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Chambers' World

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CHAMBERS' WORLD

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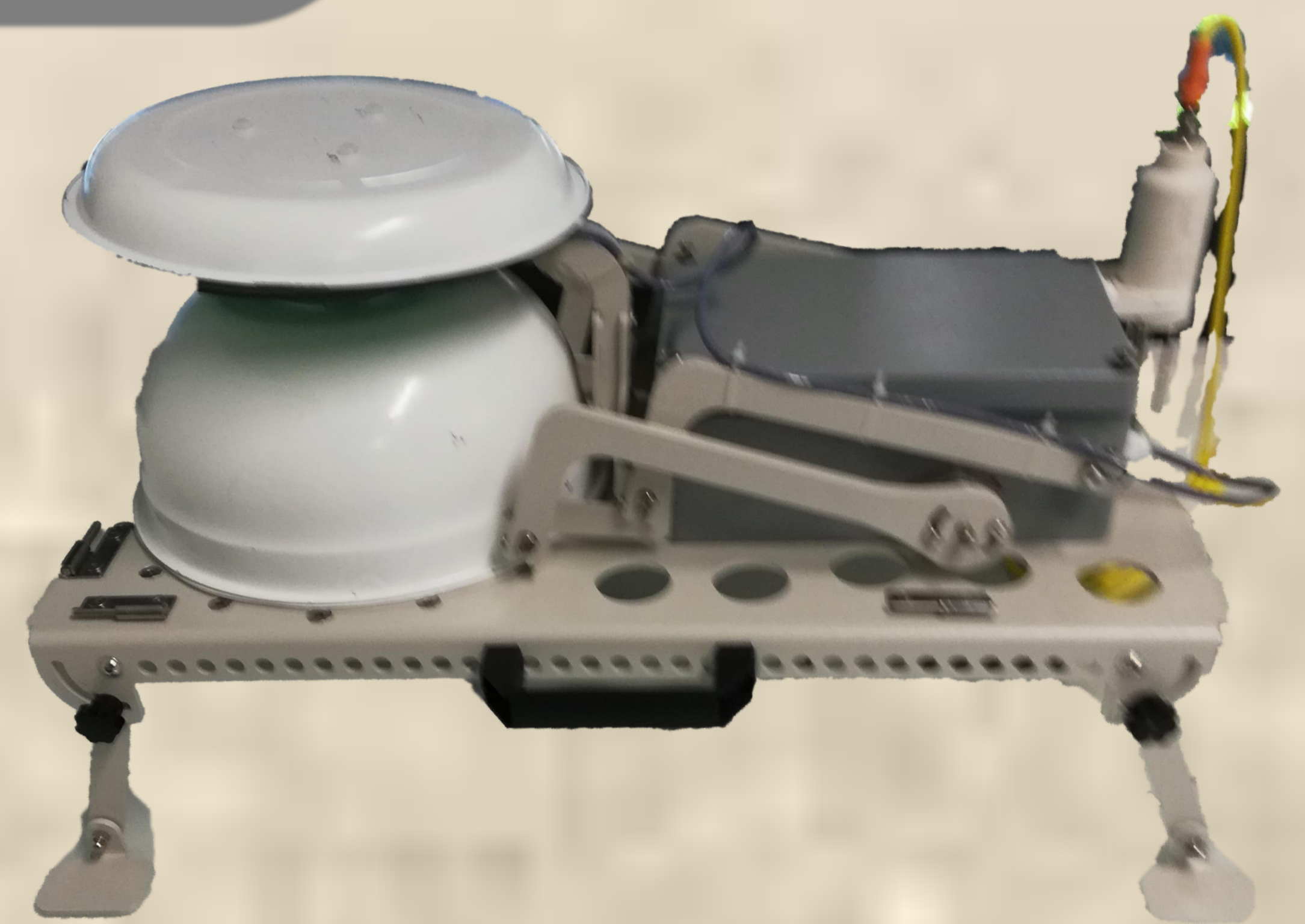
Context & Objectives

- In the context of global climate warming, soil GHG effluxes are monitored. Several techniques are used such as **eddy covariance** or **dynamic accumulation chambers**. Each technique has its pro and cons and these techniques are complementary.
- **Eddy covariance:**
 - Allows to summarize all the contributions such as soil and vegetation contributions and to measure the net fluxes.
 - Does not allow to measure separately and locally each contribution, requires a fast, ad expensive, gas analyzer, and requires some environmental conditions (air turbulence). Collected data processing is complex.
- **Dynamic accumulation chambers:**
 - Allows measuring locally the effluxes with a slow air analyzer by all the time. Measurements data processing is relatively basic. Overall measurement requires numerous chambers placement and measurements hardly allow to summarize all the contributions.

OBJECTIVES: Build cost-effective chambers adapted for each specific use.

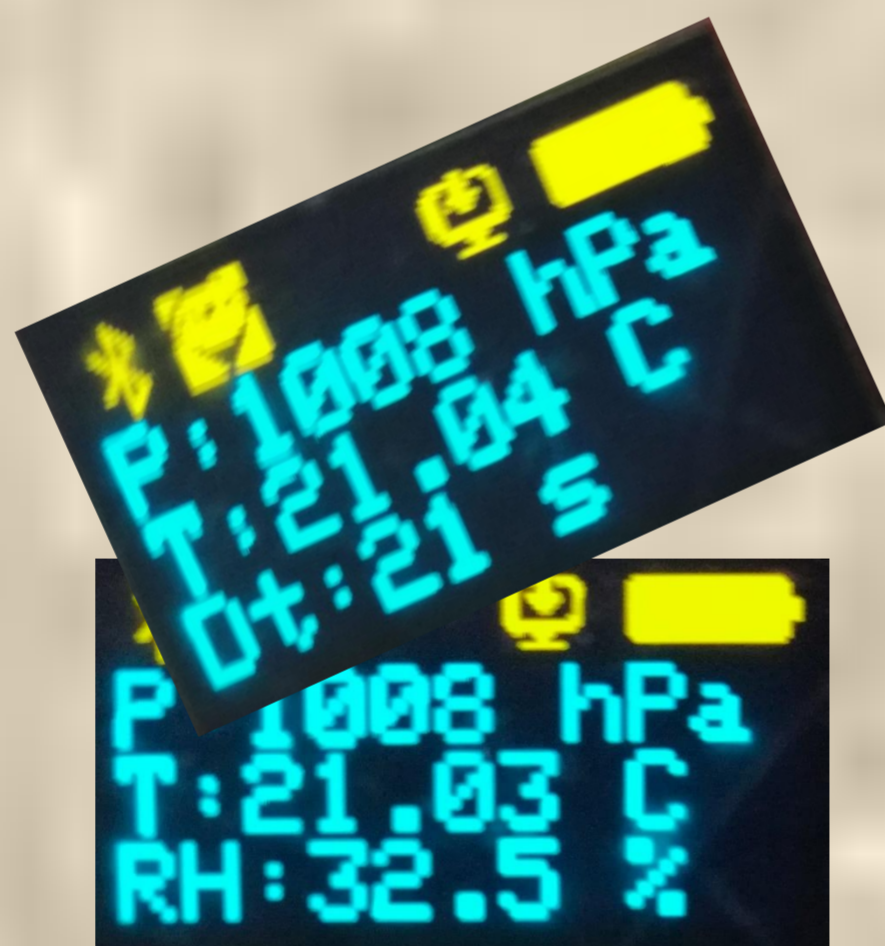
Long term installation chambers P-Gaz

- Fully automatized and piloted by an external or an internal data logger.
- Designed for an external gas analyzer and then operated serially. Or...
- Designed for an internal gas analyzer (small economic NDIR analyzers for carbon dioxide or water vapor can be embedded) along with an internal data logger allowing simultaneous uses without external pneumatic tubing. Zawilski, B. M. <https://doi.org/10.5194/gi-11-163-2022>, 2022.
- Independent stainless-steel collars for heavy, clayey soils use.
- Easy installation and uninstallation, easy chamber change for laboratory maintenance.
- Fully digital data transmission along with the diagnostic data.
- Vegetation anti-pinch grids.
- Double shielding (UV and IR).



Portable chambers for the external gas analyzer BPC

- Portable chambers for the external gas analyzer.
- Designated for external precise gas analyzer (FTIR Gasetm GT5000).
- Preinstallable stainless steel collars.
- Fully autonomous with rechargeable batteries (12h autonomy)
- Embedded air pressure, air temperature, and air moisture monitoring
- Embedded GPS for precise measurements geolocalization.
- Embedded LCD.
- Wireless real-time Bluetooth data transmission.



Fully autonomous portable chambers CoOxy

- Designated for internal gas analyzers
- Preinstallable stainless-steel collars.
- Fully autonomous with rechargeable batteries (12h autonomy)
- Embedded air pressure, air temperature, air moisture, CO₂, and O₂ monitoring
- Embedded GPS for precise measurements geolocalization.
- Embedded LCD.
- Embedded data logger with precis RTC.
- USB data transmission.



Conclusion

- Soil GHG effluxes can be accurately monitored by dynamic accumulation chambers. Each uses require different solutions. Nowadays, possibilities derivate from omnipresent IOT technology allow to make an entirely automatized "bulletproof", cost-effective setups.

Acknowledgments

Instrumental developments were mainly funded by the Institut National des Sciences de l'Univers of the Centre National de la Recherche Scientifique (CNRS-INSU) through the ICOS and OSR SW observatories. I would also to acknowledge Aurore Brut, Tiphaine Tallec and Vincent Bustillo for their help and their expression of interest.