AFRI-SMART

EO-Africa multi-scale smart agricultural water management

User Handbook

Deliverable D11

ESA Contract 4000139550/22/I-DT

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1. Introduction

This practical guide provides an overview of the main features of the web-interface of the AFRI-SMART platform for multi-scale monitoring of the main hydrological variables over Morocco and the Oum Er-Rbia basin, with a high-resolution focus on the agricultural activities in the Doukkala irrigation consortium. The platform displays a composite database of climate and hydrological information from satellite observations, reanalyses and agro-hydrological models, which can be accessed via the web interface for use in near real-time monitoring and seasonal forecasting in support of holistic water management.

The interface allows access to the data as maps, time series and summary statistics, also providing a dedicated tool for water management planning based on seasonal forecasts and optimized to reach the maximum diffusion among potential end-users.

This is a practical, self-guided exercise on accessing and navigating the system, including the various menus and data access/download. This guide will take about 45-60 minutes to complete.

2. Accessing the system

⇒ Open your web browser (preferably Google Chrome or Firefox) with the system URL:

⇒ **https://hydrology.soton.ac.uk/apps/oumerrbia_app_v2/**

⇒ The system is fully open, so there is no need to register.
⇒ When you first access the system, there may be a delay of a few seconds for the system to initialize, and for the interface to be rendered. If you are presented with the interface but no information (e.g. no maps) then continue to wait a few seconds more.

2.1 Main Interface overview

On opening the system web page, you will see the main interface which provides visualisation and access to the main data and information of the AFRI-SMART platform.

This interface allows you to view current conditions and forecasts of a set of meteorological and agro-hydrological variables in an interactive way, as spatial data layers, and area/point time series.

Five main information/interaction areas are available:

1. The top bar menu
2. The main command box
3. The map
4. The metadata box
5. The time series box

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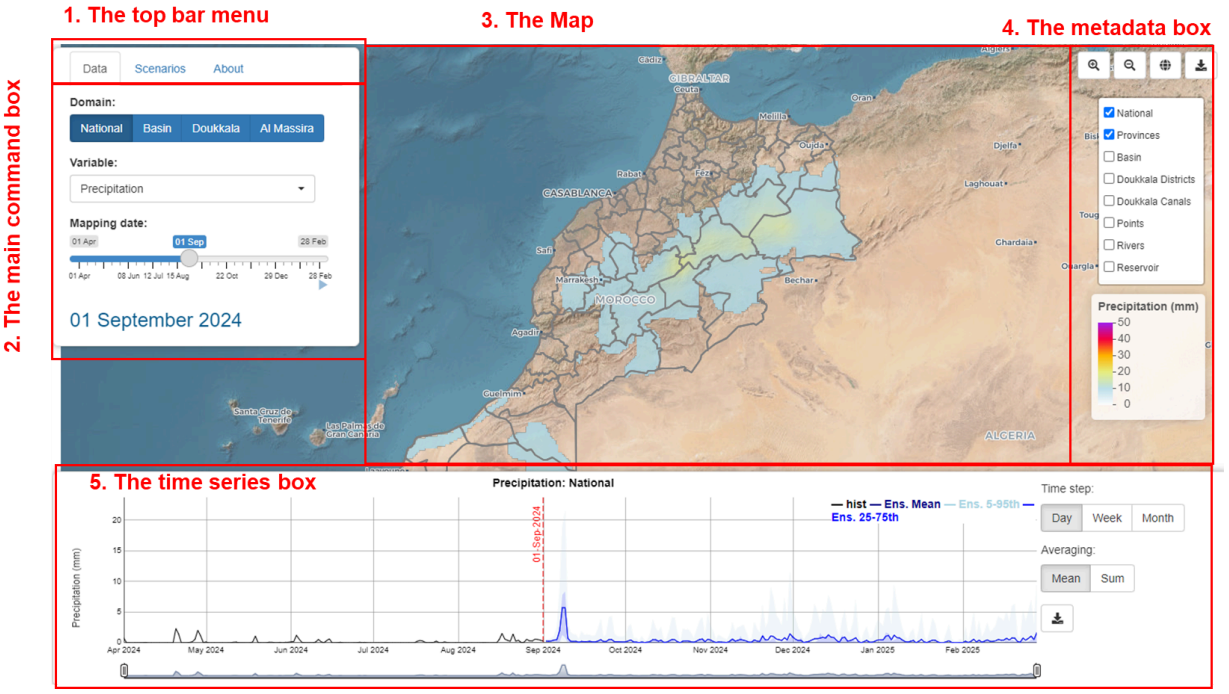

The top bar on the top-left corner of the page shows a menu with a series of tabs. The tabs provide access to the different parts of the platform:

- Data – This is the default tab and shows the current conditions (for the past 5 months) and the latest forecast (for the next 6 months) for a range of meteorological and hydrological variables and indices.
- Summary – This tab provides a summary of the results for the Doukkala area
- Scenarios - This tab shows an easy-to-use water management tool for the Al Massira dam in the form of an Excel spreadsheet.
- About – This tab provides information on the latest update of the system, background information on the system, and some help information on the functionality and navigating the system.

For the remainder of this guide, you will learn how to explore the interface, starting with the main tab and then each other tab in turn.

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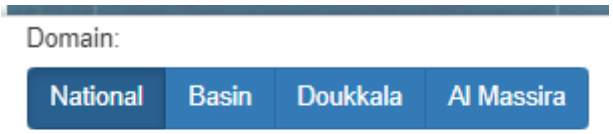
2.1.1 The Main Command box

This box, placed on the top-left corner of the main interface, collects all the commands that allow the user to decide which variable is going to be displayed by the platform, and regulate the desired temporal and spatial extents of the displayed data.

The selection of the spatial domain of the analysis is made from the Domain tabs, which determines the zooming level for the main map displayed in the platform.



- National – This is the default tab and provides the national view over the entire state of Morocco, accessing data both referring to current conditions (for the past 5 months) and the latest forecast (for the next 6 months) for a range of meteorological and hydrological variables and indices.
- Basin – This tab focuses on the Oum Er-Rbia river basin. Upon clicking on this tab, the map view extent zooms in to the basin, maintaining the same variable that was being displayed and adding the streamflow along the basin river network.
- Doukkala – This tab further enhances the detail of the analysis, zooming in to the Doukkala irrigation district. Upon selecting this tab, the variable that is being displayed is preserved.
- Al Massira – This tab shifts the map extent to the lake upstream of the Al Massira dam.

The Variable menu is a dropdown menu that allows you to select which variable is to be displayed in the Map and Time series boxes. All the available variables are featured in this menu, although some of them are computed only for specific spatial domains.

The list of all featured variables is provided in the following Table. The variables are grouped according to the different categories in the Variable menu, indicating also in parentheses the spatial domain for which the different data groups are available.

Variable name	Unit	Spatial resolution	Time frequency
Meteorology (National)			

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Precipitation	mm/d	5 km	Daily
Maximum Air Temperature (“Temp Max”)	°C	5 km	Daily
Minimum Air Temperature (“Temp Min”)	°C	5 km	Daily
Wind speed	m/s	5 km	Daily
Hydrology (National and basin)			
Evapotranspiration	mm/d	5 km	Daily
Soil Moisture	mm/d	5 km	Daily
Runoff	mm/d	5 km	Daily
Snow water equivalent	mm/d	5 km	Daily
National-scale drought indices (National)			
Standardized Precipitation Index -1 month (SPI-1)	-	5 km	Daily
Standardized Precipitation Index - 3 months (SPI-3)	-	5 km	Daily
Soil Moisture Index	-	5 km	Daily
Irrigation (Doukkala)			
Evapotranspiration (“Irrigation ET”)	mm/d	30 m	Daily
Soil moisture (“Irrigation SM”)	m^3/m^3	30 m	Daily
Soil Saturation Index	–	30 m	Daily
Irrigation Applied	mm/d	30 m	Daily
Leaf Area Index	m^2/m^2	30 m	Daily
Soil Moisture Anomaly (SMa)	-	30 m	Daily
NDVI	-	30 m	Daily
NDVI Anomaly (NDVIa)	-	30 m	*When available*
Reservoir (Al Massira dam)			
Storage	m^3	–	Daily
Level	m (a.s.l.)	–	Daily
Area	m^2	–	Daily
In Flow	m^3	–	Daily
Out Flow	m^3	–	Daily
Demand Flow	m^3	–	Daily
Evaporation	m^3	–	Daily

The Mapping data tab displays the date corresponding to the displayed map and allows you to change it by clicking on the cursor and moving the selection circle left and right. This selection is also reflected in the Time series box, where the selected date is highlighted within the time series.

The small “Play” button placed below the final date of the date selector bar allows to reproduce the different daily maps in series, animating the map visualization.

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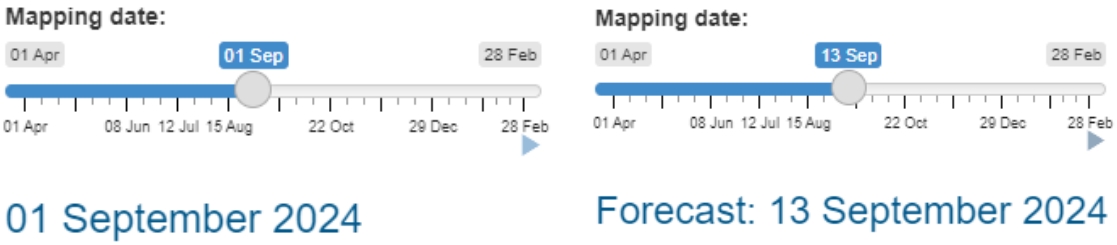
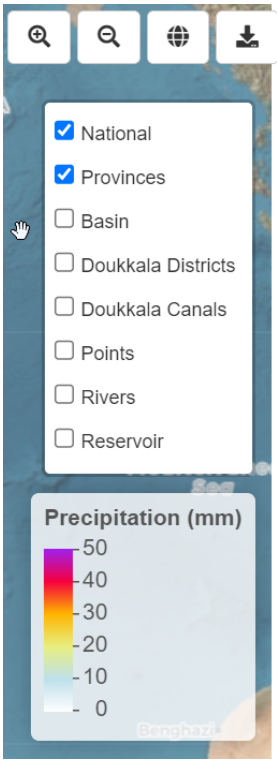


2.1.2 The Map

The map area shows the maps of the data available in the platform and occupies the centre of the interface. Its background is provided by Open Street Maps, which gives the geographical context of political boundaries and landscape features such as lakes and coastlines. The default view comprises the whole of Morocco, and precipitation is shown as default variable, overlain by the national and provincial boundaries. The map display provides functionality to pan and zoom in on the map layers to see regional and local detail, and select summaries of the data for different areas or points. Other meteorological and hydrological variables can be selected and displayed using the Main Command box. A set of other overlay maps can also be selected in the Metadata box, which also contains the map legend. Finally, whichever variable is being displayed in the map is also provided, as a time series of areal averages, in the Time series box below.

2.1.3 The Metadata box



This box collects some options to customise the data display and provides the legend for the map of the selected variable.

The first block, made up of four buttons, allows you to:

- ⇒ Zoom the map in or out using the dedicated buttons (+ and –).
- ⇒ Reset the original map view of Morocco by clicking on the globe button.
- ⇒ Download the current-date map with the download button. This will automatically save the map layers for all variables for the selected date to your Desktop or Downloads folder. The single maps will be in Tiff format and will be collected in a single .zip archive. These files can be imported into GIS software for further display and analysis.

The second block displays a number of overlay features that can be added to the map to provide visual context (e.g., district boundaries, water distribution structures) but can also be clicked to access subsets of the data (see later). The overlay features are:

- ⇒ National (vector map): borders of Morocco
- ⇒ Provinces (vector map): current provinces of Morocco

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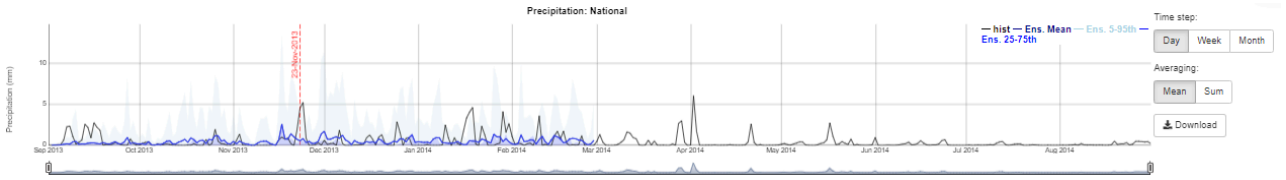
⇒ Basin (vector map): Oum Er-Rbia basin outline, automatically ticked when clicking on the "Basin" tab
⇒ Doukkala Districts (vector map): high and mid level districts into which the Doukkala irrigation district is subdivided, automatically ticked when clicking on the "Doukkala" tab
⇒ Doukkala Canals (vector lines): main water distribution canals bringing the water from the Imfout barrage and Al Massira dam to the Doukkala irrigation district, automatically ticked when clicking on the "Doukkala" tab
⇒ Points (point cloud): location of hydrometric stations that measure discharge along the Oum Er-Rbia hydrological network, automatically ticked when clicking on the "Basin" tab
⇒ Rivers (vector lines): Oum Er-Rbia complete hydrological network, automatically ticked when clicking on the "Basin" tab
⇒ Reservoir (vector map): main outline of the lake created by the Al Massira dam, with a fixed surface, automatically ticked when clicking on the "Al Massira" tab

Finally, the third block hosts the scale bar legends for the displayed maps, also reporting the unit of measurement of the displayed variables. When in "Basin" tab, a fourth block is added, providing the legend for the streamflow data, which is superimposed to whichever variable is being displayed.

2.1.4 The Time Series box



At the bottom of the interface, a time series chart is displayed. This shows the currently selected variable for a selected area or point. By default, the time plot shows the average values for the variable over the whole of Morocco. You can then select specific areas and points by clicking a feature on the map (e.g., basin, district, river point). This will update the time series chart to show a time series of the selected variable averaged over the selected area feature or point. The displayed variable is shown both in the plot title and y-axis legend (here with its unit of measurement).

The system represents uncertainty in the forecasts based on ensemble meteorological forecasts that are used to drive the hydrological (VIC+RAPID) and agro-hydrological (FEST-EWB) models to provide an ensemble of forecasts of agro-hydrological variables and drought indices. Uncertainty is represented by the ensemble spread (5-95th and 25-75th percentile ranges) in the time series in the corresponding box.

On the right of the chart are three sections:

- The "*Time step*" buttons allow to change the temporal scale of the plot, between daily (default), weekly or monthly

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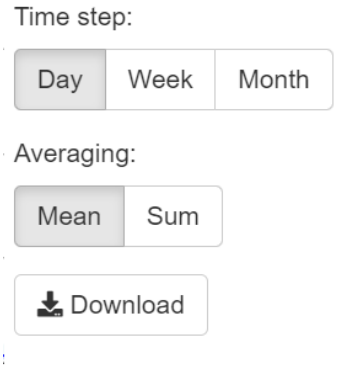
- The "*Averaging*" buttons allow to set how the temporal aggregation is performed for weekly/monthly display, between mean (default) and sum (for accumulated values)
- The "*download*" button allows you to download the currently displayed time series data as a csv file, which can be used to carry out further analysis in Excel or other software.



3. The "National" scale tab

When you select the "National" scale in the Domain tabs, you view for the entire Morocco the current conditions and forecasts of a set of meteorological, hydrological, flood and drought variables in an interactive way, as spatial data layers, and area/point time series. The map display provides functionality to pan and zoom in on the map layers to see regional and local detail, and select summaries of the data for different areas or points.

Exercise: Selecting Different Variables and Dates

⇒ Select a different variable from the dropdown list, e.g. "*Soil moisture index*". This will update the map, legend and time series below.
⇒ Change the date of the displayed map, by clicking a different data on the selector bar, or drag the selector button to the left or right. The red highlighted date on the time series chart below will be updated.
⇒ Run through the dates of the historic and forecast periods automatically by clicking on the "*play*" button at the bottom-right of the date selector. This will animate the maps one day at a time. Stop the animation by clicking on the "*pause*" button.

Note: the current selected date is displayed at the top of the Time cursor tab. If the date is within the forecast period, it will be appended by "*Forecast:*". When in the forecast period, the map shown is the forecast ensemble mean.

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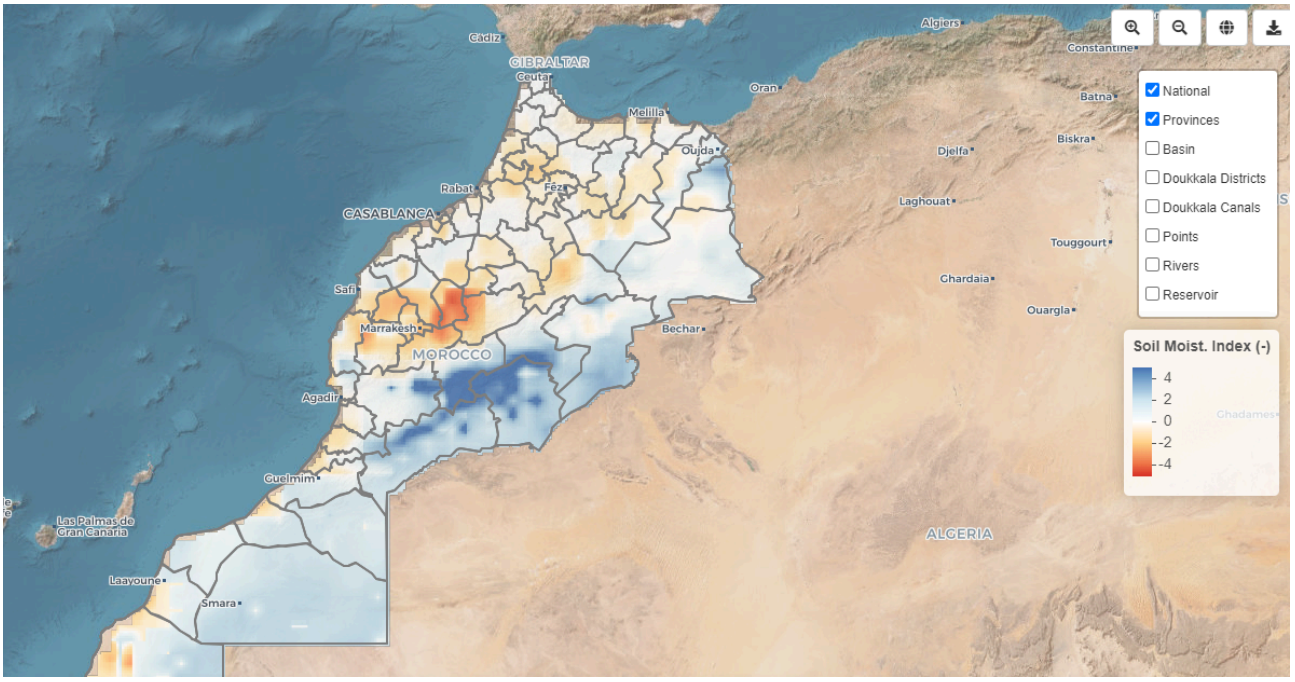
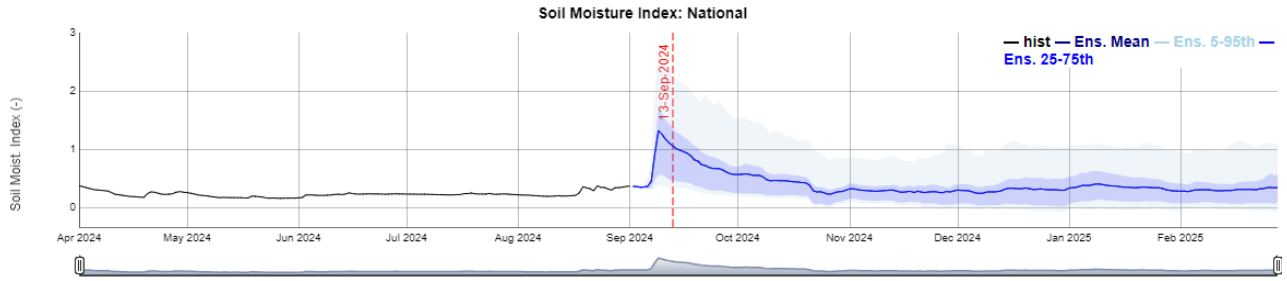


The time chart shows the evolution of the currently selected variable for the past 5 months of historic data and the future 6 months of the forecast. The historic data are shown as a single estimate (black line); the forecast is shown as the ensemble mean (dark blue line), 25-75th (blue shading) and 5-95th (light blue shading) percentile ranges to represent the most likely forecast (mean) and its uncertainty (percentile ranges). These elements are collected in the legend positioned in the top-right corner of the time plot. Finally, a vertical dashed red line with a date string indicates the date corresponding to the data shown in the main map. This reference will change either moving the time cursor from the Main Command box or by clicking on a specific date in the time plot itself.



Exercise:

⇒ Select one of the layers (e.g., "*Provinces*"), and then hover the mouse over the vector features on the map and these will be highlighted in red.

⇒ Click on one of the provinces on the map, and the time series will be updated with the data for the current variable averaged over the selected district. The plot title will adapt to this selection by displaying the name of the feature whose data is shown in the plot.

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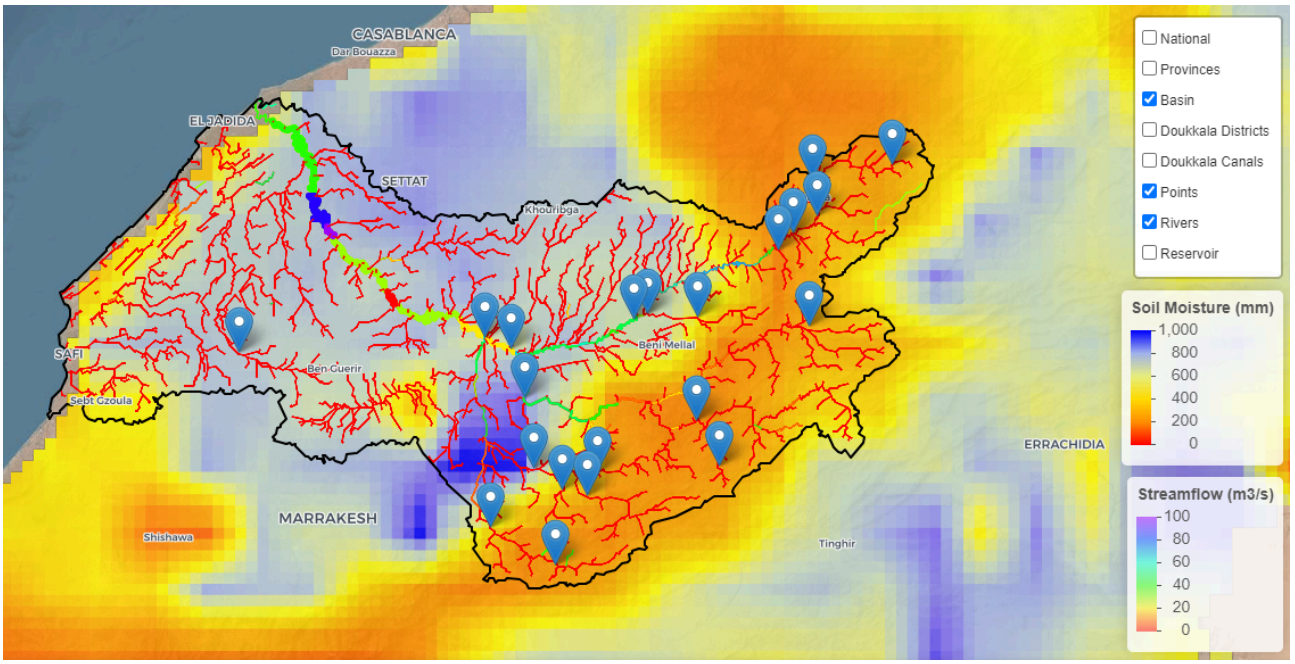
4. The “Basin” scale tab

When you select the “Basin” scale in the Domain tabs, you focus on the Oum Er-Rbia river basin seeing the current conditions and forecasts of a set of meteorological, hydrological, flood and drought variables in an interactive way, as spatial data layers and time series. The map display provides functionality to pan and zoom in on the map layers to see regional and local detail, and select summaries of the data for different areas or points.

This zoom allows also to display the streamflow in some selected locations, where stream gauges are located.



Exercise:

- ⇒ Click on the “Basin” tab. The view focuses on the Oum Er-Rbia river basin, with streamflow gauges and discharge along the river reaches becoming visible.
- ⇒ Hover the mouse over the map to visualize the names of the different gauges.
- ⇒ Click on a pin point, located in the basin
- ⇒ Select a different variable from the dropdown list, e.g. “*Runoff*”. This will update the map, legend and timeseries below.
- ⇒ Drag on a section of the chart to zoom in on a selected part of the time series. The chart will be shaded grey as you drag to indicate the selected time period
- ⇒ Double click on the chart to revert to showing the full time series period.

If the selected layer is “*Points*”, the time series shows past and current conditions for streamflow for the selected river point.

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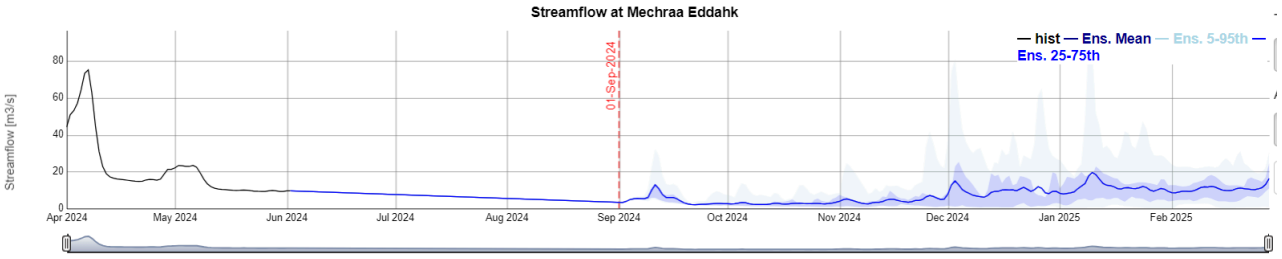

Exercise:

⇒ With the streamflow time plot displayed in the previous exercise, click on the "Week" and "Month" buttons, analysing the average volumes in these periods of time.

⇒ Click on the "Sum" button in the Averaging section, to check the cumulative volume variation in time.

⇒ Click on the "Download" button to obtain a CSV file with the time series displayed in the box. The file will have a default name ("ts_outputs.csv") and will provide both the time series of observations and ensemble percentiles (5^{th}, 25^{th}, 75^{th}, 95^{th} and ensemble mean).

5. The "Doukkala" irrigation scale tab

Clicking on the "Doukkala" tab from the Domain menu shifts the map focus on the Doukkala Irrigation district, maintaining the current displayed meteorological/hydrological/flood/drought variable. This tab automatically enables the "Doukkala Districts" and "Doukkala Canals" from the first block of the Metadata. The plot shown in the Time Series box corresponds to the overall average of the displayed variable over the whole of Doukkala, but the different sub areas can be clicked to display the sub-areal variable averages.

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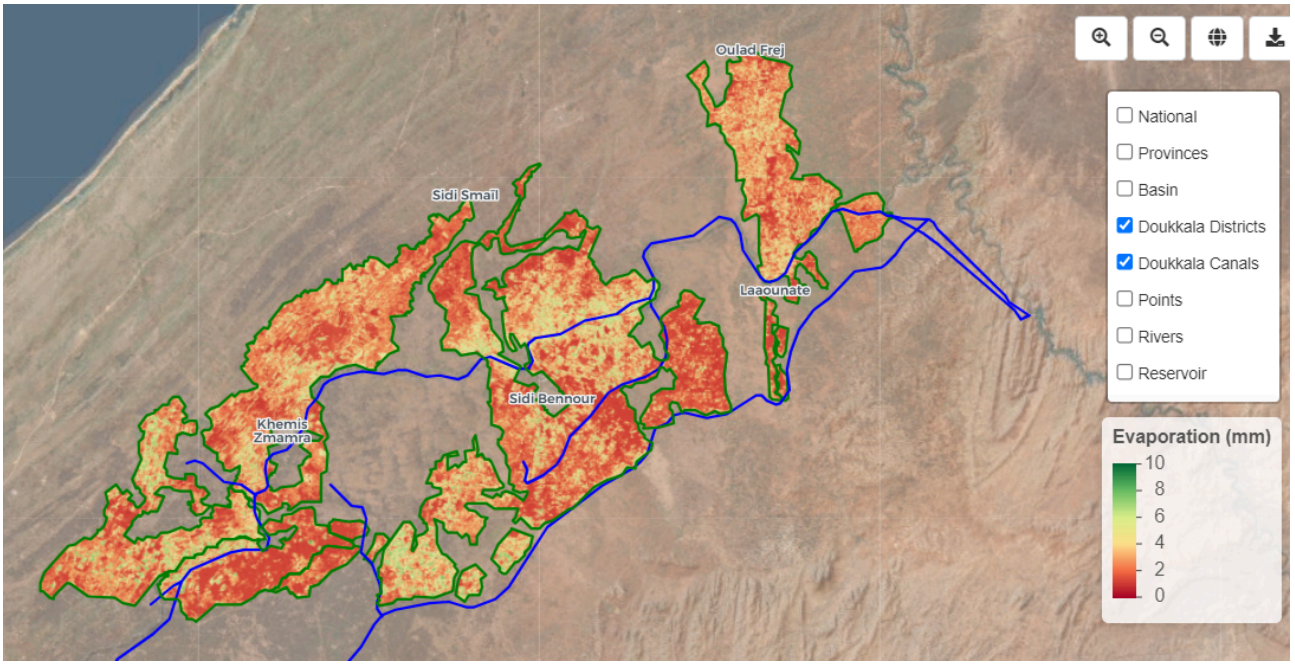
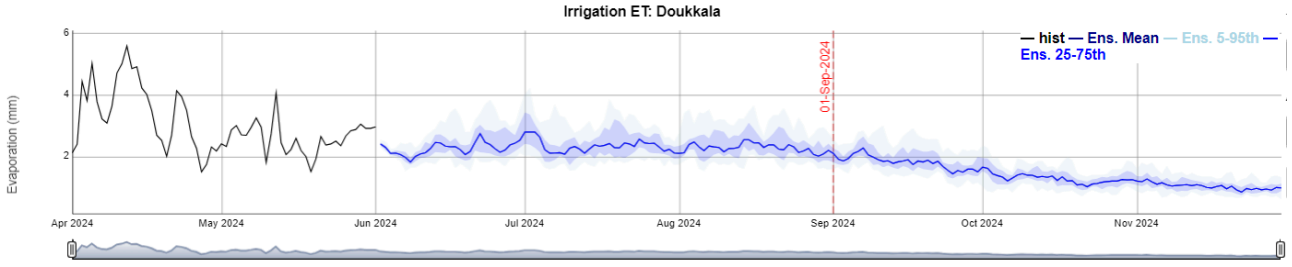


Exercise:

⇒ Click on the "Doukkala" tab, then select the "Irrigation ET" from the Variable dropdown menu in the Main Command box.
⇒ Hover the mouse over the map to see the different sub-areas light up.
⇒ Click on the "Zemara" sub-area, located in the Doukkala
⇒ Drag on a section of the chart to zoom in on a selected part of the time series. The chart will be shaded grey as you drag to indicate the selected time period
⇒ Double click on the chart to revert to showing the full time series period.



Exercise:

⇒ Download evapotranspiration map
⇒ Click on the "Download" button to obtain a CSV file with the time series displayed in the box. The file will have a default name ("ts_outputs.csv") and will provide both the time series of observations and ensemble percentiles (5^{th}, 25^{th}, 75^{th}, 95^{th} and ensemble mean).
⇒ modify the dates to check the spatial variability of the evapotranspiration maps

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⇒ you can repeat the same procedure to select “Irrigation SM” from the Variable dropdown menu in the Main Command box, and download the Time series CSV file and then similarly the “SM anomaly”.

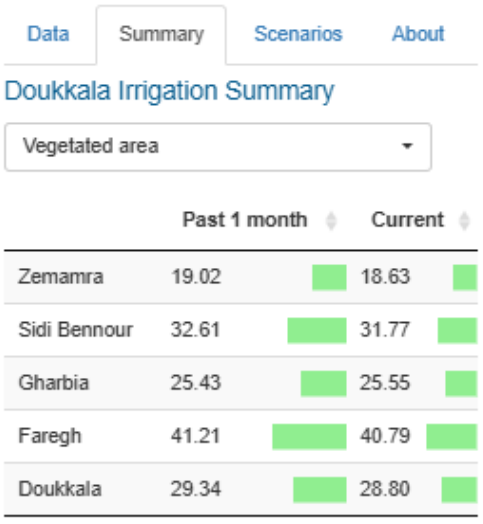
⇒ Click on the “National” tab and select the “Soil moisture anomaly”, you can compare the consistency or difference between the low and spatial resolution estimates

6. The “Summary” tab

The current, past and forecast conditions are also summarized in table form for the Doukkala district. This provides information that can be used to quickly identify the areas that are expected or are in the transition to water stress conditions or of high water demand.

Click on the “*Summary*” tab. The table shows a set of metrics averaged or accumulated over each district and the total area:

- “vegetated area”: shows the percentage of the area that is cultivated. The historic data for the past month is calculated as an average of the available satellite image. The current information is computed for the last available image.



- “water deficit area”: shows the percentage of the area that is under deficit conditions. The historic water deficit for the past 7 days is calculated from the historic data of soil moisture anomalies averaged over each district. The forecast water deficit areas for the next 1-week, 2-weeks, 1-month and 6-months are calculated from the forecast ensemble mean and averaged over each district. The current area in deficit is calculated from the most recent historic data.

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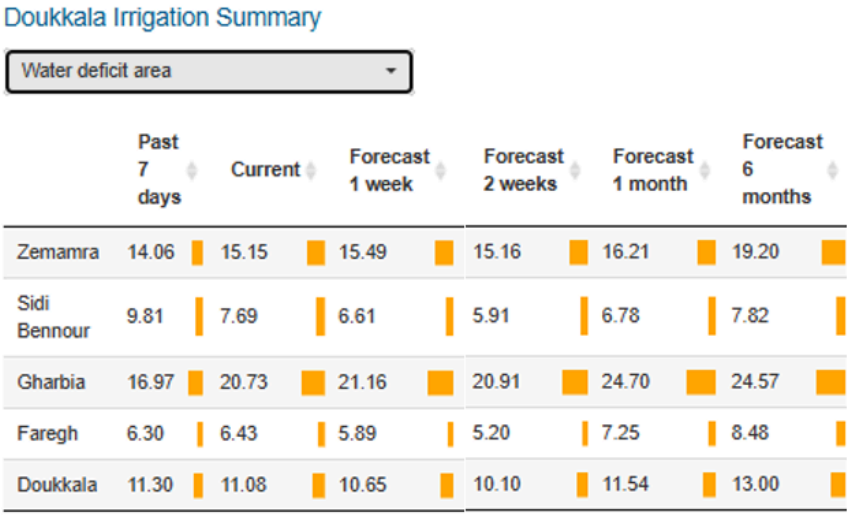

	Past 7 days	Current	Forecast 1 week	Forecast 2 weeks	Forecast 1 month	Forecast 6 months
Zemamra	14.06	15.15	15.49	15.16	16.21	19.20
Sidi Bennour	9.81	7.69	6.61	5.91	6.78	7.82
Gharbia	16.97	20.73	21.16	20.91	24.70	24.57
Faregh	6.30	6.43	5.89	5.20	7.25	8.48
Doukkala	11.30	11.08	10.65	10.10	11.54	13.00

- “water demand”: shows the water demand in mm/day. This information is computed for the past 7 days, the current condition and the forecasts for the next 1-week, 2-weeks, 1-month and 6-months.

7. The “Scenario” tab

The Water Management Tab triggers the direct download of the Water Management spreadsheet.

An easy-to-use water management tool for the main dams in the Oum Er-Rbia basin is provided here in the form of an Excel spreadsheet. The tool provides outputs of time series of the water release from the dam to the main river and the level of satisfaction of irrigation water demand from the Doukkala irrigation district.

The tool links the water inflow and water storage within the reservoir with the downstream requests from Al Massira dam for agricultural water use (Doukkala irrigation district) and civil water use (drinking water for some urban centres in the Oum Er-Rbia basin, including Casablanca). Different scenario options can be selected to consider variations in the water level and storage in the different reservoirs, minimum environmental flows or additional sources of non-conventional water.

The tool is updated every month based on forecasted inflows and water demands from this web platform. As it is a planning tool, it focuses on the forecast period to identify possible scenarios of future water management.

The considered dams are:

- Al Massira
- ElHansali

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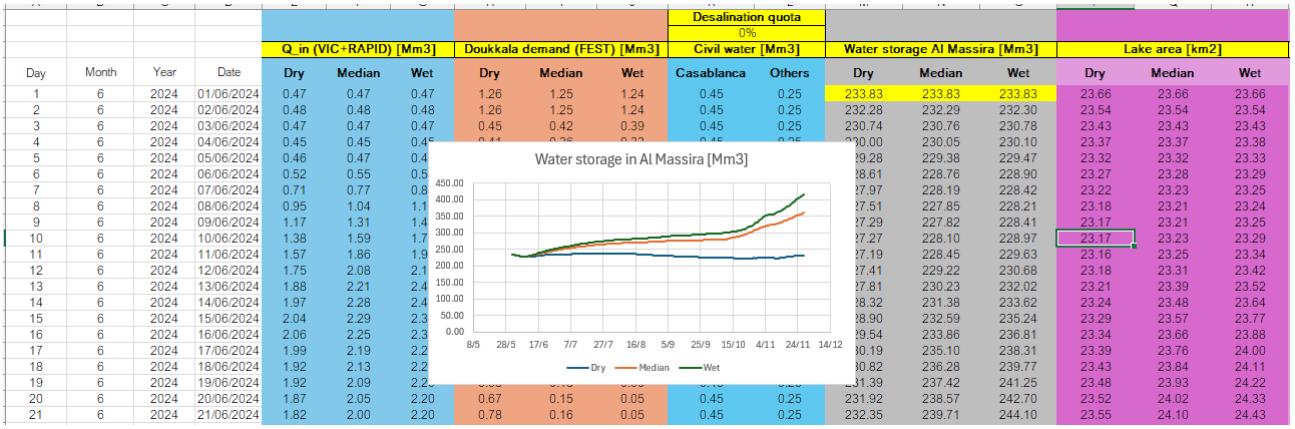
- Bin El Ouidane
- M. Hassan 1er
- Moulay Youssef



				Q_in (VIC+RAPID) [Mm3]			Doukkala demand (FEST) [Mm3]			Desalination quota 0% Civil water [Mm3]		Water storage Al Massira [Mm3]			Lake area [km2]		
Day	Month	Year	Date	Dry	Median	Wet	Dry	Median	Wet	Casablanca	Others	Dry	Median	Wet	Dry	Median	Wet
1	6	2024	01/06/2024	0.47	0.47	0.47	1.26	1.25	1.24	0.45	0.25	233.83	233.83	233.83	23.66	23.66	23.66
2	6	2024	02/06/2024	0.48	0.48	0.48	1.26	1.25	1.24	0.45	0.25	232.28	232.29	232.30	23.54	23.54	23.54
3	6	2024	03/06/2024	0.47	0.47	0.47	0.45	0.42	0.39	0.45	0.25	230.74	230.76	230.78	23.43	23.43	23.43
4	6	2024	04/06/2024	0.45	0.45	0.4						230.00	230.05	230.10	23.37	23.37	23.38
5	6	2024	05/06/2024	0.46	0.47	0.4						29.28	229.38	229.47	23.32	23.32	23.33
6	6	2024	06/06/2024	0.52	0.55	0.5						28.61	228.76	228.90	23.27	23.28	23.29
7	6	2024	07/06/2024	0.71	0.77	0.8						27.97	228.19	228.42	23.22	23.23	23.25
8	6	2024	08/06/2024	0.95	1.04	1.1						27.51	227.85	228.21	23.18	23.21	23.24
9	6	2024	09/06/2024	1.17	1.31	1.4						27.29	227.82	228.41	23.17	23.21	23.25
10	6	2024	10/06/2024	1.38	1.59	1.7						27.27	228.10	228.97	23.17	23.23	23.29
11	6	2024	11/06/2024	1.57	1.86	1.9						27.19	228.45	229.63	23.16	23.25	23.34
12	6	2024	12/06/2024	1.75	2.08	2.1						27.41	229.22	230.68	23.18	23.31	23.42
13	6	2024	13/06/2024	1.88	2.21	2.4						27.81	230.23	232.02	23.21	23.39	23.52
14	6	2024	14/06/2024	1.97	2.28	2.4						28.32	231.38	233.62	23.24	23.48	23.64
15	6	2024	15/06/2024	2.04	2.29	2.3						28.90	232.59	235.24	23.29	23.57	23.77
16	6	2024	16/06/2024	2.06	2.25	2.3						29.54	233.86	236.81	23.34	23.66	23.88
17	6	2024	17/06/2024	1.99	2.19	2.2						30.19	235.10	238.31	23.39	23.76	24.00
18	6	2024	18/06/2024	1.92	2.13	2.2						30.82	236.28	239.77	23.43	23.84	24.11
19	6	2024	19/06/2024	1.92	2.09	2.2						31.39	237.42	241.25	23.48	23.93	24.22
20	6	2024	20/06/2024	1.87	2.05	2.20	0.67	0.15	0.05	0.45	0.25	231.92	238.57	242.70	23.52	24.02	24.33
21	6	2024	21/06/2024	1.82	2.00	2.20	0.78	0.16	0.05	0.45	0.25	232.35	239.71	244.10	23.55	24.10	24.43

The different variables computed from the models which are updated into the management tool, are:

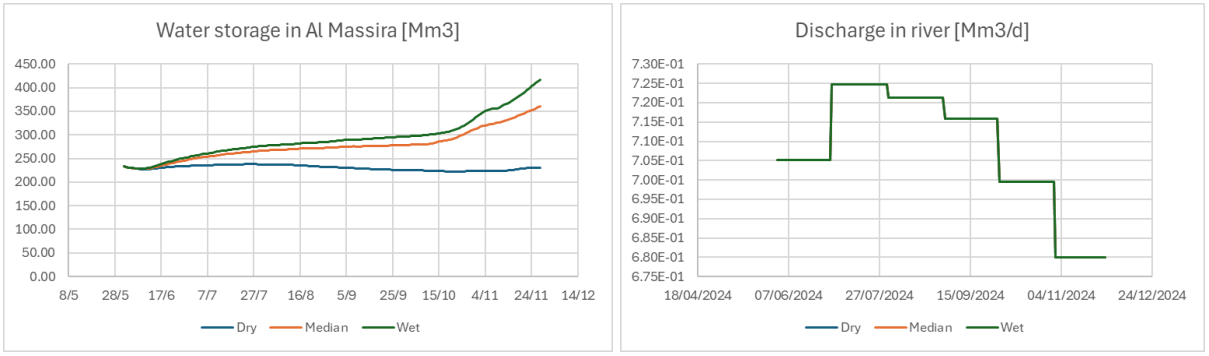
- The first columns show the temporal framework of the data, which have a daily time step, for the forecast times
- “Q_in (VIC+RAPID)” is the inflow into the lake, as millions of cubic meters per day (Mm^3).
- “Irrigation demand” is the irrigation water demand: for Al Massira dam is computed from the FEST-EWB model, while for the other dams is an average value of past data, as millions of cubic meters per day (Mm^3).
- “Civil water” columns collect the two main requests of drinking water extracted from the Al Massira lake, split between the demand from the city of Casablanca and the one from other cities in the area. The volumes are in Mm^3.
- “Water storage” is water volume in the lake. The values are provided in Mm^3.
- “Lake area”, “PET over lake” and “Evaporation from dam” columns collect the lake extension (km^2), the potential evapotranspiration over the lake (mm), and the resulting evaporation losses from the lake (Mm^3).
- “Outflow in river” identifies the water release from the dam into the main river course, as millions of cubic meters per day (Mm^3).

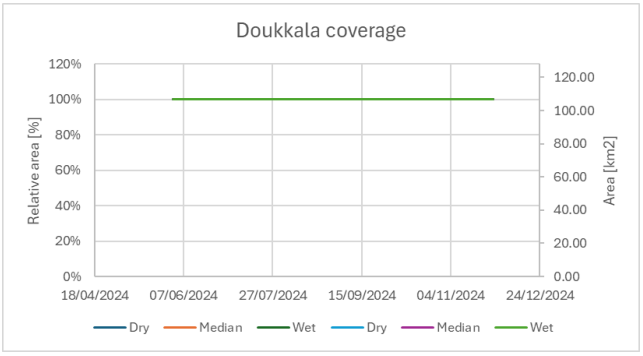
For the Al Massira dam, in addition there is the possibility of including:

- “Effective Doukkala uptake” is the actual volume of water that can be withdrawn from the Al Massira lake, based on the water availability and management constraints. The values are provided as Mm^3.
- “Doukkala satisfaction rate” represents the percentage of satisfaction of the overall demand from the irrigation district (in %), by a comparison between the “Effective Doukkala uptake” and the average historic demand used to maintain the cultivation levels of the period.
- “Average irrigated area” represents the total area that can be irrigated with the current water availability (in km^2).

All the displayed variables are provided for three conditions, labelled “Dry”, “Median” and “Wet”. These refer to the ensemble percentiles of the seasonal forecast: the “Dry” scenario identifies the 25th percentile in the river discharge ensemble, the 75th percentile in PET over the lake and the 75th percentile in water demand from the irrigation district. In the same way, the “Wet” scenario collects the 75th percentile in river discharge ensemble, 25th percentile in lake PET and 25th percentile in irrigation water demand.

Some pre-configured plots are already present in the spreadsheet, showing the main inputs and outputs for the three scenarios (dry, median and wet). These include: (1) a temporal evolution of water storage in the Al Massira lake; (2) the time series of water release from the dam to the main river reach (“Discharge in river”) and (3) the satisfaction of the Doukkala irrigation water demand in time, both in terms of relative area (left-hand axis) and absolute irrigated area (right-hand axis).





Within the spreadsheet tool, **four management scenarios are possible,** where the user can define some parameters and customise the final results to adapt them to the actual water management practices. These options are the following:

⇒ The Desalination quota, concerning the amount of drinking water used by the city of Casablanca that is supplied by a desalination plant instead of river freshwater. It ranges between 0% (default value) and 100%.

⇒ The Minimum fill is the minimum water storage in the Al Massira dam, for which non-constrained water (for drinking use downstream and for minimum vital flow) can be released into the river downstream of the dam. When water storage surpasses this threshold, an extra water outflow in the river is added to the basic constraints. Its default value is set to 450 Mm^3.

⇒ The Minimum Vital Flow is the minimum flow that always has to be guaranteed in the river downstream of the dam to ensure the survival of the natural ecosystem of the river itself. It is usually set by national regulations, and can be altered in conditions of water scarcity emergency. It is provided as an average river discharge and its default value is 0 m^3/s.

⇒ The Minimum water storage for uptake is the minimum value of water storage in the dam to allow water uptake for the irrigation district. Its demand will be met only with water exceeding this threshold, to avoid reducing too much the water storage in the dam, allowing to maintain a strategic water reserve to satisfy the drinking water demand in the following months. Its default value is 200 Mm^3.

6.2 Exercise

⇒ Click on the “Water management” Tab in the dashboard to download the spreadsheet tool updated with the data from the latest seasonal forecast

⇒ The columns are already filled in with the most recent data

⇒ Try to plot in time other variables, such as irrigation demand, river inflow to the dam or lake extension

⇒ Try to change the desalination quota, by adding a contribution from desalination plants, considering that new plants are also expected to be operative in few years, and to evaluate the effect on the satisfaction of the irrigation demand of Doukkala.

⇒ Change the minimum fill level, to trigger possible different outgoing discharges, identifying the effect over water availability for Doukkala.

⇒ Try different values for the Minimum Vital Flow, which help to maintain the sustainability of the downstream ecosystem (this will decrease the available water for irrigation), and evaluate the change in the Doukkala satisfaction rate.

⇒ Modify the Minimum water storage for uptake, which identifies the threshold for which the transfer of water to the irrigation district is interrupted. Increasing it would reduce the amount of water potentially available for the irrigation district, and could reduce the satisfaction rate of the irrigation water demand.

8. The “About” tab

The “About” tab gives an overview of the system and its background, including the methods and datasets, and some detail on how it is run operationally. Some details of the operational monitoring and forecasts are given. The Documentation link allows you to download a pdf file describing the provided variables and their characteristics. The document is available both in English (“EN” button) and French (“FR” button).

Congratulations!

You have now completed the AFRI-SMART platform user guide. We hope that this has given you a useful overview of the wide range of features for data exploration, visualization, and download that our platform has to offer. If you have any questions or comments that you would like to give about the contents of this guide or the AFRI-SMART platform interface and its data, please use the email address on the front page, and we will try to address any questions or concerns that you may have. Thanks!

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