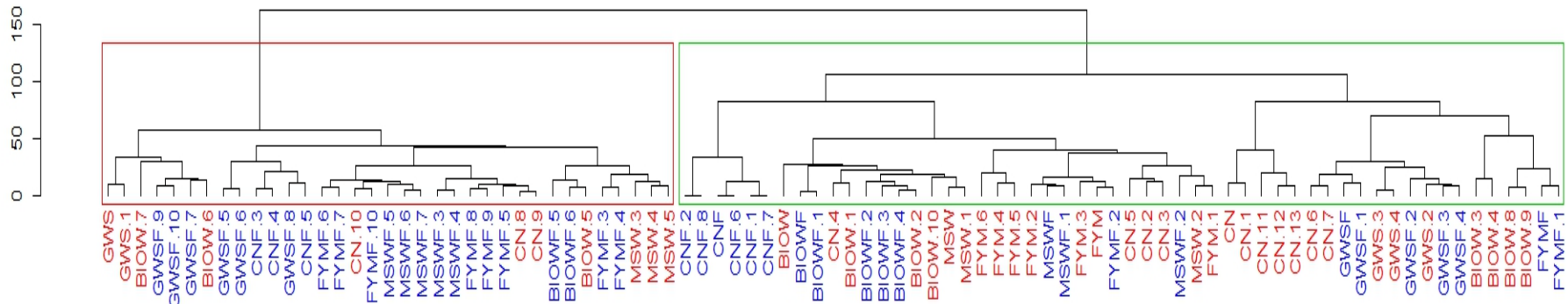
- SIMULTANEOUS ON-LINE MONITORING OF VOCs;

- LIMIT OF DETECTION <math><10 \text{ pptv}</math>

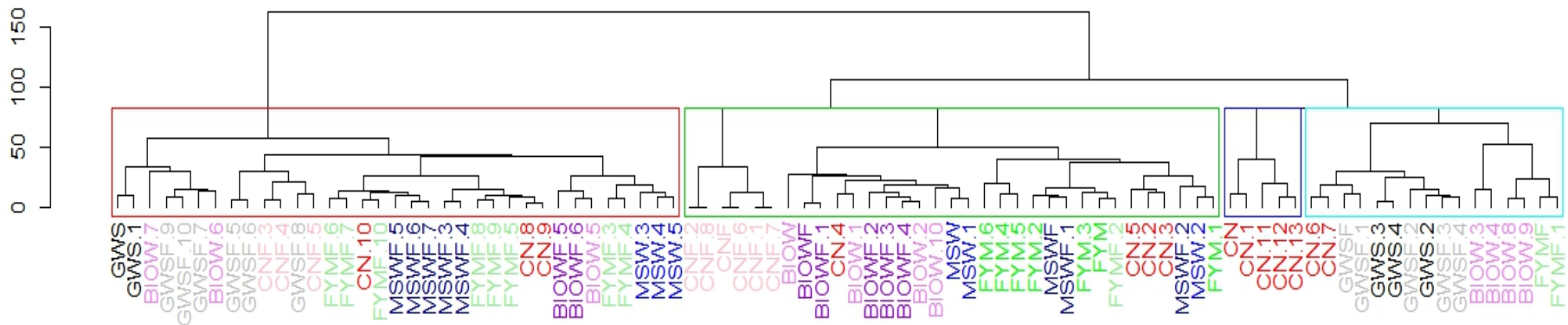
### COUPLED WITH TIME OF FLIGHT:

- SPEED
- HIGH RESOLUTION

# Hierarchical cluster Analysis



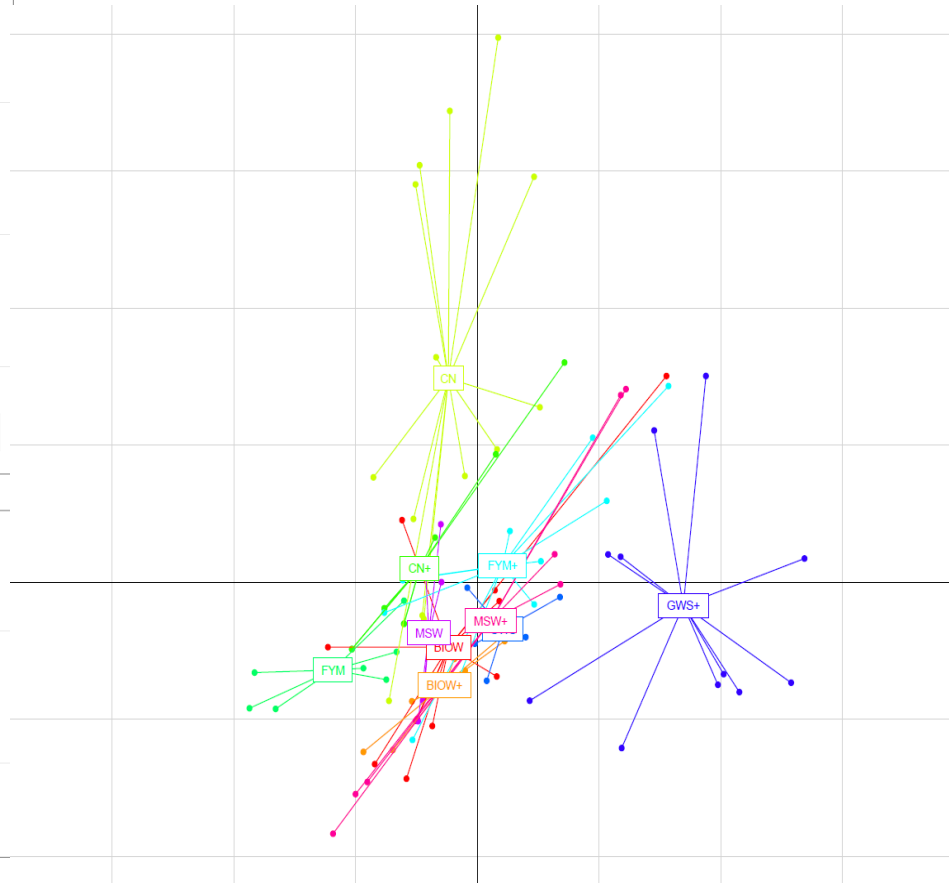
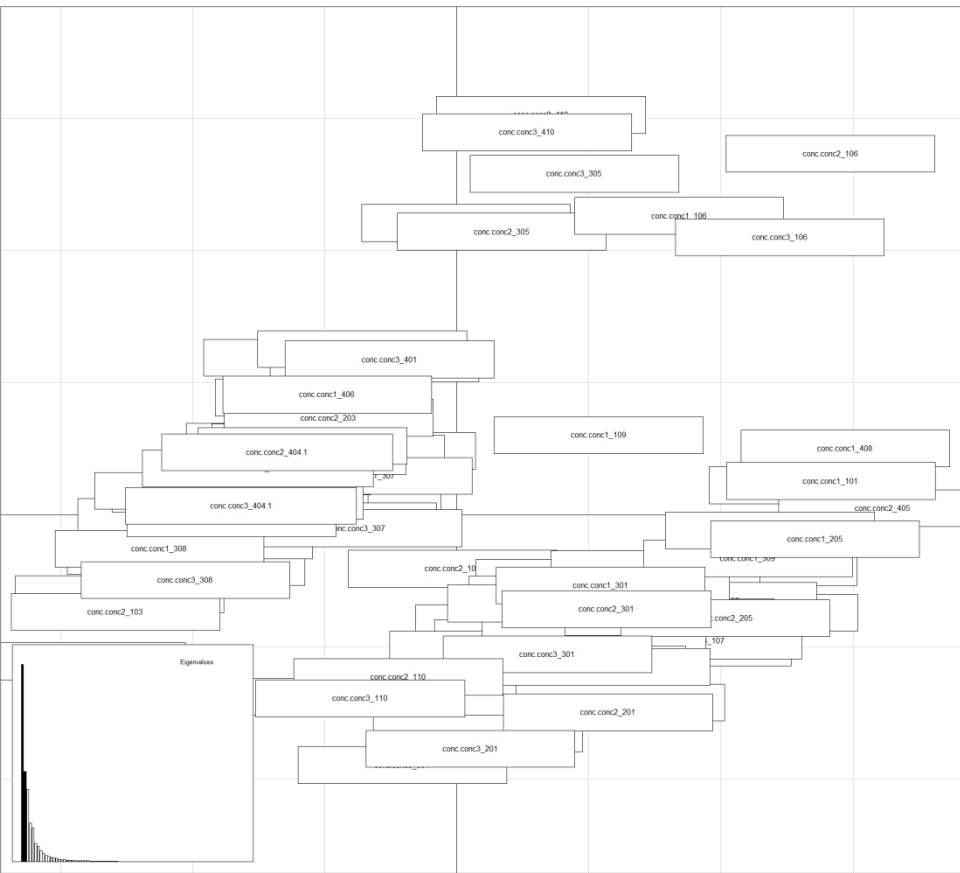
**Blue** = optimal N mineralization, **Red** = Low N mineralization



**MSW**: Municipal solid waste, **GWS**: Green waste and sludge, **BIOW**: Bio-waste, **FYM**: farmyard manure, **CN**: control without organic inputs

(F) = parts of the field with optimal N mineralization

# PCA and BCA



Masses	91.06	91.07	93.03	109.06
Formula	$(C_4H_{10}S)H^+$	$(C_4H_{10}S)H^+$	$(C_6H_5O)^+$	$(C_7H_8O)H^+$
Name	Isopropyl Methyl Sulfide	Isopropyl Methyl Sulfide	Toluene	Methoxybenzene

Masses	143.13	144.14	157.15	158.16
Formula	$(C_9H_{18}O)H^+$	?	$(C_{10}H_{20}O)H^+$	?
Name	Nonanal/ nonanone		Decanal/ Decanone	

# Conclusions

## HIERARCHICAL CLUSTER ANALYSIS

- ▶ different pattern between optimal and low N concentration
- ▶ different patterns concerning all the type of organic waste.

## BCA and PCA

- ▶ three main groups based on their common patterns.
- ▶ **CN and GWS:**
  - ISOPROPYL METHYL SULFIDE
  - TOLUENE
  - METHOXYBENZENE
  - NONANONE
  - DECANONE

# Acknowledgement



This work was funded by

- ANAEE-S (ANR)
- COV3ER (ADEME)

**THANK YOU FOR THE ATTENTION**