MOSAI
Workshop

March
2022

LATMOS-i

Land-ATMOSphere interactions in a changing environment:

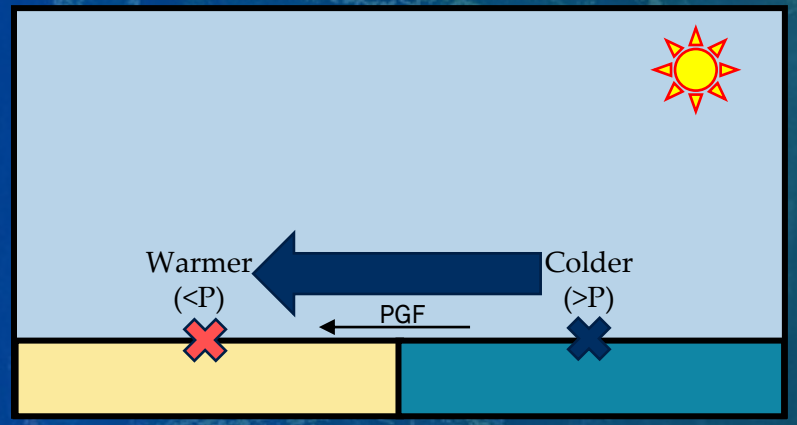
How do they impact on atmospheric-boundary-layer processes at the meso, sub-meso and local scales in mountainous and coastal areas?

PID2020-115321RB-I00

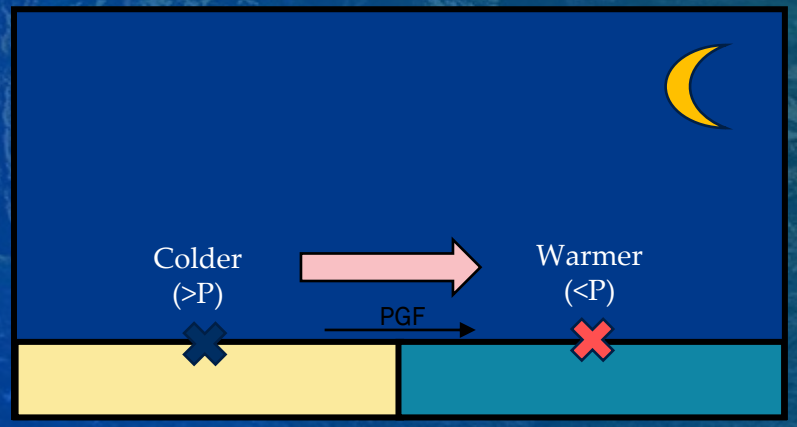
This is quite simple…

Thermally-driven flows

Sea breezes

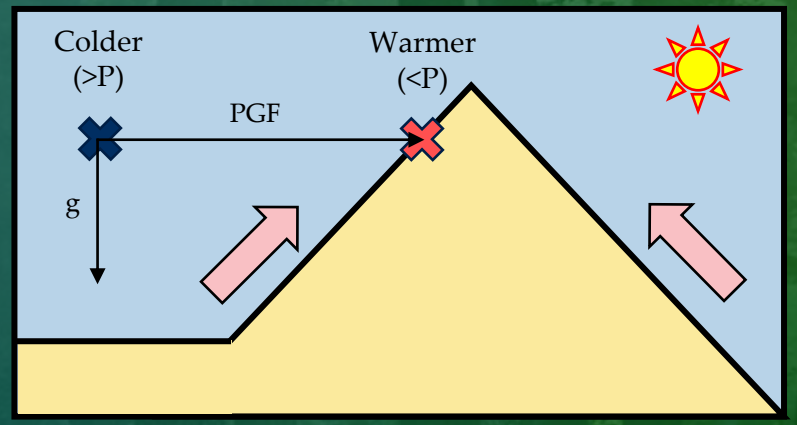


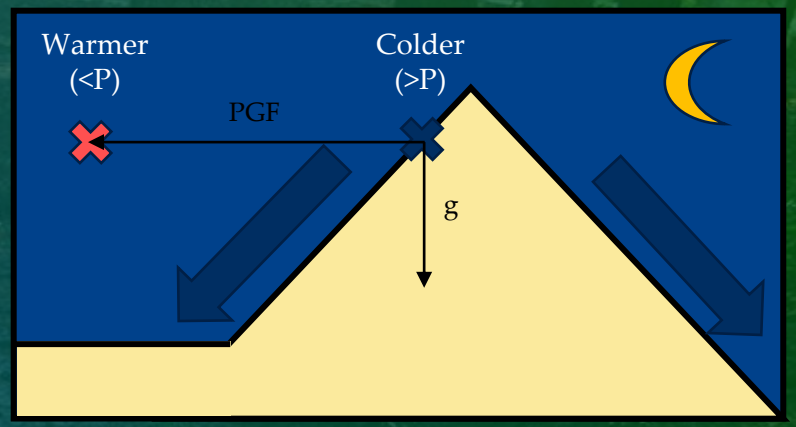
Daytime



Nighttime

Mountain breezes

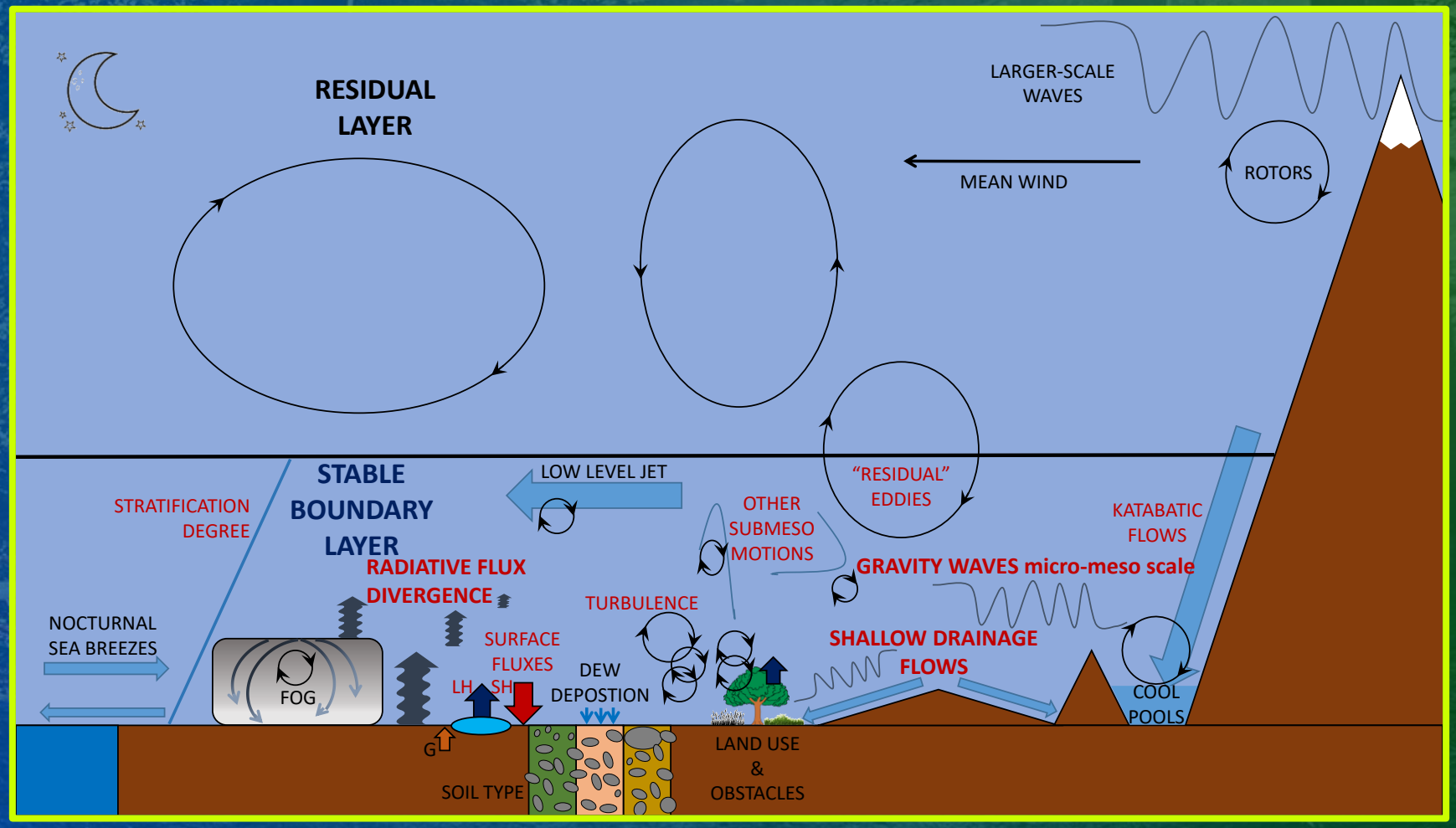




Thermally-driven flows

Interaction with other processes in the planetary boundary layer

An example of the interactions (nighttime)



This is more complex…

To deepen in the understanding of thermally-driven mesoscale flows (both mountain and sea breezes) and their interaction with processes of different scales

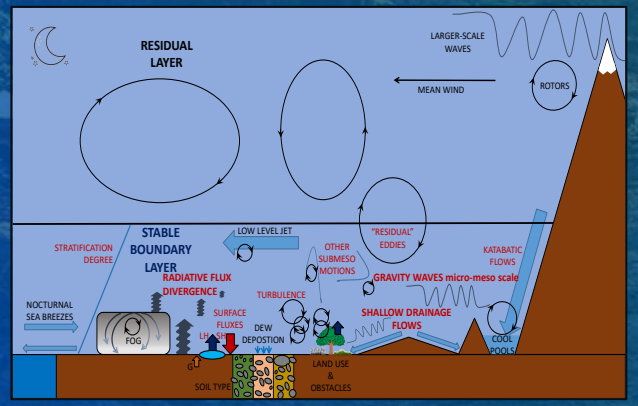
Objective

How do the **breezes interact** with…

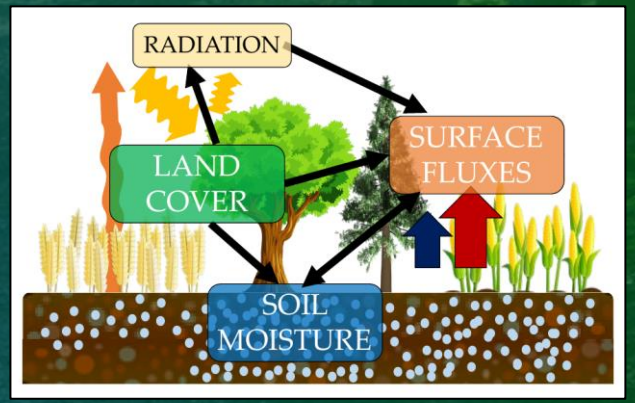
Dynamical atmospheric-boundary-layer processes
(turbulence, gravity waves, fog, etc.)

Surface-vegetation-atmosphere processes
(fluxes, land cover, soil moisture, future changes)

OBJECTIVE 1



OBJECTIVE 2



Funded by the Spanish Ministry of Science and Innovation
2020 I+D+i Projects
PID2020-115321RB-I00

Key info about LATMOS-i

- IP Carlos Yagüe (UCM)
- 3-years (Sept 2021 – Aug 2024)
- ~115.000 €
- 1 PhD: Sept 2022 – Aug 2025
- 1 Postdoc: Sept 2022 – Aug 2024
- Instruments maintenance (not new equipment)

METCLIM-UCM
(Multiscale Atmospheric Processes in Meteorology and Climate)

Involved institutions

Ciemat
Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas

UNIVERSIDAD COMPLUTENSE MADRID

UCA Universidad de Cádiz

LA LABORATOIRE D'AÉROLOGIE

AEMet
Agencia Estatal de Meteorología

WAGENINGEN UNIVERSITY & RESEARCH

INTA

Estación Biológica de Doñana CSIC

Tasks

TASK 1
Generation and maintenance of databases

Herrería (C. Madrid)
+ CRA (France)

Arenosillo + EBD (Andalucía)
+CESAR (The Netherlands)

TASK 2
Analysis of dynamical processes

Thermally-driven flows
(including shallow drainage flows)

Turbulence
Gravity waves
Fog

TASK 3
Analysis of surface processes

Surface energy balance
(including imbalance)

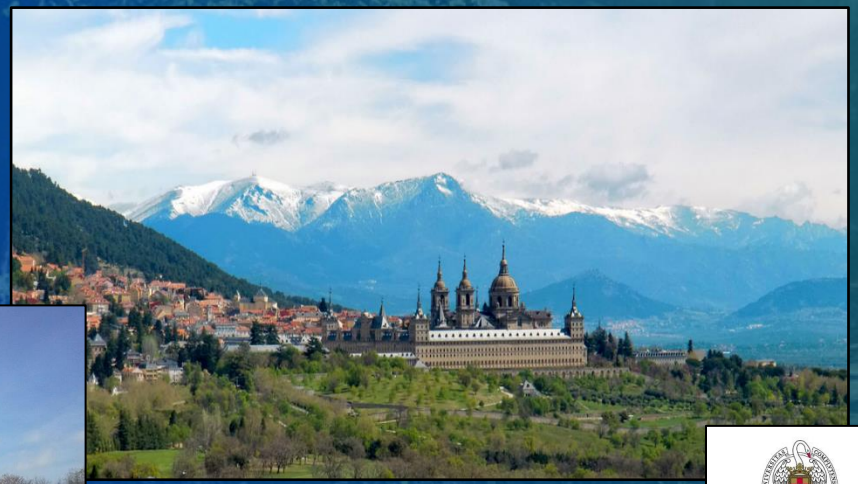
Land use (vegetation)
& soil moisture effects

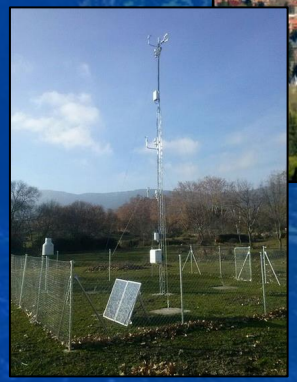
Global change effects

Task 1- Databases

Mountainous terrain

La Herrería – El Escorial
(Sierra de Guadarrama)





Centre de Recherches Atmosphériques
Pyrenees (France)

Task 1- Databases

Coast

El Arenosillo (Mazagón) + EBD (Huelva)

www.inta.es

CESAR
Cabauw (The Netherlands)

Bosveld et al. (2020),
(Photo by Wouter Knap)

Task 2- Dynamical processes

Thermally-driven flows

All sites, vertical and horizontal distribution. Statistical analysis, type, scale, interaction…

Whiteman (2000)

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Thermally-driven flows

All sites, vertical and horizontal distribution. Statistical analysis, type, scale, interaction…

Turbulence

Sonic anemometers (all coastal and mountainous sites). Multiscale analysis.

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Thermally-driven flows

All sites, vertical and horizontal distribution. Statistical analysis,

Turbulence

Sonic anemometers (all coastal and mountainous sites). M

Gravity waves

Microbarometer at Herrería site + 6-years database at CIBA site (Valladolid).

Task 2- Dynamical processes

Thermally-driven flows

All sites, vertical and horizontal distribution. Statistical analysis, type, scale, interaction…

Turbulence

Sonic anemometers (all coastal and mountainous sites). Multiscale analysis.

Gravity waves

Microbarometer at Herrería site + 6-years database at CIBA site (Valladolid).

Fog

Coastal fog (Gulf of Cádiz) – few studies.

Task 3- Surface processes

Surface energy balance (including imbalance)

Master thesis started. Mountainous and coastal sites.

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Land use (vegetation) effects

4 SEB towers in Doñana + 1 portable tower (Arenosillo) + Herrería site.

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Soil moisture effects

Sensors in Doñana + CRA (France) + Herrería + satellite analysis (SMOS).

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Global change effects

WRF model sensitivity experiments.

Forthcoming activities

El Arenosillo

- **Installation of 3 visibilimeters BIRAL SW-100**

  2 m – 50 m – 100 m

  FOG vertical profile

  ~3 years

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- **Surface energy balance (SEB) tower**

  Breeze period

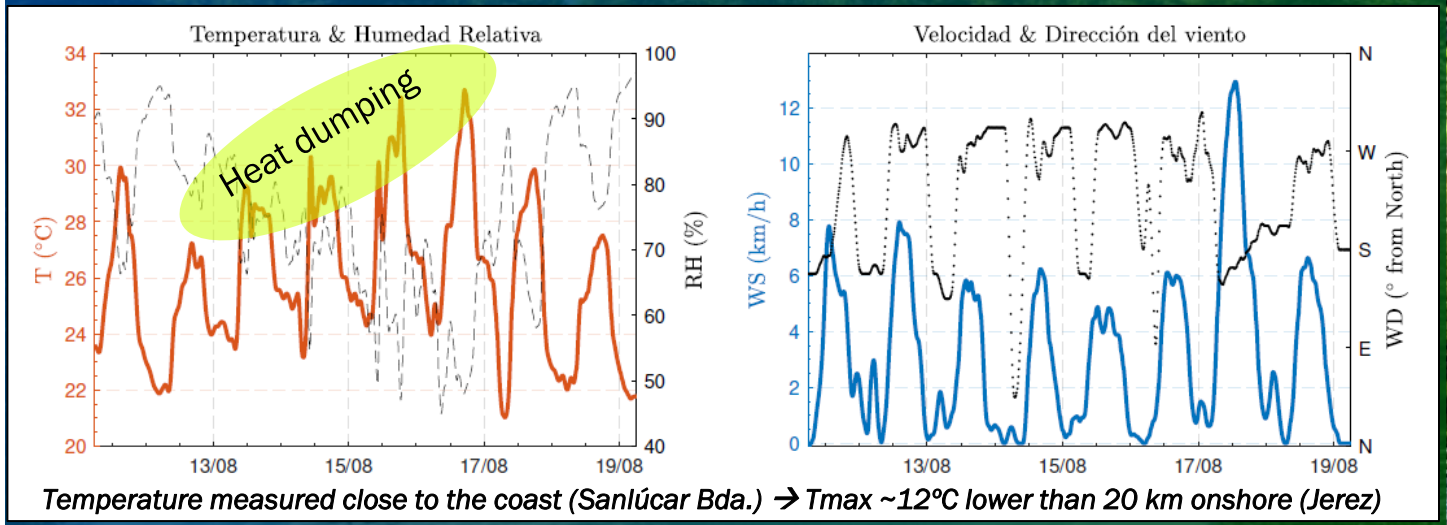
  Installation in May 2021

Forthcoming activities

UCA

- **Grade Thesis - Esther Luján**

See breezes and heat waves, a case study (Aug 2021)



Temperature measured close to the coast (Sanlúcar Bda.) → Tmax ~12ºC lower than 20 km onshore (Jerez)

Foto biral

Forthcoming activities

UCM

- **Master Thesis - J. Antonio Pocino**

Suface energy balance closure – La Herrería (2016-2022)

Foto biral

Forthcoming activities

CRA - MOSAI

- **Surface energy balance (SEB) tower**

Possible mutual collaboration?


Thanks!
More info & collaboration
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