MOSAI Newsletter – 17 June 2024

(all the newsletter are on the MOSAI web site)
https://mosai.aeris-data.fr/news-letters/

F. Lohou

Outline of the newsletter

Figure 1: Mosai workshop participants – 11-13 June 2024

Welcome

Welcome to Alice Maison who started her post-doctoral position with Frédérique Cheruy at LMD last January. Alice started to work on the implementation of a common simplified land surface model to study the impacts of surface heterogeneity on the atmosphere in climate models.

Jacob at IGE, Alexandre at LAERO, Audrey at LATMOS and Frédéric at LMD are finishing their internship… many thanks to them for the nice results they presented last week.

All the presentations are available on workshop workshop workshop page of the MOSAI web site.

Field campaigns

The MOSAI project had three one-year measurement campaigns.

And we've done them!

June 2020 to June 2021 at the Meteopole, January 2022 to October 2022 at SIRTA and March 2023 to March 2024 at P2OA. In addition, 3 intensive campaigns took place at P2OA in April, August and December 2023. A special Thanks to Marie and the CRA team who worked a lot to prepare and organized these three campaigns. It should not be forgotten that each campaign is accompanied by a sensor intercomparison campaign. The P2OA campaign is particularly long, since we have to compare 17 eddy-covariance measurement systems.

We can say that these three years have been particularly intense and we can congratulate ourselves on everyone's hard work, especially the technical teams.

I would like to emphasize that each team has also made a significant financial contribution, because beyond the missions partially covered by the project, no ANR funding has been devoted to instrumentation or consumables. We would like to thank ACTRIS-FR for its financial contribution to the 3 EOPs.

The experimental plans (Météopole, SIRTA, P2OA) , the quick-looks and the data are available on the web site.

DEPHY Workshop (27-31 mai 2024, Lège-Cap-Ferret)

Guylaine and Frédérique organized and animated 3 half-days at DEPHY workshop on the topic “model-obs comparison with the use of MOSAI data set”. The 19 august 2024 was used as a golden day to develop a 1D case and was run with different numerical models.

Many thanks to Guylaine for preparing and gathering all the dataset (EC station, RS, windcube,...).

Papers

Two papers are currently under review :

- Mahilde Jomé et al., 2024, BLM : « Impact of surface heterogeneity on the surface energy balance non-closure using long-term observations »
- Maurin Zououa et al., 2024, EGUsphère : « Using supervised neural networks to better evaluate surface turbulent heat fluxes in weather and climate numerical models: a demonstration study » - https://doi.org/10.5194/egusphere-2024-568

One paper has recently been submitted
Mauro Ghirardelli et al., AMT, 2024: “ SAMURAI-S: Sonic Anemometer on a MUlti-Rotor drone for Atmospheric turbulence Investigation in a Sling load configuration”

2024 MOSAI workshop

The MOSAI workshop took place 11-13th June at Météo-France/CIC. Thanks to Guylaine for organizing this !

We had very nice scientific presentations, all available here.
We were around thirty members of the MOSAI community and it was very interesting to see that collaborations are developing at different levels.

- Very nice collaboration and complementarity between Alice and Emilie on the land-atmosphere coupling in the numerical models. The works of Royston will also be used an extended.
- Promising interactions around the transition site with
  - the data (EC stations, scintillometer, wind cube, TB, RS and RPAS, Soil compositon and humidity),
  - the very well-resolved Myrtille’s idealized simulation,
  - a possible meso-nh LES simulation suggested by Fleur,
  - and the different large scale models simulation.
- Still on-going complementary works on model-Obs comparisons from Maurin/Audrey/Sophie and Artem/Frédérique with the use of Mathilde’s results.

Nathaniel Chaney, who is currently a visiting scientist at LMD, made us the pleasure of participating to the workshop and taking part to the discussions. He presented the CLASP project and its last results. We will present the objectives, campaign and results of MOSAI to the CLASP community next autumn in order to make bridges and collaborations.

We have also scheduled 3 discussion sessions during which we focused on the following subjects :

- General paper status
- Outline of the paper on the P2OA campaign
- EC stations homogeneous treatment and files. Feeding of the data base.
- Choice of Golden days.

Below the conclusions of these discussion sessions.

A très bientôt…

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Conclusions of the discussion sessions
Workshop MOSAI
11-13 Juin 2024

General paper status

- Almost all the parts are written but links between them are needed.
- We also identified some figures to better illustrate the methodology.
- A first complete version should be submitted to all the co-authors next autumn for a submission before the end of the year … 2024
- We have a trouble on choice of the journal to which we could submit since the paper has a large part devoted to the bibliography but is also presenting the objectives and the methodology of the project. It seems that only ESD is willing to edit this type of paper but limited to 3000 words, and we have already 7000 ! We need to ask to ESD, BAMS and JEMS (new European version of BAMS). Other ideas ?

Paper on the P2OA Campaign.

- Marie prepared an outline which was discussed and improved (see outline below)
- A new discussion is planed on the 8th of July 10:00 local time.

EC stations homogeneous treatment and files. Feeding of the data base.

- A meeting with AERIS will be planed to discuss some issues concerning the data base
  - Coupling between several data sets from different labs (CNRM and ISPA) but on the same sites (deciduous forest and Maize).
  - Research keys are different for meteopole and P2OA eop.
  - How to link the permanent measurement at the P2OA site to the MOSAI web site.
  - Add some people allowed to upload data on the data base.
- Intercomparison campaign

- Updated table for instrumentation assembling and dismantling in order to propose a table of instruments which can be compared.
- Each PI must provide (by file sender extended to end of august) Jacques and Jean-Claude (jacques.couziner@meteo.fr and jean-claude.etienne@meteo.fr) with Fullouput files from Eddy-Pro for fluxes and text/CSV files for slow data before mid-august.

Golden days

Different weather conditions can be interesting

- Clear sky, but cases with weak convective cumulus clouds developing in the afternoon should not be removed though.
- Stratocumulus case because of Arome's difficulty in simulating such cases.
- Low and high winds for different dynamical stability cases. Also two opposite directions for rough to smooth and smooth to rough cases.
- Different soil humidity cases.

Based on the IOP overview prepared by Marie and considering the instrumental status of the IOP days, several days have been chosen as golden days :

April SOP : 16-17 and 19
August SOP : 19-20 and 23
December SOP : 06 and 14

OUTLINE
P2OA Field campaign paper

Stephan, Mauro, Pablo, Sylvain, Myrtille, Marie, Alex

It is proposed to submit a field campaign paper at BAMS or JEMS. Groups are welcome to submit complementary data papers, for specific datasets, if appropriate.

Some key points of the paper :

- Instrumental innovations (turbulence measurements by RPAS, fast moisture sensor onboard tethered balloon, RPAS above canopee)
- Documentation at different time scale (20Hz→ 1 year)
- A focus on a specific heterogeneity : edge maize / forest

Title

A proposition (Fleur)

Documenting the role of surface heterogeneities on the atmosphere surface layer at different spatio-temporal scales

Introduction

P2OA long term measurements ↔ Model evaluation
→ representativity

→ representation in models
→ how to compare model/obs ?

Background :

- Surface Heterogeneity representation issues
- Previous field campaigns made over a surface heterogeneity
- Internal boundary layers

Objectives

→ 1/ Characterize and document the flux heterogeneity around the permanent tower
→ helps to evaluate models, and be aware in obs/mod comp

→ 2/ Focus on a heterogeneity transition and associated surface layer processes (including sub-meso circulation (nb : from bebop profiles & transects)
→ helps to understand ass processes → to improve models

Experimental Strategy

1/ Description of the site

2/ Main Strategy

heterogeneity, representativity
role of valley winds
focus on transition
scales : BL, landscape, transition
EOP/**SOP** timings

3/ Detailed experimental implementation

BL Vertical structure :
- ceilometer
- UHF
- **RS**

Landscape scale
- flux « network » : flux stations and ANN device
- Scintillometry (IGE)
- Soil moisture and texture variability

Scale of the hetero transition
- temp and humi varia across (ISPA, **backpack**!)
- flux at the edge, flux at forest, flux at maize
- Inside forest
- scintillometry (CESBIO)
- **Surf temp (DJTherm, SAMOURAI)**
- **Turbulence across (SAMOURAI, TB, micro lidar)**

Modelling plan

« Simple evaluation » of NWP models
- Real time obs/model comparison (fluxes)
- ARO 500 m and 1.3 km sim, RS comp, circulations (BL scamle)

Evaluation of models from statistitcal MLP approach
→ MLP approach on EOP and long-term series

Better understanding of sub meso circulation and impact on fluxes
→ case study with WRF-LES at 100 m reso 10-15 km, including CRA and Aure exit valley, nudged in WRF (Cadiz)

Understanding local scale processes (transition scale, rresolving canopy)

→ high reso LES (ISPA)

Data process and availability

- Quick looks
- flux uniformly processed data
- scintillometry
- soil moisture and texture
- Remote sensing
- Tethered balloon
- RPAS
- Canopee

Preliminary results (maybe only obs?)

- Seasonal variation of surface flux heterogeneity, soil moisture and vegetation (LAI from Sebastien)
  - → Obs/Mod comparison for fluxes?? NWP ? Which gridpoint ? -not sure
- overview of IOPs ? (about 18 days…) → table.
  - → also some figs ? (1 page or fig / SOP?)
- 1 or 2 case studies ? (→ 19/08 ?)
  - → RS+UHF+ceilor for vertical structure →comparison with ARO ?
  - → RPAS + balloon for turbulence at transition
  - → BeBop for local mean variables at transition → 2D cross section ?

Conclusion / perspectives