SPECIAL PROJECT PROGRESS REPORT

All the following mandatory information needs to be provided. The length should *reflect the complexity and duration* of the project.

Reporting year	2026
Project Title:	Land-atmosphere-ocean coupling along the Atlantic Eastern Boundary Current Systems
Computer Project Account:	spptlima
Principal Investigator(s):	Daniela C.A. Lima
Affiliation:	Instituto Dom Luiz, Faculdade de Ciências, Universidade de Lisboa
Name of ECMWF scientist(s) collaborating to the project (if applicable)	…… ……
Start date of the project:	01/01/2025
Expected end date:	31/12/2026

Computer resources allocated/used for the current year and the previous one

(if applicable)
Please answer for all project resources

		Previous year		Current year	
		Allocated	Used	Allocated	Used
High Performance Computing Facility	(units)	100M SBU	23 655 SBU	55M SBU	475 SBU
Data storage capacity	(Gbytes)	120000 GB	0	160000 GB	0

Summary of project objectives (10 lines max)

The project aims to improve the understanding of land-atmosphere-ocean coupling along the Atlantic Eastern Boundary Current Systems, with a particular focus on the Iberian Peninsula-Morocco and southwestern Africa. The main objectives are to quantify the role of coastal upwelling, coastal low-level jets and land-use change in regional climate, evaluate coupled feedback mechanisms, and assess their influence on climate extremes under present and future climate conditions using high-resolution regional climate simulations.

Summary of problems encountered (10 lines max)

No major scientific or technical problems were encountered during the current reporting period. The project resumed following the maternity leave reported previously. The main activity during this period focused on preparatory work, including the analysis of ERA5 reanalysis data to characterize coastal low-level jets and drought conditions, providing a baseline for the forthcoming modelling experiments. The start of the numerical simulations required additional preparation of the modelling framework and computational environment.

Summary of plans for the continuation of the project (10 lines max)

The next phase of the project will focus on launching the high-resolution WRF simulations, scheduled to start in July. Simulations driven by ERA5 reanalysis will be performed to investigate land-atmosphere-ocean interactions, followed by simulations forced by CMIP6 data for future climate scenarios. The resulting datasets will be used to evaluate the representation of coastal low-level jets, drought conditions and other coupled processes, and to assess the influence of land-use change and ocean-atmosphere feedbacks on regional climate variability and extremes.

List of publications/reports from the project with complete references

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……
……
……

Summary of results

If submitted **during the first project year**, please summarise the results achieved during the period from the project start to June of the current year. A few paragraphs might be sufficient. If submitted **during the second project year**, this summary should be more detailed and cover the period from the project start. The length, at most 8 pages, should reflect the complexity of the project. Alternatively, it could be replaced by a short summary plus an existing scientific report on the project attached to this document. If submitted **during the third project year**, please summarise the results achieved during the period from July of the previous year to June of the current year. A few paragraphs might be sufficient.

During the current reporting period, the project focused on preparing the framework for the analysis of land-atmosphere-ocean interactions along the Atlantic Eastern Boundary Current Systems. Although the regional modelling component was postponed during the first year owing to maternity leave, the project is now fully underway, and the modelling activities are scheduled to begin in July.

As an initial step, a climatological analysis based on the ERA5 reanalysis was conducted to characterize the occurrence of coastal low-level jets (CLLJs) and drought conditions over the study regions. Coastal low-level jets are one of the key atmospheric features of Eastern Boundary Current Systems, strongly influencing coastal upwelling, moisture transport and regional climate. Drought conditions were characterized using ERA5-derived variables in order to identify periods of anomalously dry conditions and to investigate their relationship with CLLJ variability.

The preliminary analysis provides a first assessment of the temporal and spatial variability of both coastal jets and drought events, establishing a consistent observational baseline for the project. These diagnostics will be used to investigate the interactions between atmospheric circulation and drought conditions and will serve as a reference for the evaluation of the regional climate simulations.

Figures included in this report illustrate the climatological distribution and frequency of coastal low-level jets together with the identified drought periods, highlighting the regions where these interactions are expected to be most relevant.

The next phase of the project will focus on the production of high-resolution WRF simulations, which are scheduled to start in July. These simulations will allow the assessment of land-atmosphere-ocean coupling processes under different vegetation and climate scenarios, providing the basis for evaluating the role of land use, coastal upwelling and atmosphere-ocean interactions in the occurrence of droughts and other regional climate extremes.

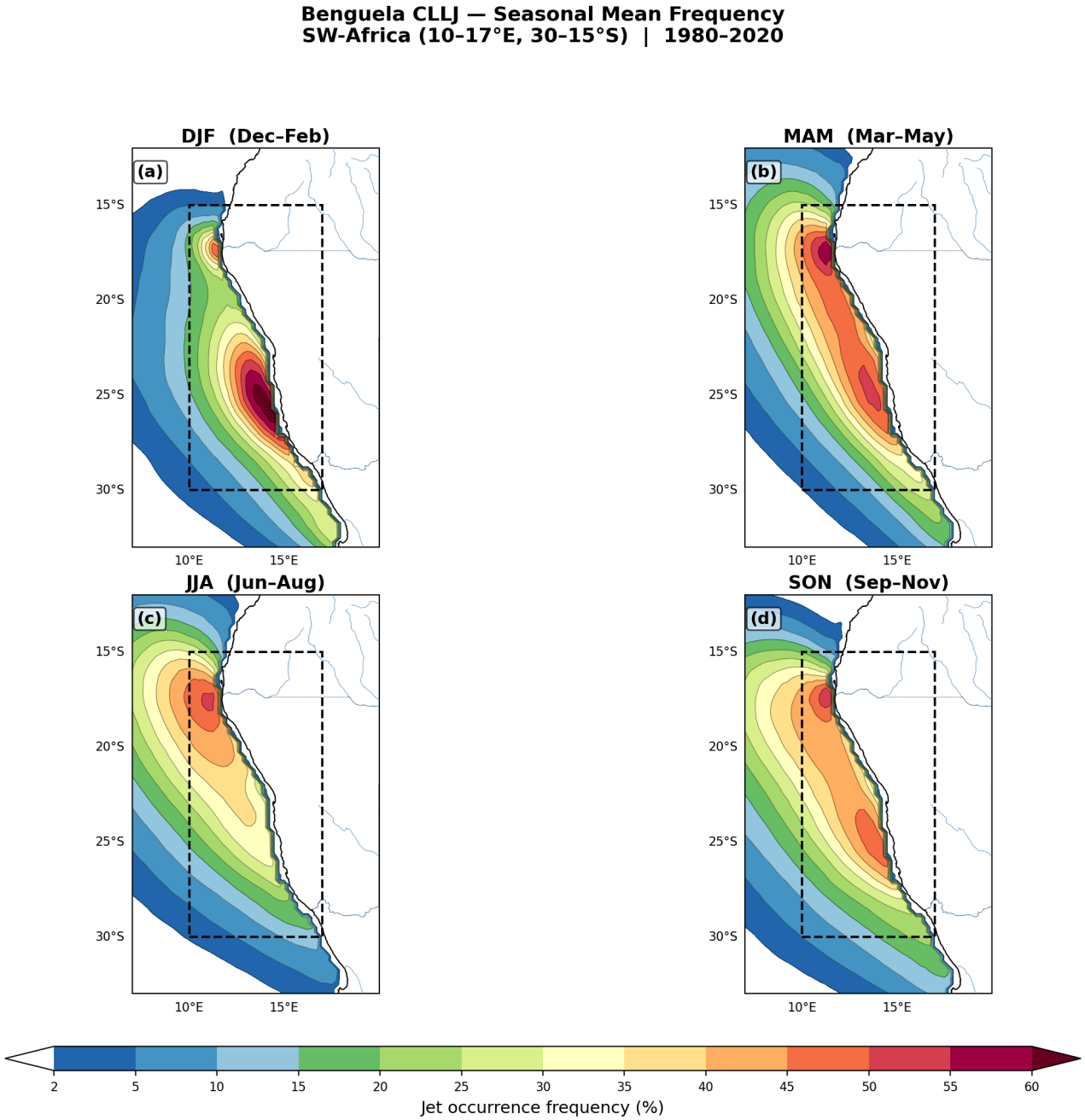

Figure 1. Maps of frequency of occurrence of coastal low-level jets for each season for the period 1980-2020 using the ERA5 reanalysis data for the southwestern Africa region.

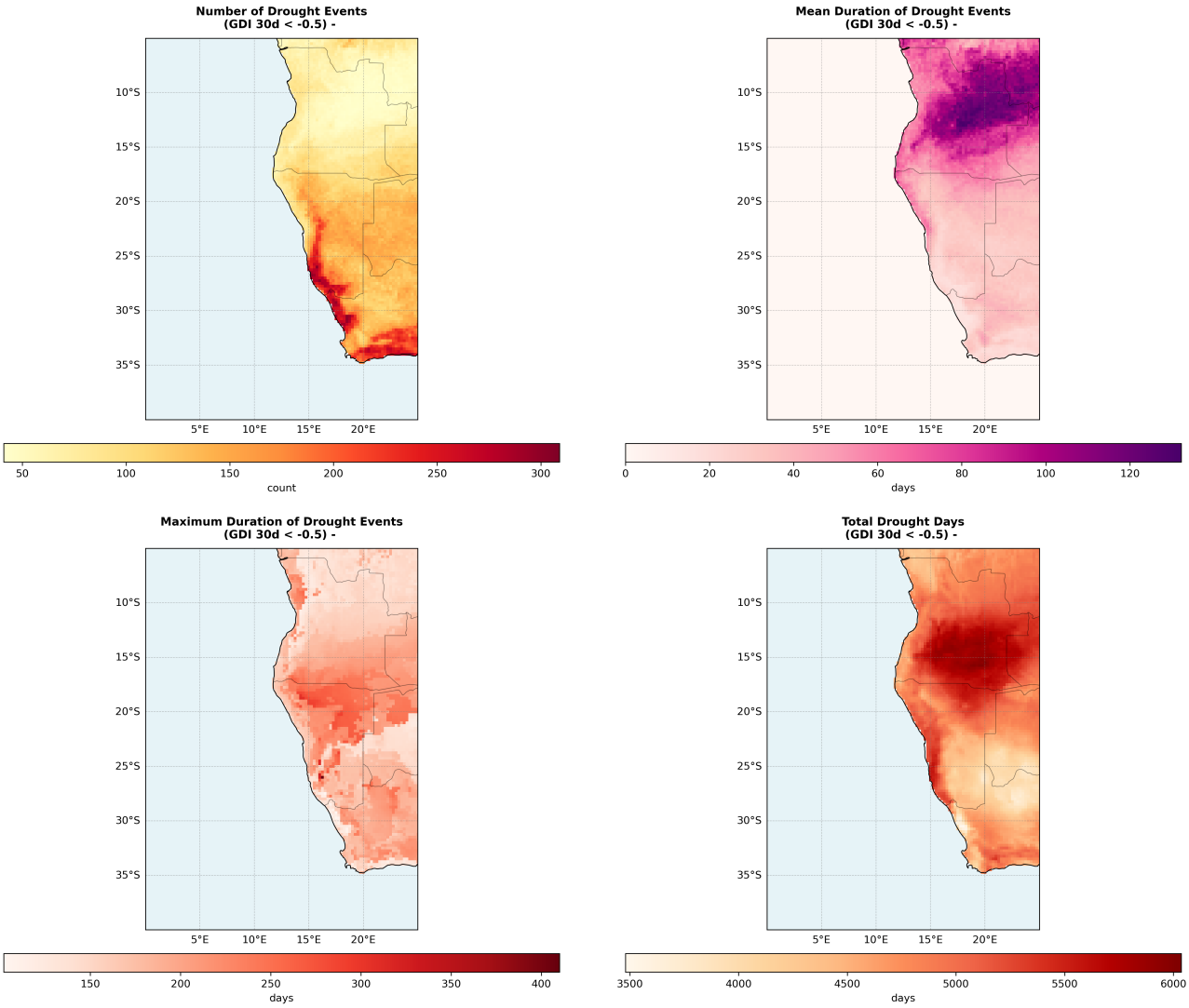

Figure 2. Maps of number of drought events (top left), mean duration of drought events (top right), maximum duration of drought events (bottom left) and total drought events (bottom right) using the Drought index GDI, for the period 1980-2020 using the ERA5 reanalysis.