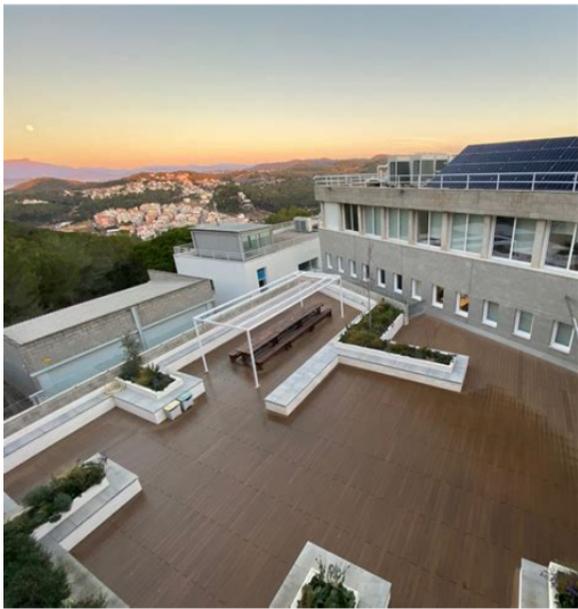


Nuevas herramientas para el control de la calidad del agua en embalses

Rafael Marcé
Centre d'Estudis Avançats (CEAB-CSIC), Blanes





CEAB

Centre d'Estudis Avançats de Blanes



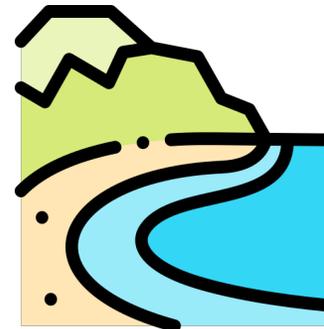
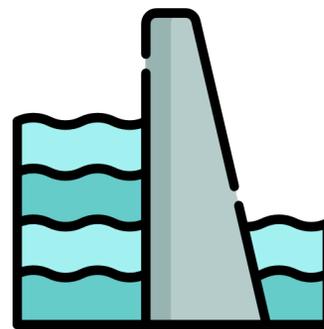
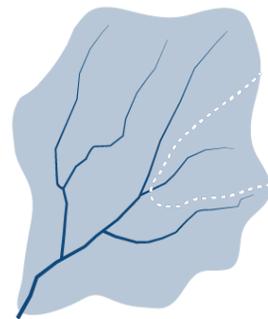
Rafael Marcé



Jordi F. Pagès

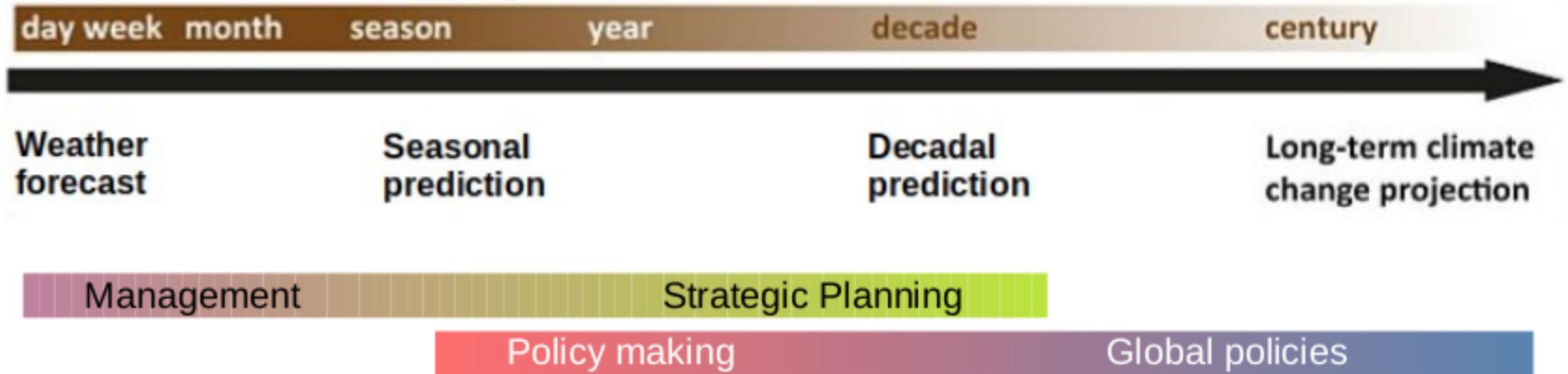


Daniel Mercado-Bettín

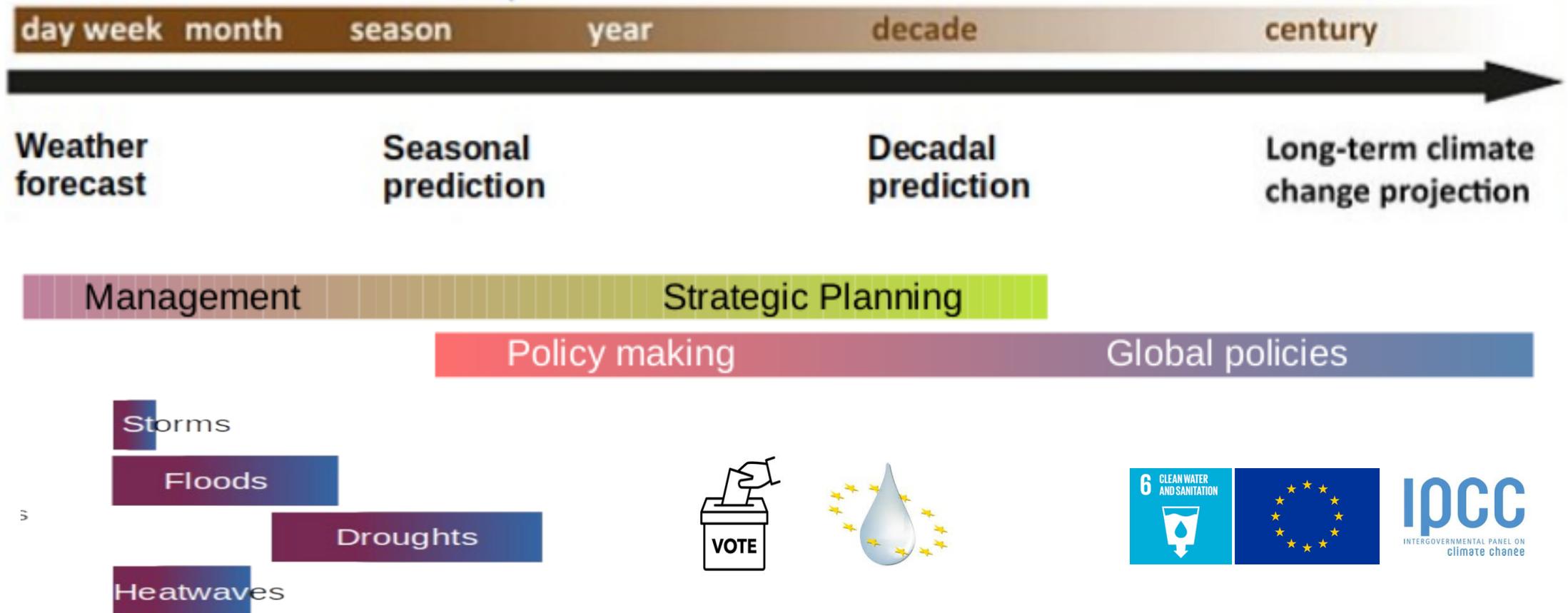


**Si un modelo es la respuesta,
¿cuál era la pregunta?**

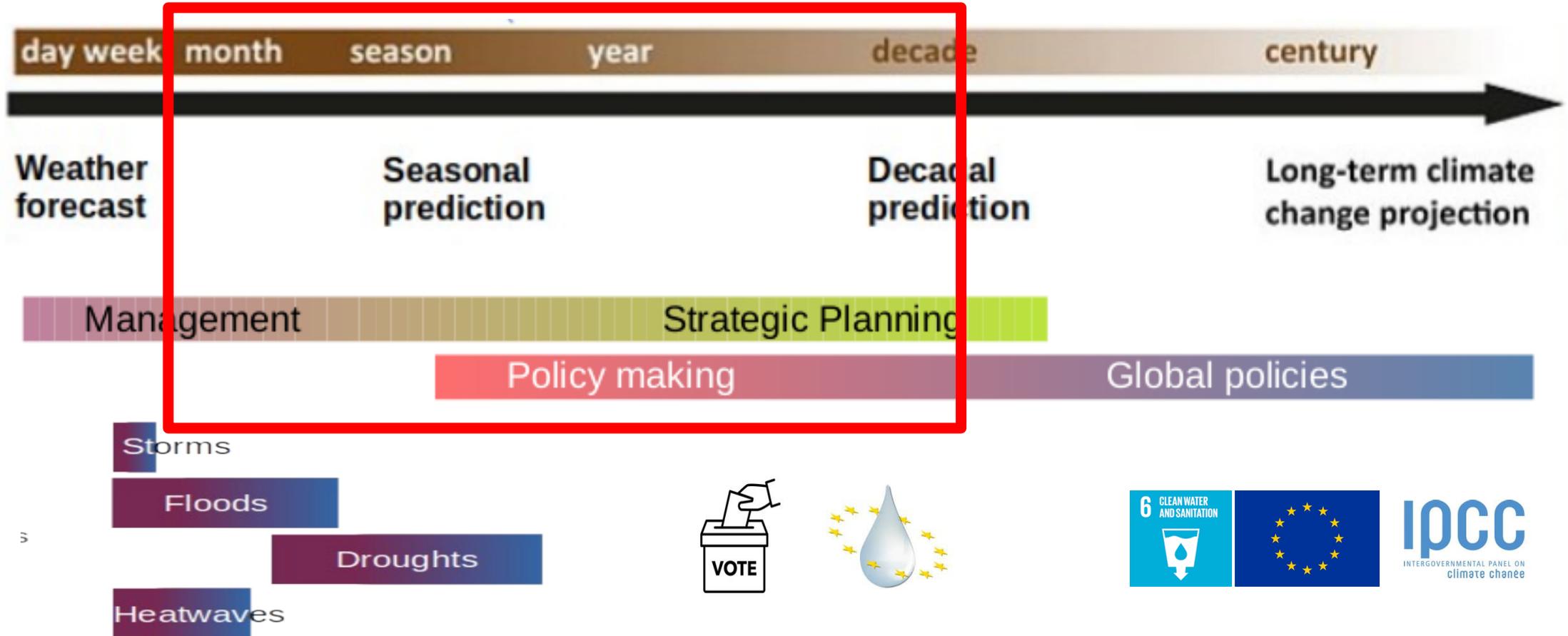
¿A qué escala temporal nos hacemos las preguntas?



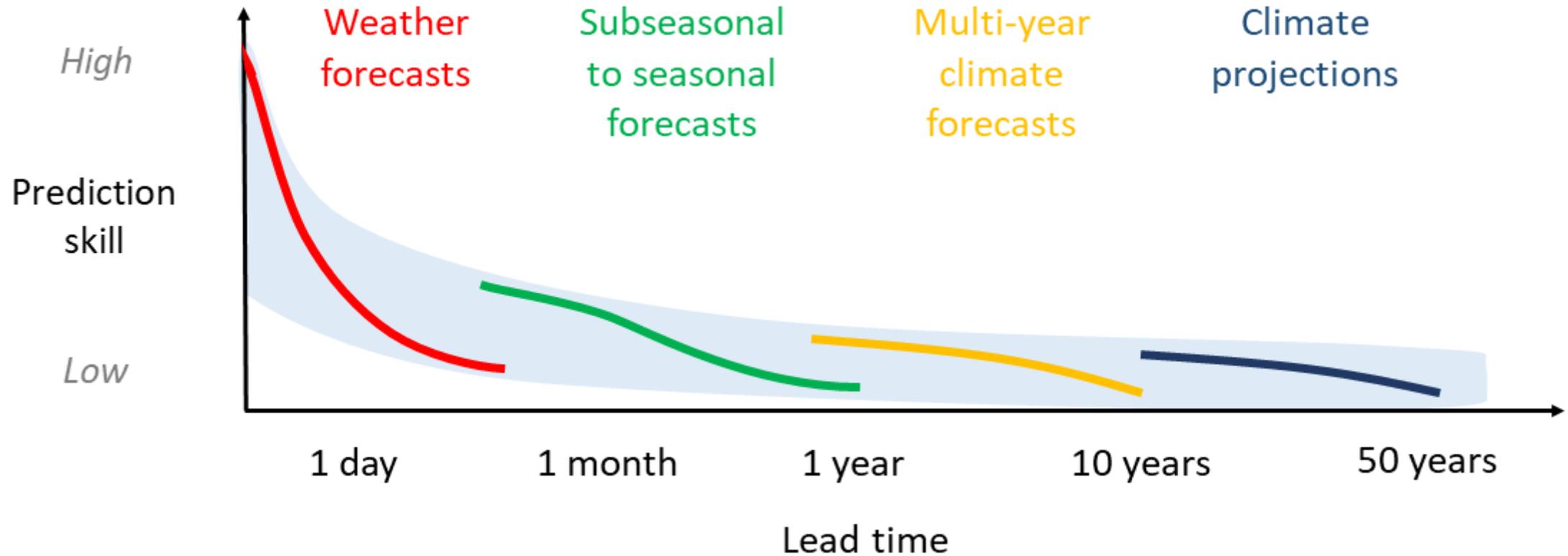
¿A qué escala temporal nos hacemos las preguntas?



¿A qué escala temporal nos hacemos las preguntas?

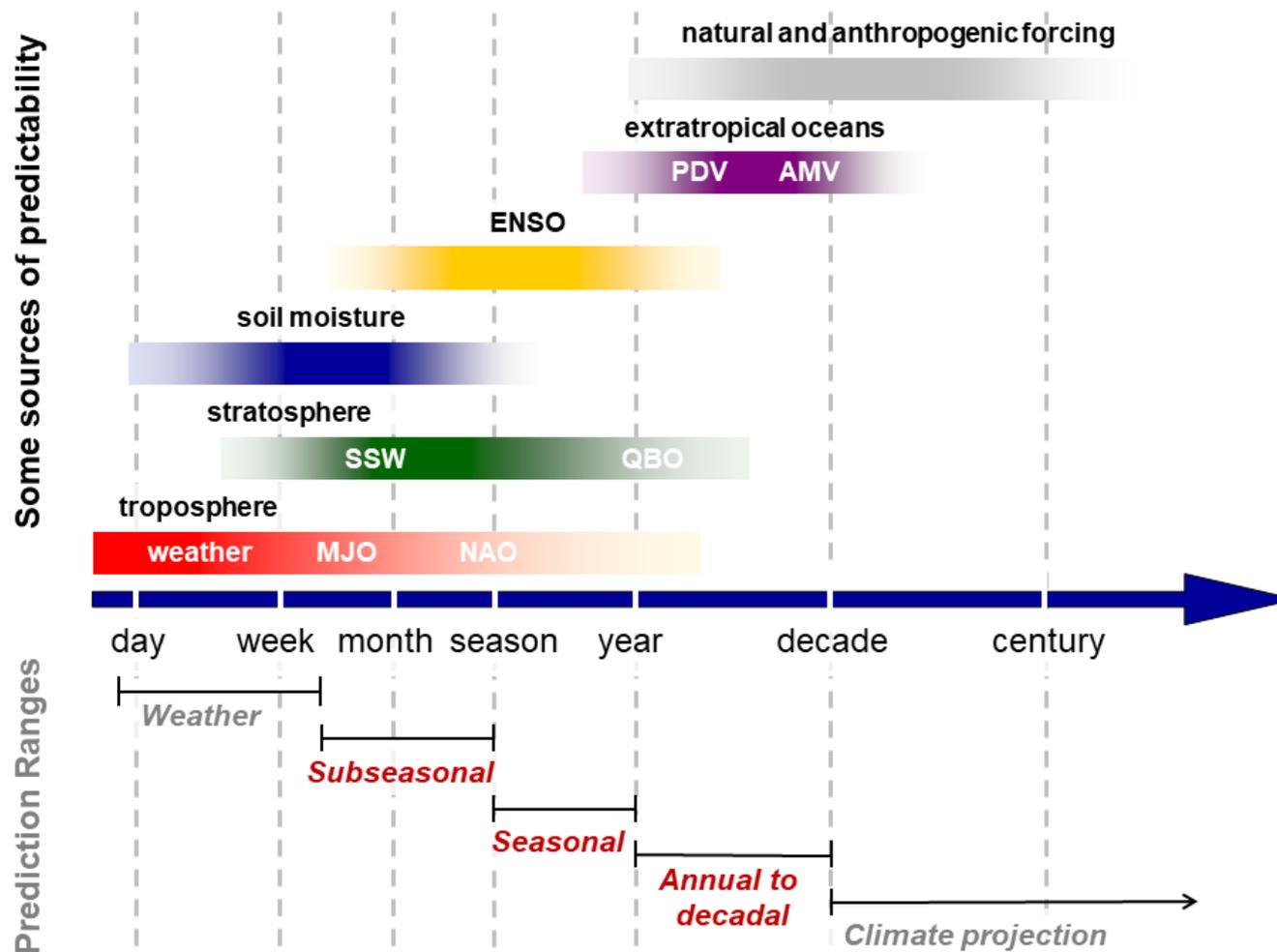


Bondad de las predicciones a lo largo del eje temporal



Slater et al., 2023

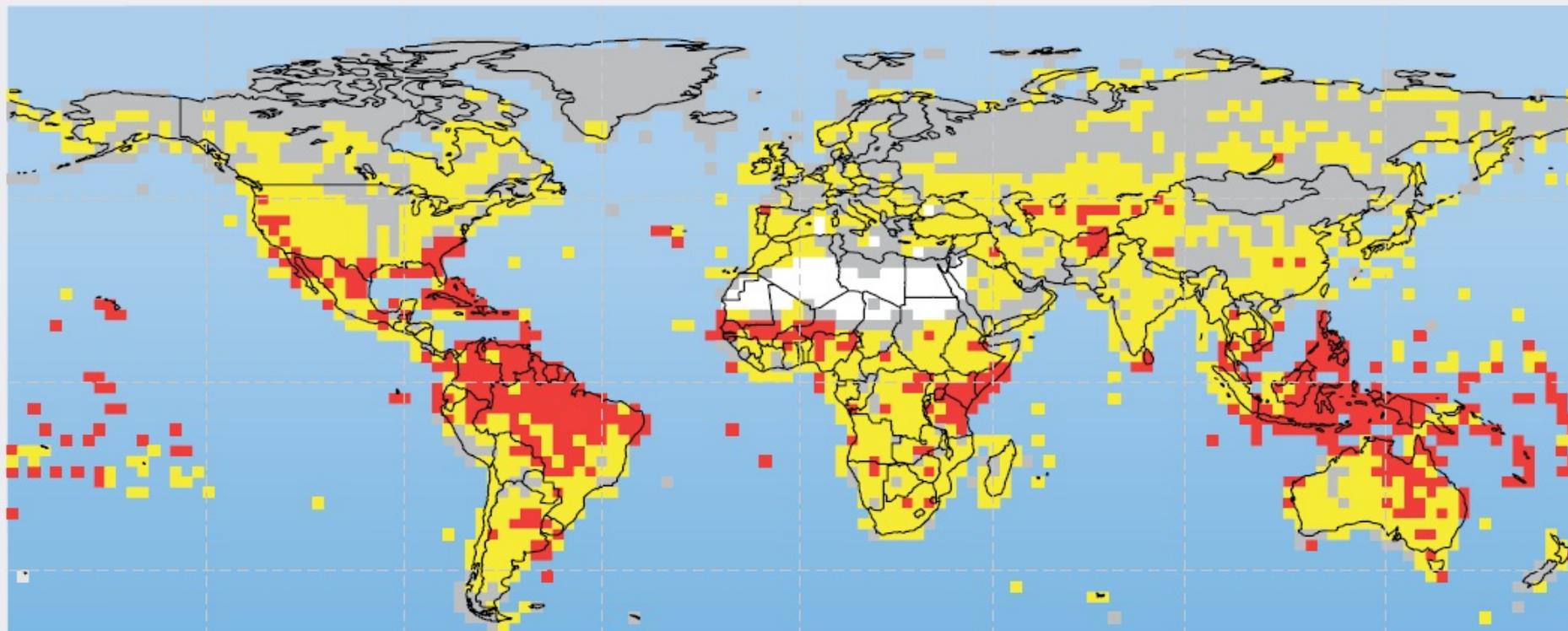
Los horizontes de predicción se alimentan de diferentes fuentes de predictabilidad



Merryfield et al. (2020)

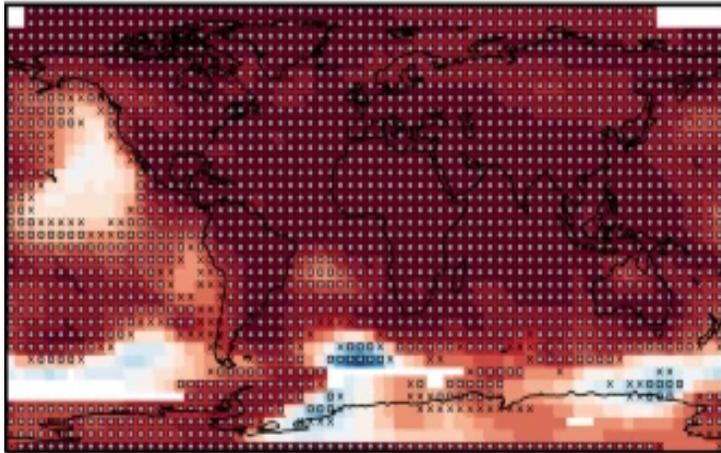
Predicción estacional

Precipitation forecast skill: best of all seasons

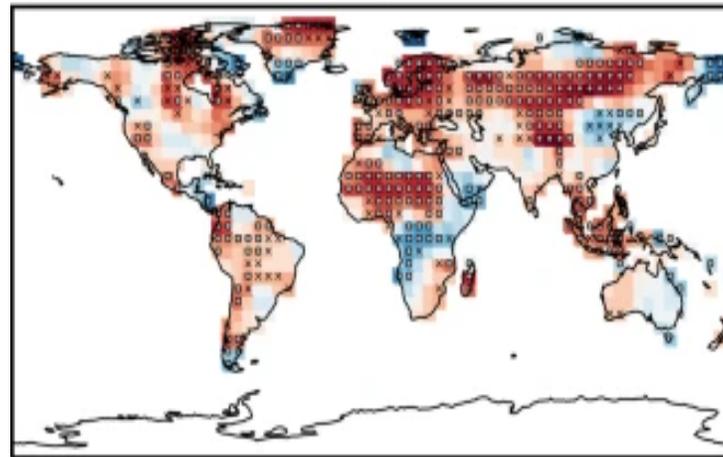


Predicción decadal

Total skill
(a) Temperature

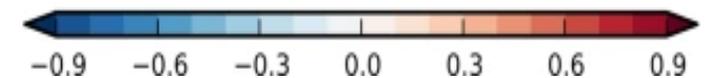
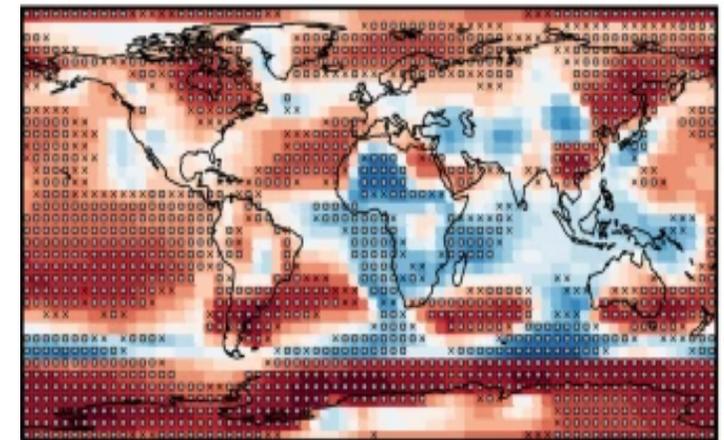


(c) Precipitation



Smith et al., 2019

(e) Pressure



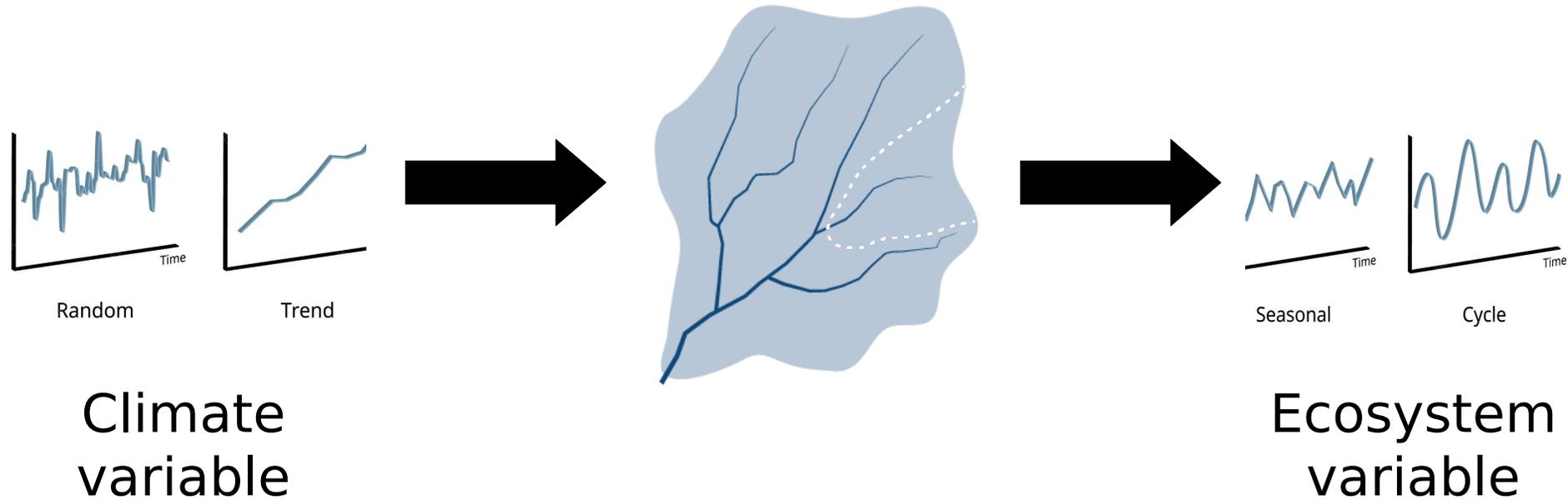
npj | Climate and Atmospheric Science

REVIEW ARTICLE OPEN

A signal-to-noise paradox in climate science

Adam A. Scaife^{1,2} and Doug Smith¹

Los ecosistemas como integradores y amplificadores de señales climáticas



El Niño Southern Oscillation and climate trends impact reservoir water quality

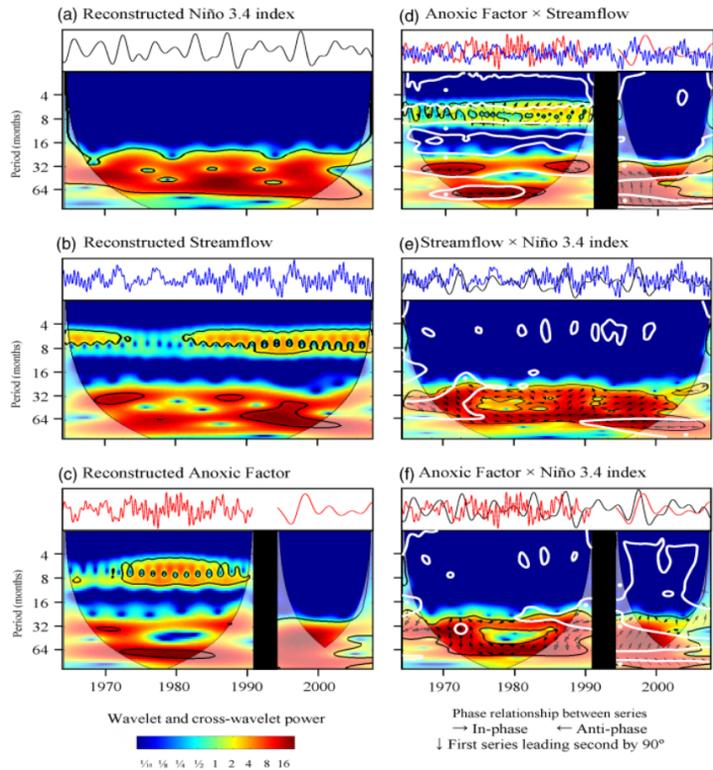
RAFAEL MARCÉ*†, MIQUEL ÀNGEL RODRÍGUEZ-ARIAS‡, JUAN CARLOS GARCÍA§ and JOAN ARMENGOL†

*Catalan Institute for Water Research (ICRA), Scientific and Technological Park of the University of Girona, 17003 Girona, Spain,

†Fluvial Dynamics and Hydrological Engineering (FLUMEN), Department of Ecology, University of Barcelona, 08028 Barcelona, Spain,

‡Laboratory for Communication, Education, and Dissemination of Research, Institut Català de Ciències del Clima (Catalan Institute for Climate Sciences, IC3), 08005 Barcelona, Catalonia, Spain, §Aigües Ter Llobregat (ATLL), Road Martorell to Olesa,

km 4.6, 08630 Abrera, Spain

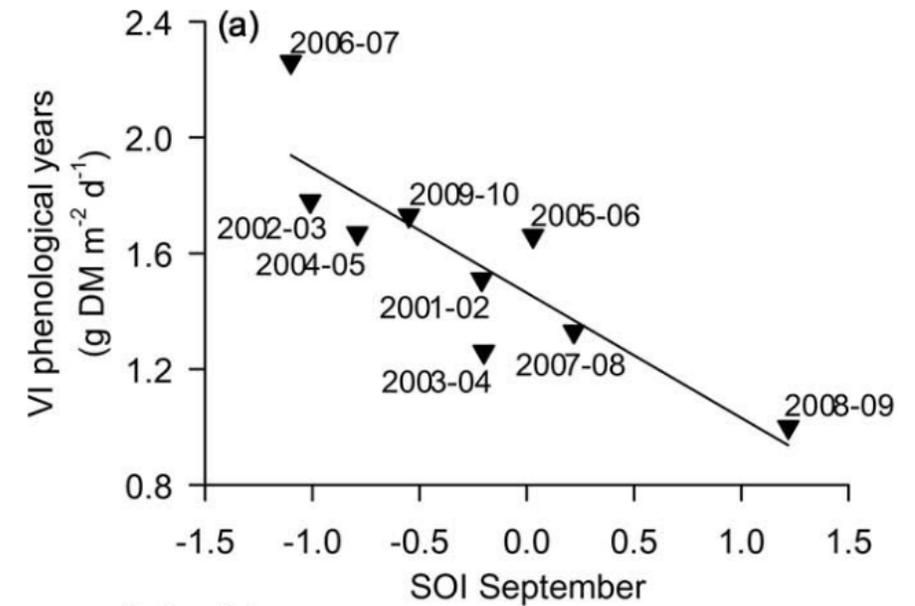


El Niño southern oscillation and seasonal drought drive riparian input dynamics in a Mediterranean stream

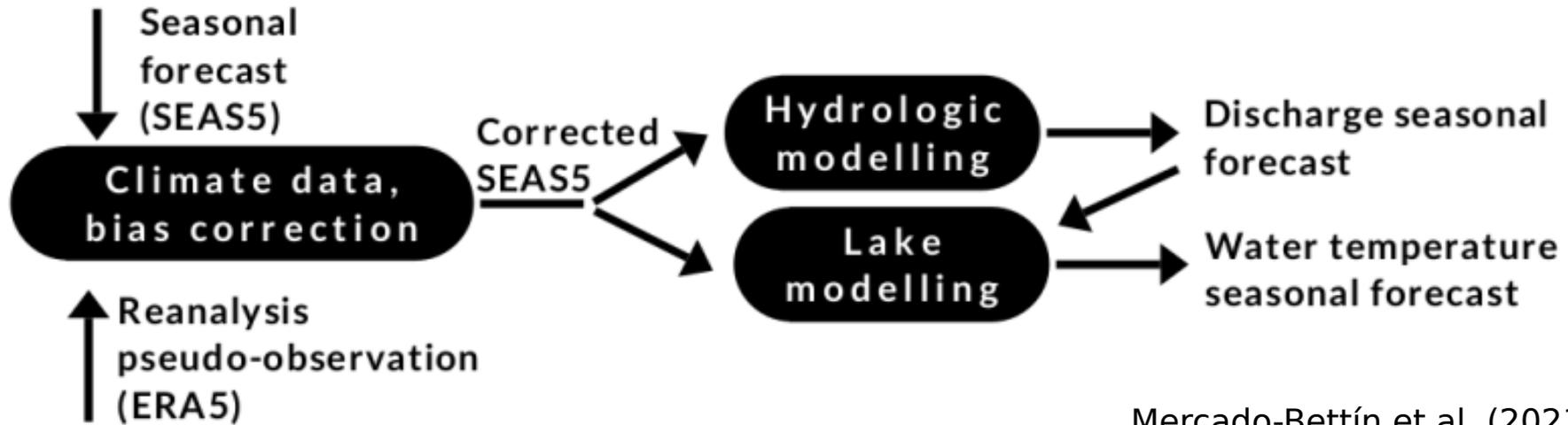
Isis Sanpera-Calbet,*¹ Vicenç Acuña,² Andrea Butturini,¹ Rafael Marcé,^{1,2} Isabel Muñoz¹

¹Departament d'Ecologia, Facultat de Biologia, Universitat de Barcelona (UB), Diagonal 643, Barcelona, Catalonia, Spain

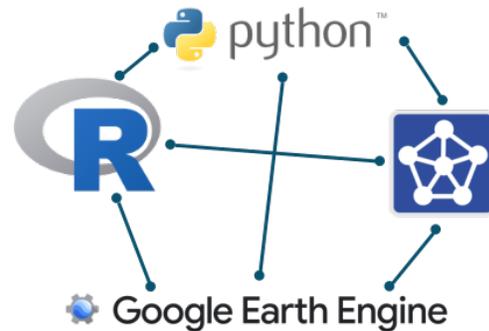
²Àrea de Recursos i Ecosistemes, Institut Català de Recerca de l'Aigua (ICRA), Emili Grahit 101, Girona, Catalonia, Spain



Flujos de trabajo



Mercado-Bettín et al. (2021) Water Research

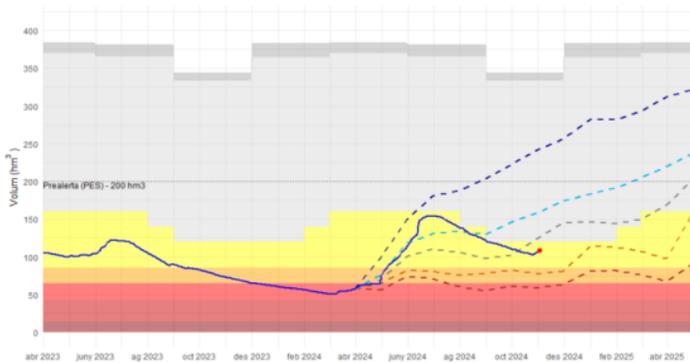
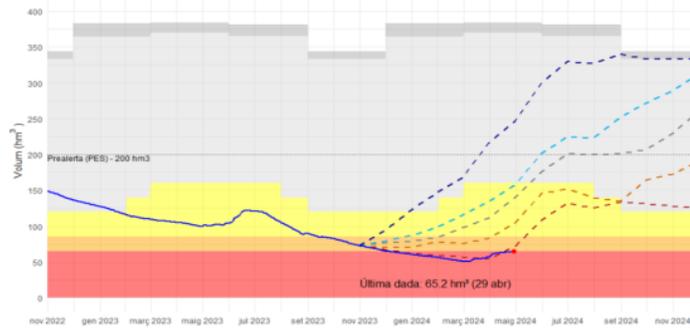
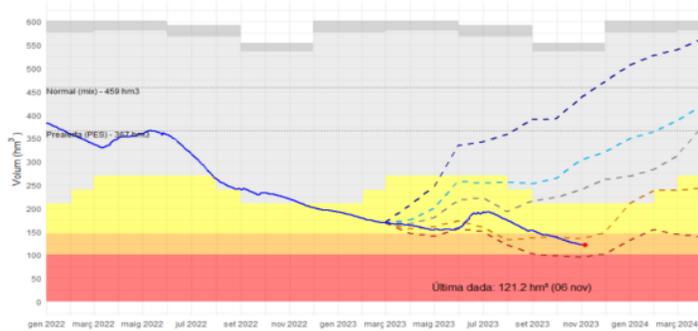


Modelos estadísticos
Process-based
Knowledge-based machine learning

Ejemplo práctico:
predicción de
volúmenes en
el sistema Ter
durante la última
sequía



Durante una sequía las predicciones basadas en estadísticas de entrada de agua históricas siempre serán excesivamente optimistas

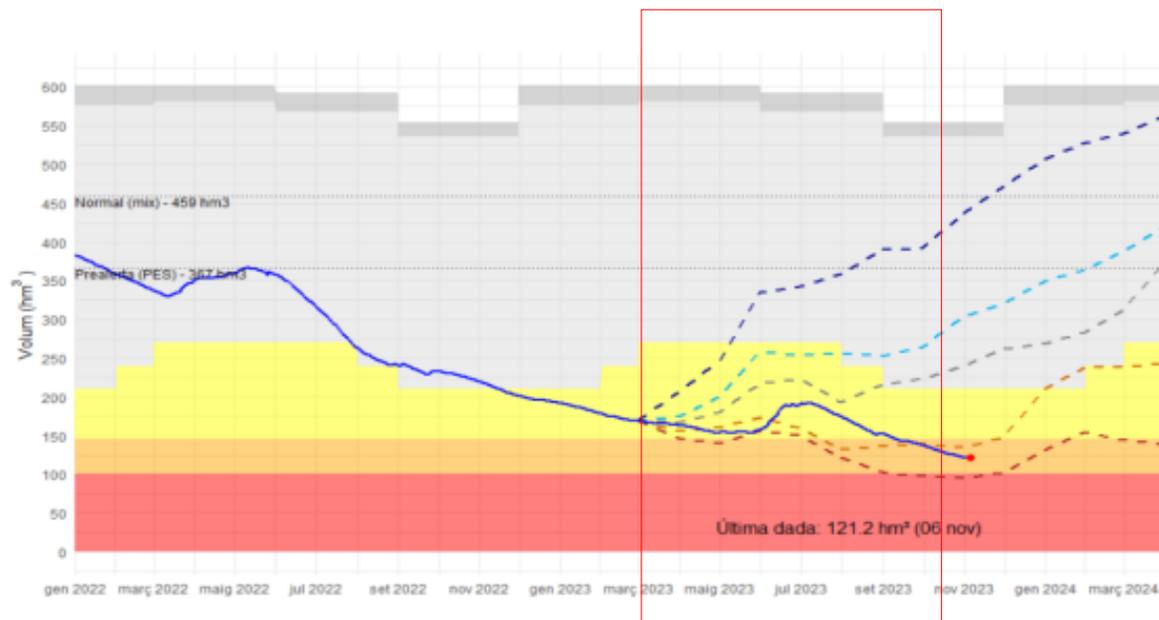


- - - MN - - - P15% - - - P50% - - - T10 - - - Alerta - - - Emergència I - - - Emergència III
 - - - P5% - - - P25% - - - Volum obs - - - T25 - - - Excepcionalitat - - - Emergència II

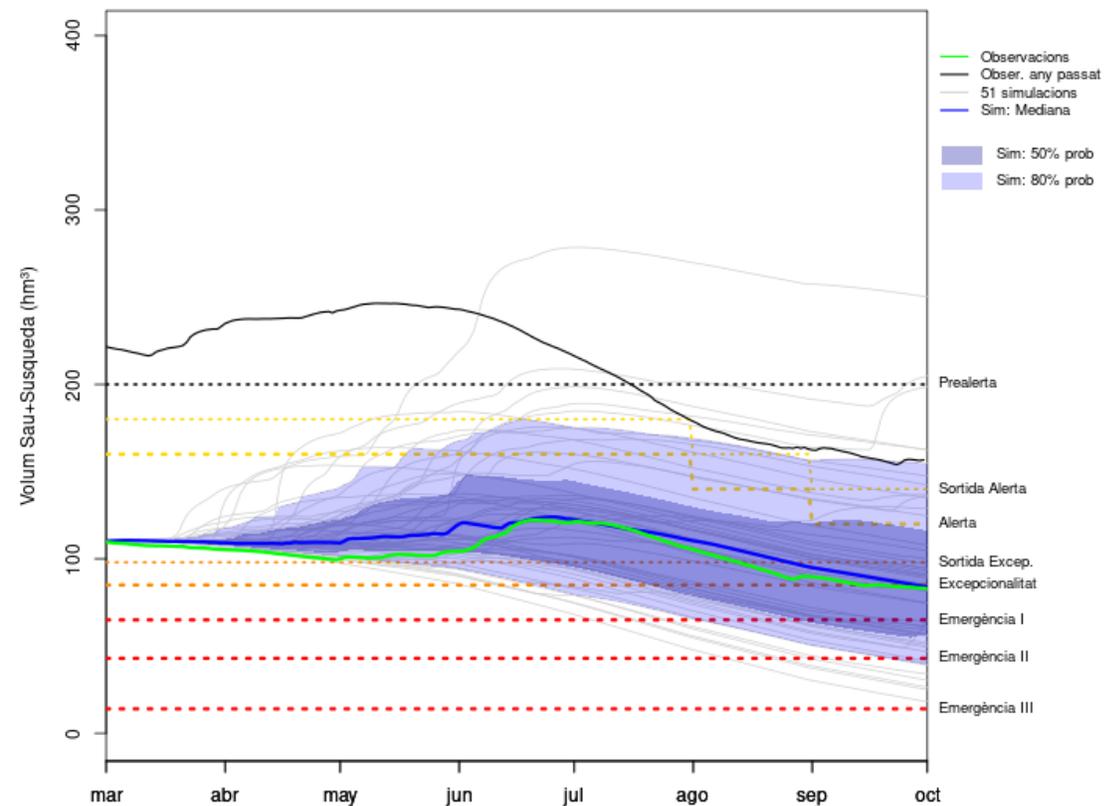
Sistema Ter

Dades en m3/s		abr-25	maig-25	juny-25	jul-25	ag-25	set-25	total
Abastament	ATL ETAP Ter	2,77	2,77	2,77	2,77	2,77	2,77	2,77
	ETAP Montfullà	0,53	0,63	0,73	0,86	0,90	0,66	0,72
	Total abastament	3,3	3,4	3,5	3,6	3,7	3,4	3,49
Reg	C.R. Pardina	0,12	0,11	0,12	0,22	0,11	0,12	0,13
	C.R. Anglès	0,12	0,11	0,19	0,22	0,19	0,12	0,16
	C.R. Sant Julià Llor	0,04	0,04	0,04	0,04	0,04	0,04	0,04
	C.R. Vilanna	0,08	0,09	0,19	0,24	0,22	0,08	0,15
	C.R. Monar	0,10	0,21	0,37	0,57	0,44	0,14	0,31
	C.R. Cervià	0,08	0,19	0,66	0,90	0,60	0,19	0,44
	C.R. Vinyals	0,15	0,26	0,50	0,93	0,60	0,39	0,47
	C.R. Sentmenat	0,50	0,60	2,12	2,35	2,05	0,85	1,42
	C.R. Moli de Pals	0,69	1,01	2,16	2,35	2,09	0,96	1,55
Total reg	1,88	2,62	6,35	7,84	6,34	2,88	4,67	
Altres	Oci. Aj.Salt, Pesca	0,00	0,11	0,08	0,15	0,00	0,23	0,09
Desembassament total		5,18	6,14	9,93	11,62	10,00	6,54	8,25

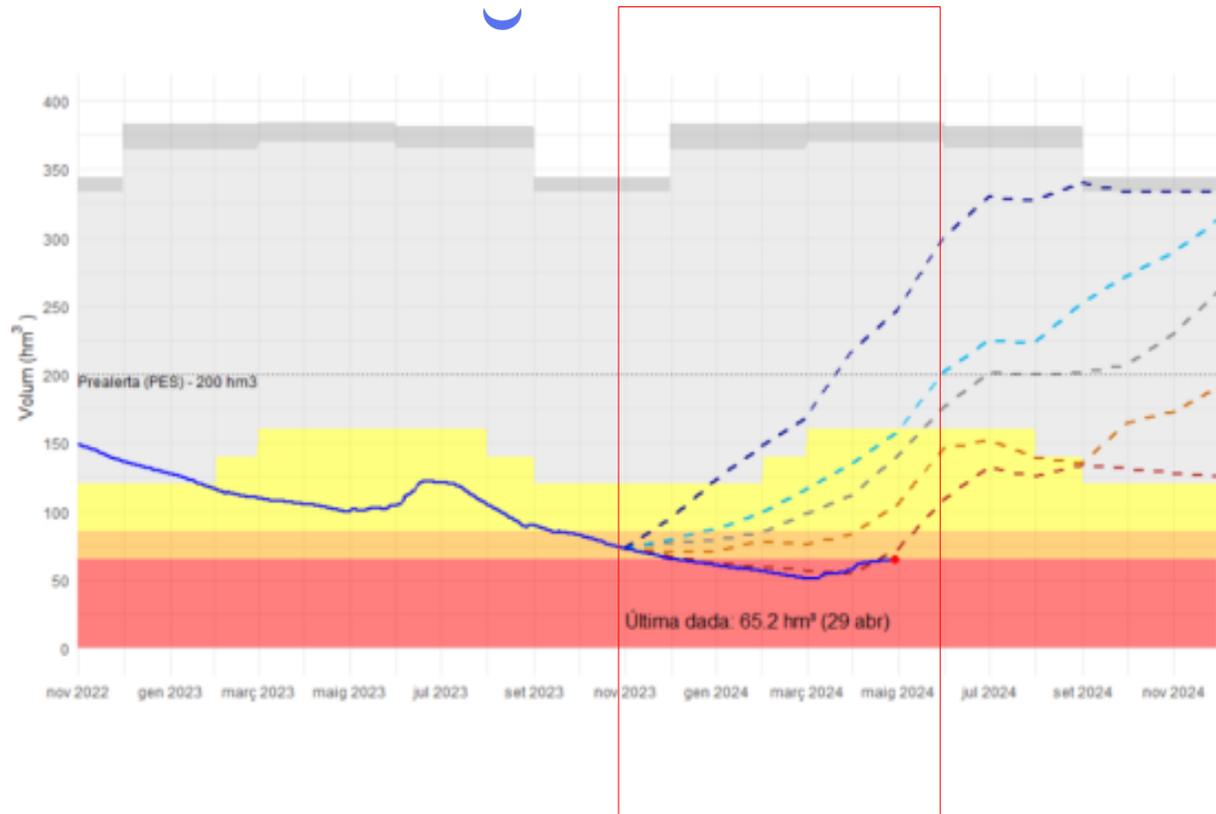
Predicción lanzada a 01 de Marzo de 2023



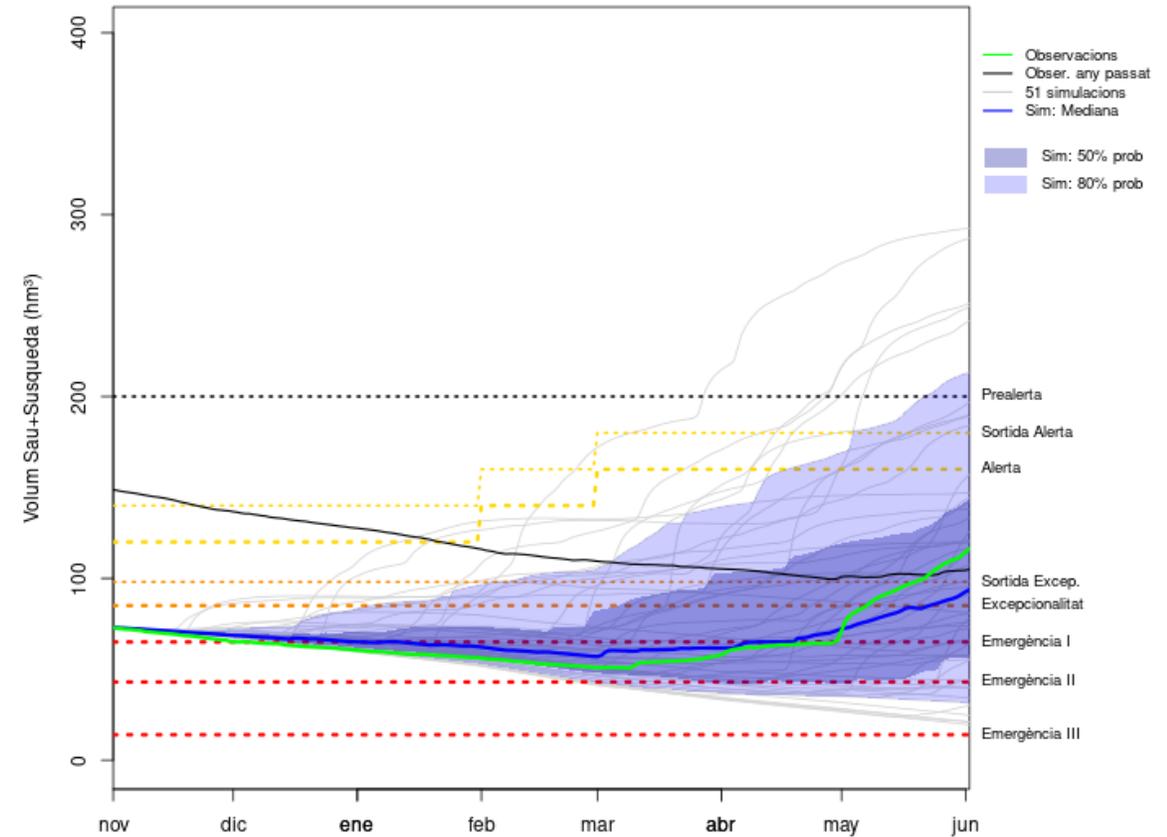
Predicció inicialitzada el 2023-03-01



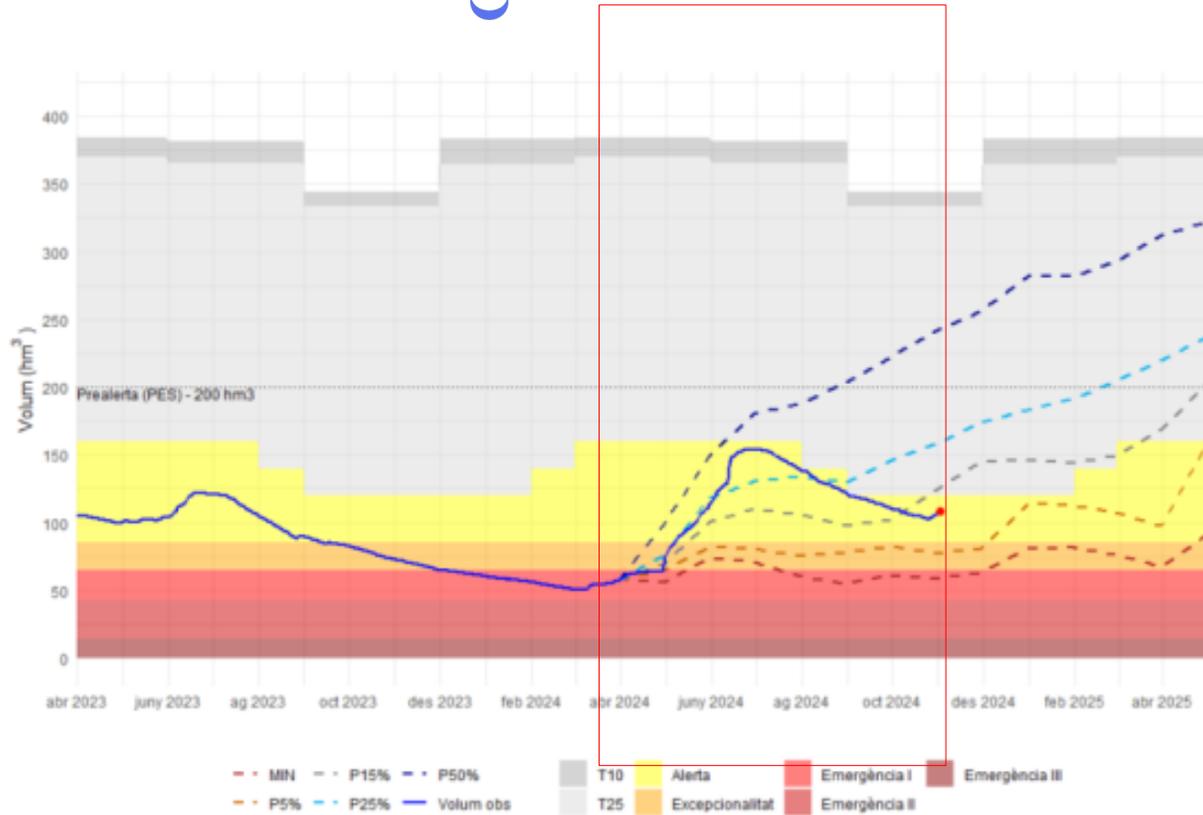
Predicción lanzada a 01 de Noviembre de 2023



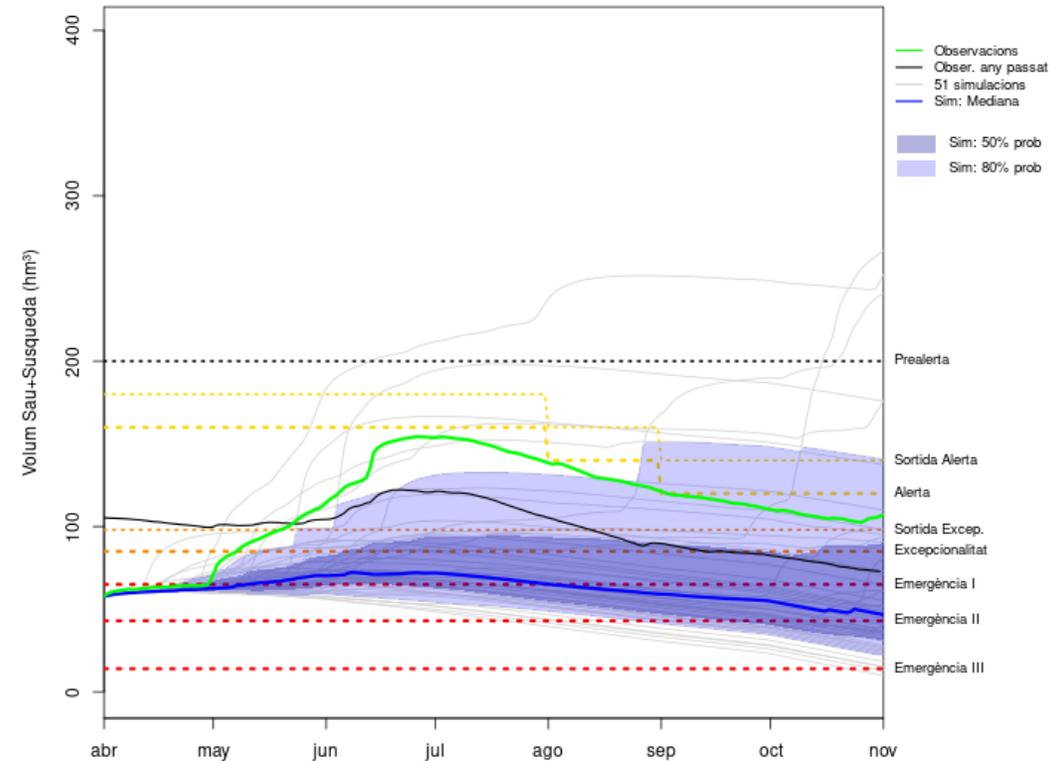
Predicció inicialitzada el 2023-11-01



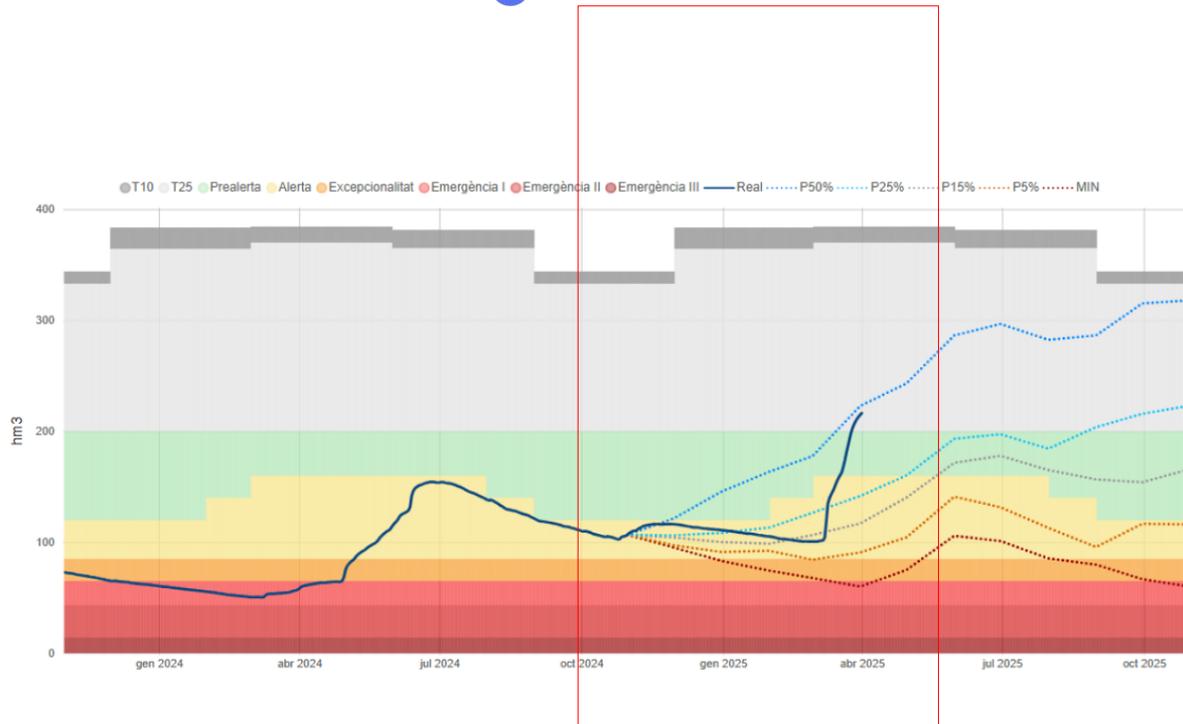
Predicción lanzada a 01 de Abril de 2024



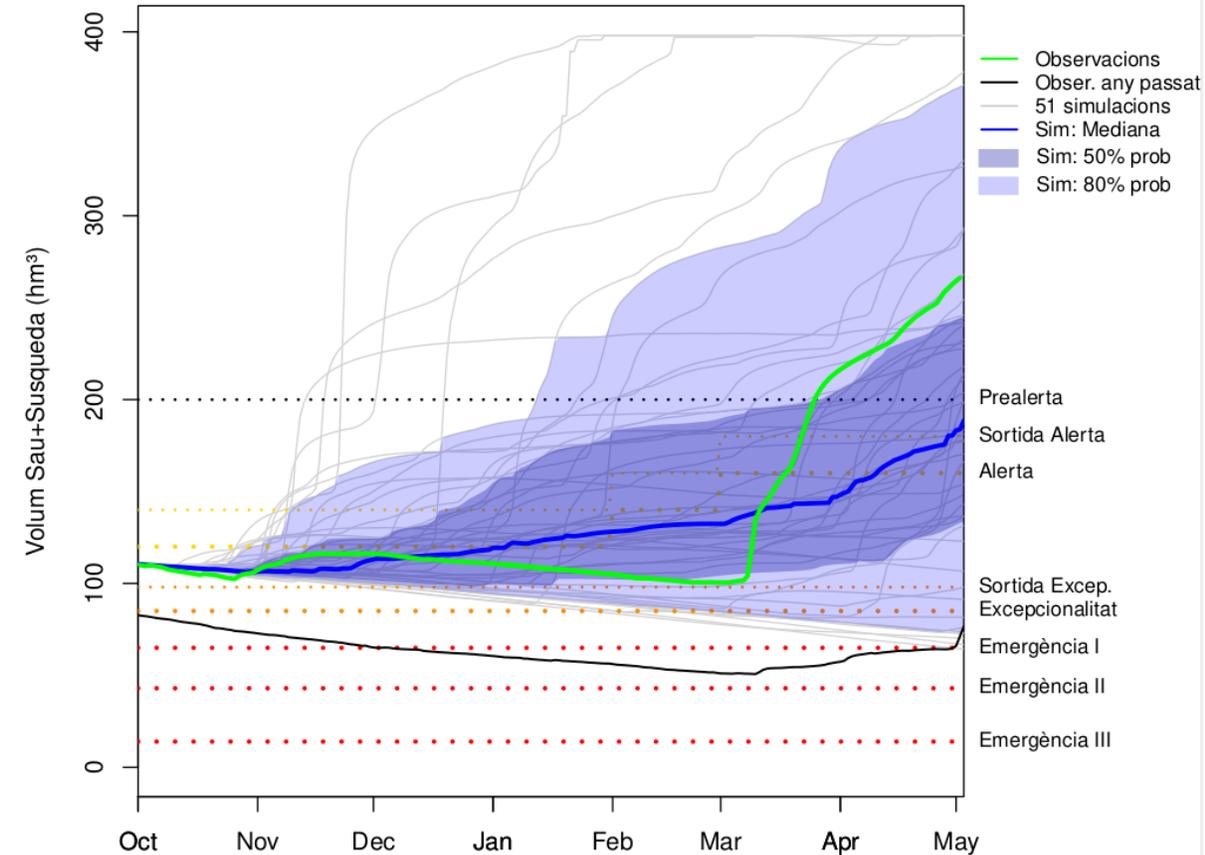
Predicció inicialitzada el 2024-04-01



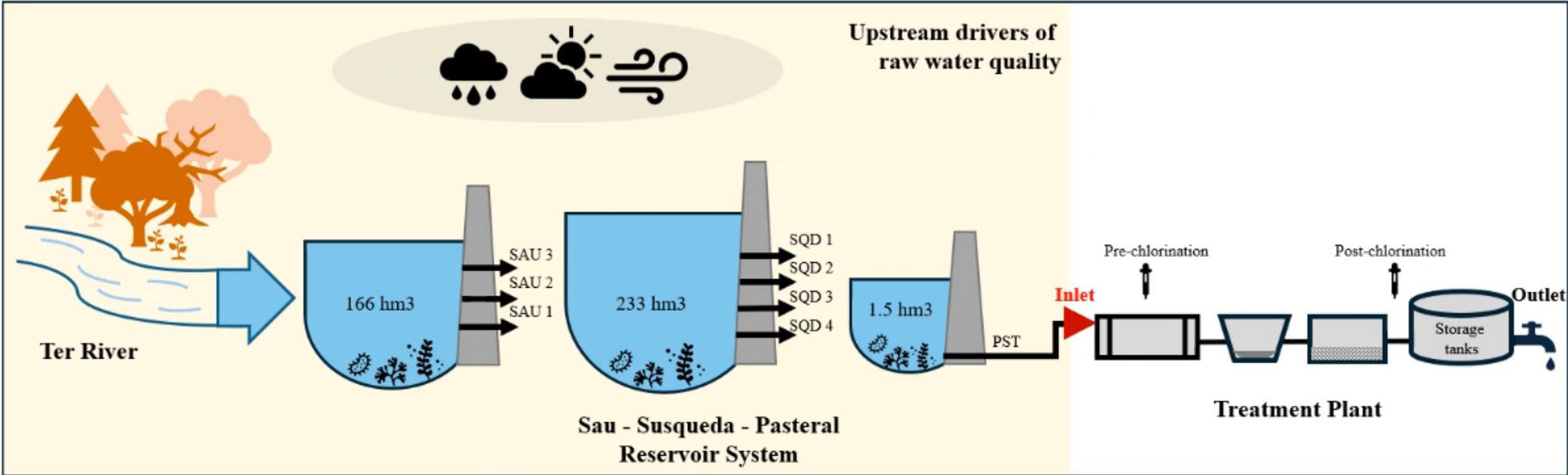
Predicción lanzada a 01 de Octubre de 2024



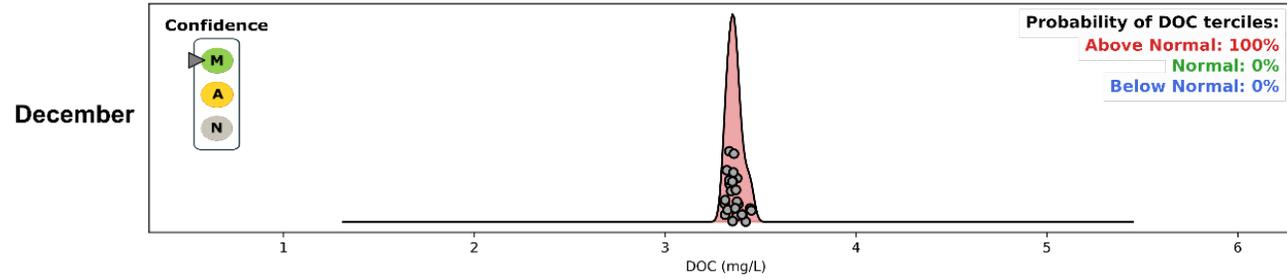
Predicció inicialitzada el 2024-10-01



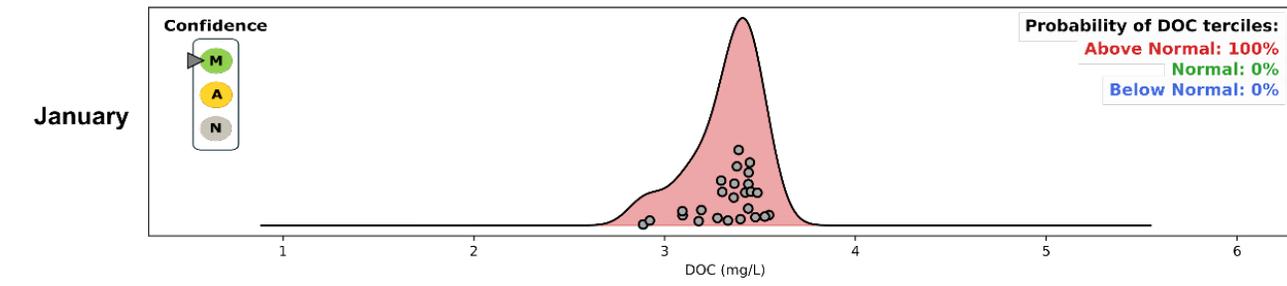
Predicción estacional de DOC en entrada de planta potabilizadora



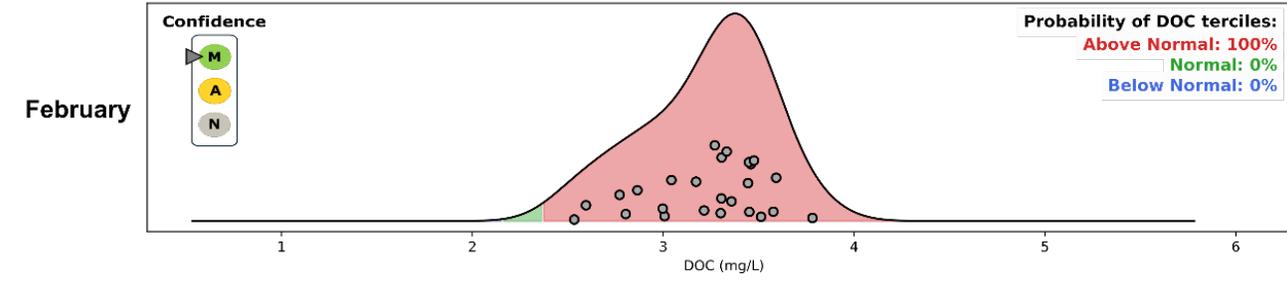
Predicción estacional de DOC en entrada de planta potabilizadora



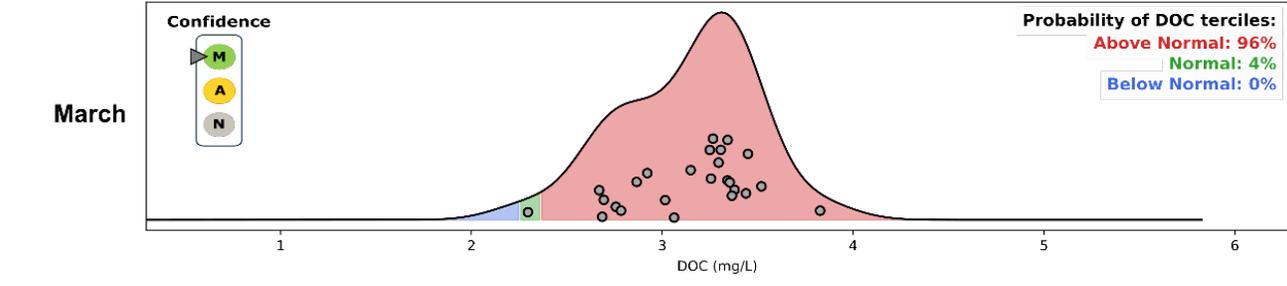
Air Temperature	Precipitation
Warm	Wet
Normal	Normal
Cold	Dry
Streamflow	DOC
High	High
Normal	Normal
Low	Low



Air Temperature	Precipitation
Warm	Wet
Normal	Normal
Cold	Dry
Streamflow	DOC
High	High
Normal	Normal
Low	Low



Air Temperature	Precipitation
Warm	Wet
Normal	Normal
Cold	Dry
Streamflow	DOC
High	High
Normal	Normal
Low	Low



Air Temperature	Precipitation
Warm	Wet
Normal	Normal
Cold	Dry
Streamflow	DOC
High	High
Normal	Normal
Low	Low

Most Probable Tercile of Predicted Variables



Historical Terciles:
 Above Normal (Red)
 Normal (Green)
 Below Normal (Blue)

Confidence (skill):
 M = Moderate
 A = Acceptable
 N = None

Seasonal forecast (ensemble members)
 ○

Bessons digitals per a la predicció i gestió de la qualitat de l'aigua i la dinàmica de la línia costanera a les conques internes de Catalunya, amb especial atenció a les sequeres i altres fenòmens climàtics extrems

NEREIDA

2025 – 2028

Amb subvenció de l'Agència Catalana de l'Aigua



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Centre d'Estudis Avançats de Blanes



**Agència Catalana
de l'Aigua**



GLEON

Global Lake Ecological Observatory Network

Save the date!

Next GLEON All-hands meeting
will be *in person* at

Lake Banyoles (Spain)

Local hosts: Núria Catalán, Ada
Pastor, and Mireia Bartrons

**August 30th to
September 4th 2026**



