Introducing seasonal hydro-meteorological forecasts in local water management. A local scale demonstrator for an intensively cultivated watershed in the island of Crete, Greece.

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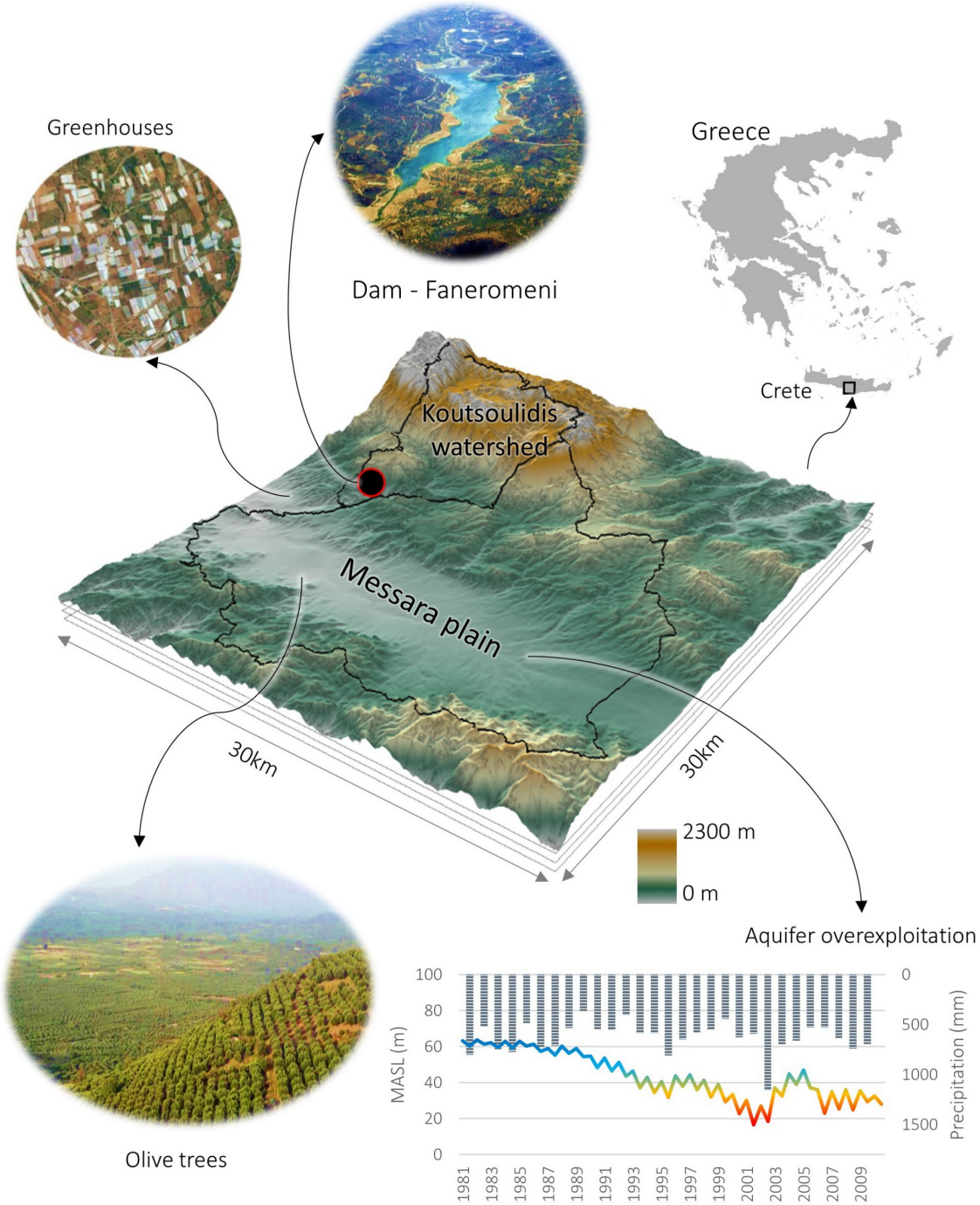
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Intro

Seasonal forecasts can be interfaced with practical applications to improve and increase the operational capabilities of several targeted sectors, as for example by reducing weather related risks such as freshwater stress in agriculture.

In this study we present the co-design, development and evaluation of a local scale demonstrator that brings seasonal hydro-meteorological forecasts in local water management of an intensively cultivated watershed in the island of Crete, Greece.

The Messara plain (Figure) encompasses an area of 400 km^2 located in the central-south, semi-arid area of Crete, Greece (Grillakis et al., 2018). The growth of agriculture in Messara plain has a strong impact on the water resources that led to a dramatic drop in the mean annual groundwater level during the last 30 years. The recently operating dam of Faneromeni added a capacity of 18Mm^3 to the system and proved vital during recent dry periods. In 2016-2017 drought period, the unsustainable water management practices led to the draining of the dam (Koutroulis et al., 2016).



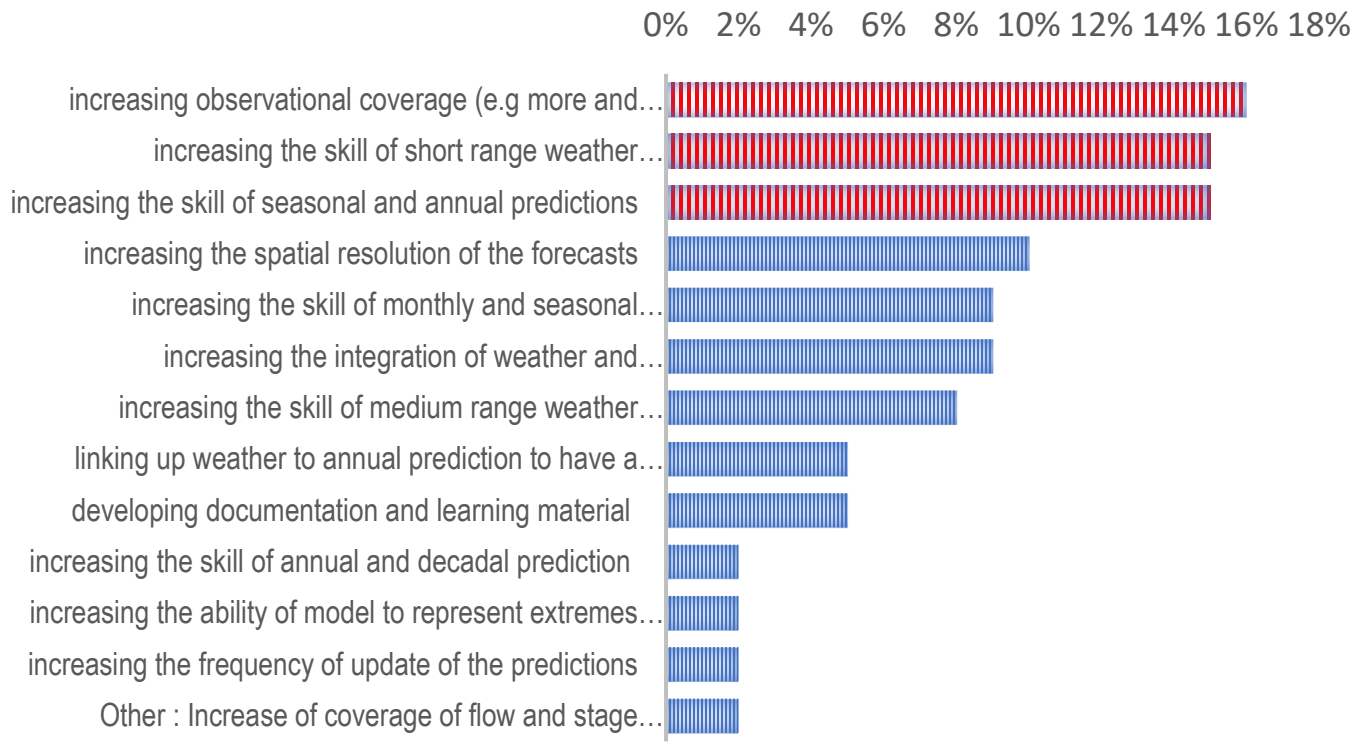
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Users

Several potential users – stakeholders are involved in the management of the water resources and in agriculture of the wider region of the Messara Valley

We consulted with the stakeholders to gain a better understanding of the challenges and opportunities facing the management of the water resources . A series of interviews have been conducted alongside face-to-face workshop.

If you could invest 10 coins into research and development to support your decision how would you spend them?



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Rationale

As a response we developed the www.imprex.gr information portal.

It is a local scale demonstrator bringing seasonal hydro-meteorological forecasts in local water management. It consists of three pillars of information

- specific sources and guidance for weather and climate information not familiar to the local users,
- a demonstrator of seasonal forecasting for the inflow in the local reservoir and
- locally adjusted seasonal forecast information for precipitation over the Messara valley.



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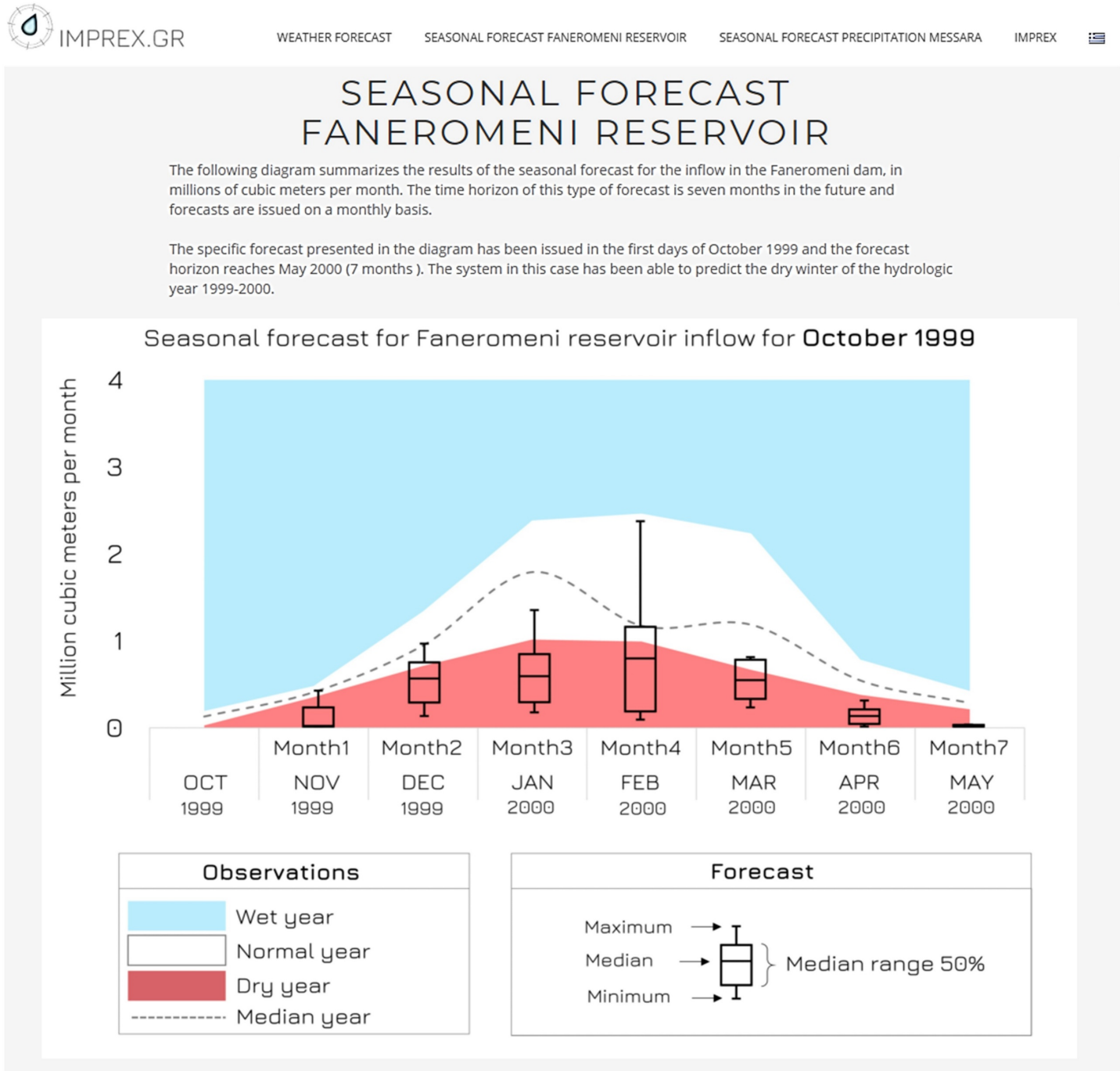
This page contains links, by means of active icon buttons with the logo of each service to several websites that include short and medium-term weather forecast information. Clicking on the information (i) icons at the right of the page, detailed information for each web site is displayed regarding browsing and retrieving weather information both at the local-point scale and in the form of maps. Links to weather forecasting applications for mobile phones are also available. Finally, there are two links to specialized weather forecasting nodes



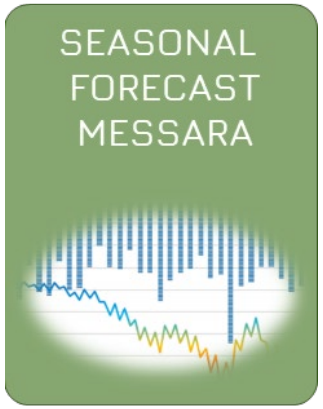
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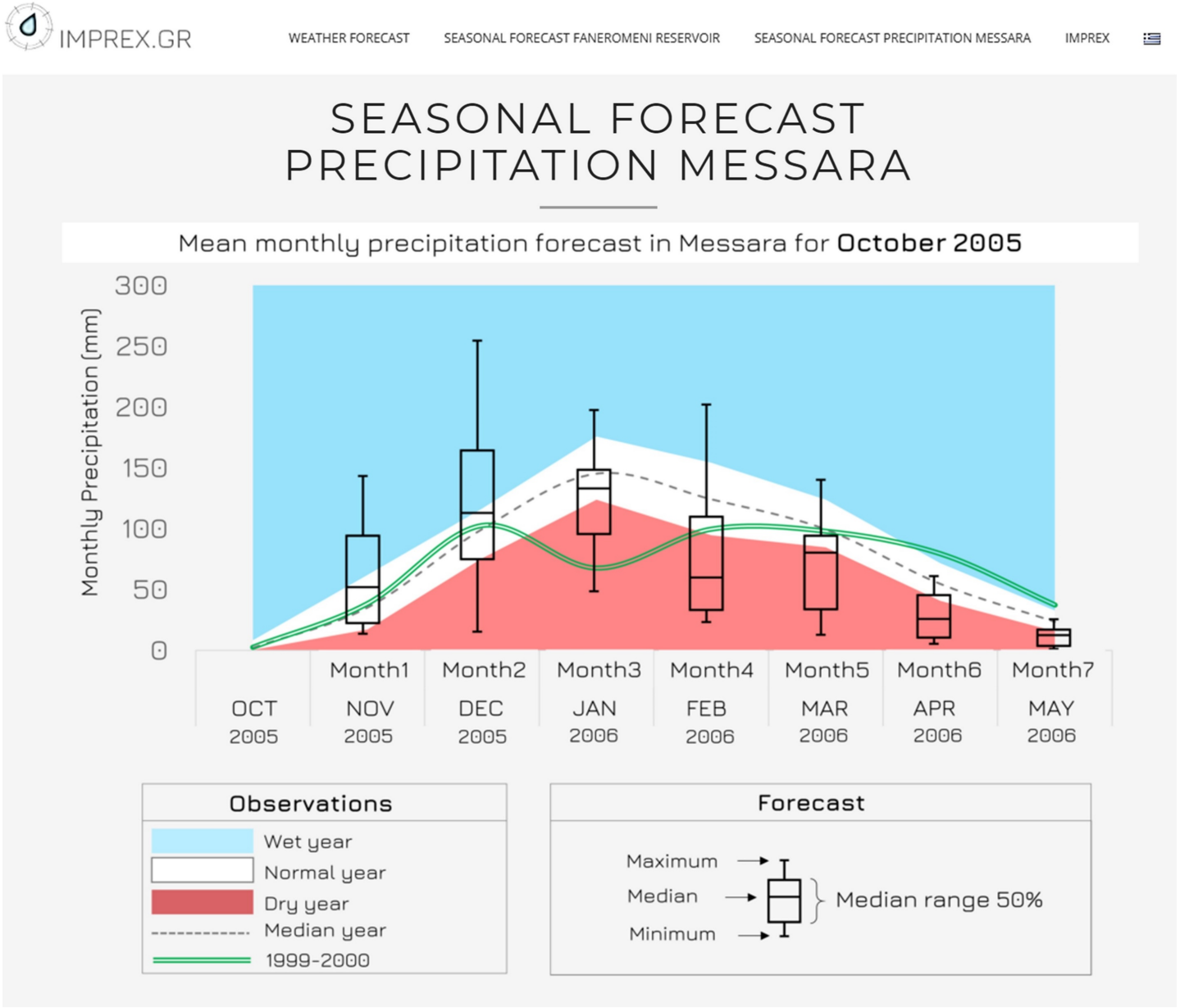
- The page illustrates the probabilistic forecast of the reservoir inflow, superimposed over the long term climatic inflow based on observations.
- The diagram summarizes the results of the seasonal forecast for the inflow in the Faneromeni dam, in millions of cubic meters per month.
- The specific forecast acts as demonstrator by presenting the diagram that has been issued in the first days of October 1999 with a forecast horizon reaching up to May 2000 (7 months)



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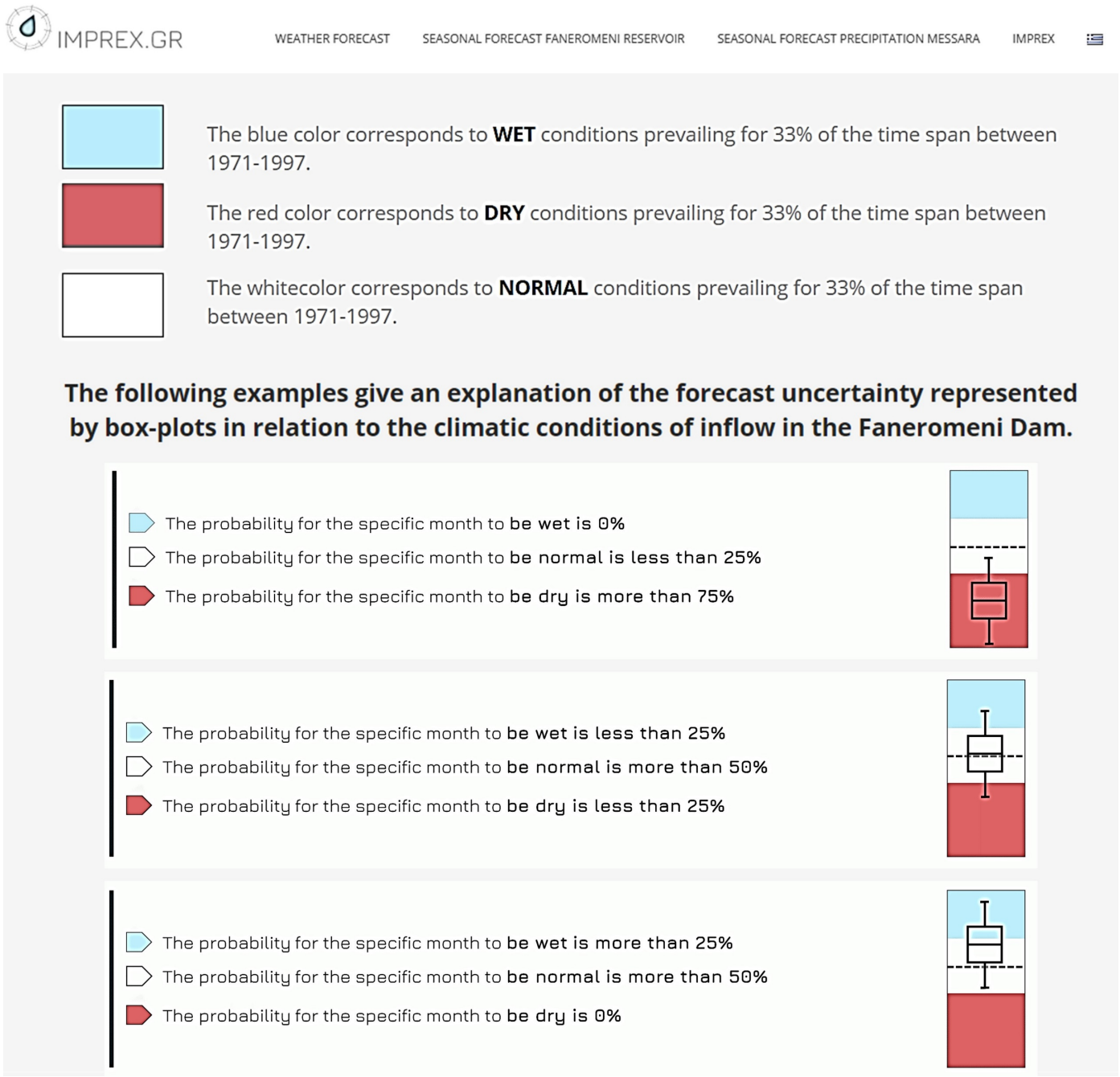
- The page shows the probabilistic forecast of the precipitation over Messara plain in a similar way as the dam inflow.
- The specific forecast acts, again, as demonstrator by presenting the precipitation diagram that has been issued in the first days of October 2005 with a forecast horizon reaching up to May 2006 (7 months).



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Guidance on probabilistic forecast

- The colors in the background of the diagrams correspond to the climatology of the discharge for the seasonal forecast of the reservoir inflow (the multiyear average conditions recorded in the local gauging station which operated during the period 1971-1997) and of the precipitation for the Messara plain.
- The overlaid boxplots give the range of the probabilistic forecasts at the monthly scale. Furthermore, three examples explain the assessment of the probabilistic forecasts against the average long term climatic conditions.
- Technical evaluation of the seasonal forecast is detailed in Grillakis et al., 2018

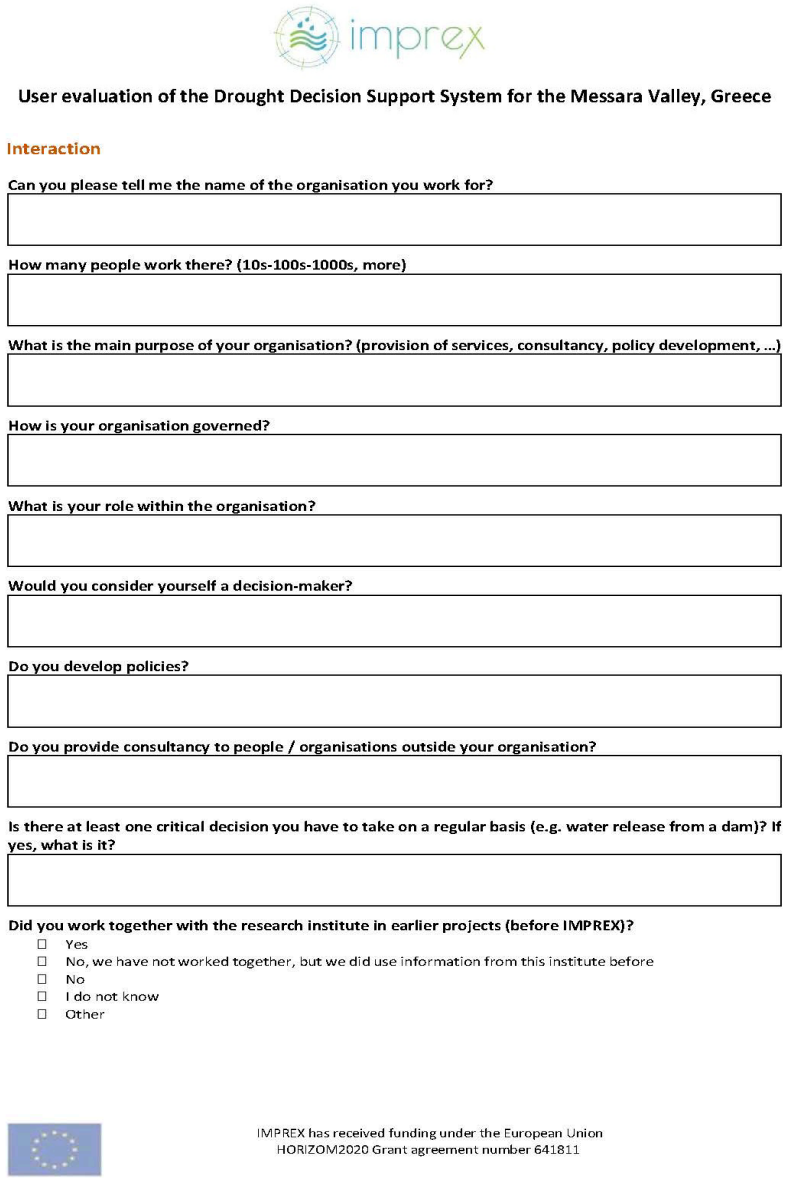


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User evaluation

The usefulness, the accessibility of information, as well as the barriers which currently hamper the deployment of climate services in the decision-making process were examined through an evaluation survey.

- All responders perceive drought as a risk for their organisation or activities.
- Seasonal climate predictions were rated as the most useful followed by climate extremes (either observed, short or long term).
- The usefulness of the information provided by the Drought Decision Support System for the Messara Valley was rated as extremely useful from all responders for informing water resources management decision.
- The most important reason for not using the information from the IMPREX project for decision making is reported as the inability to incorporate this information in the existing decision making process or infrastructure.
- Other barriers are the lack of (financial) resources to make any decisions based on this information, the uncertainty of the information and the difficulty to understand it.



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User evaluation of the Drought Decision Support System for the Messara Valley, Greece

Interaction

Can you please tell me the name of the organisation you work for?

How many people work there? (10s-100s-1000s, more)

What is the main purpose of your organisation? (provision of services, consultancy, policy development, ...)

How is your organisation governed?

What is your role within the organisation?

Would you consider yourself a decision-maker?

Do you develop policies?

Do you provide consultancy to people / organisations outside your organisation?

Is there at least one critical decision you have to take on a regular basis (e.g. water release from a dam)? If yes, what is it?

Did you work together with the research institute in earlier projects (before IMPREX)?

- ☐ Yes
- ☐ No, we have not worked together, but we did use information from this institute before
- ☐ No
- ☐ I do not know
- ☐ Other

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References

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