



Universitat
de les Illes Balears



RiscBal
OBSERVATORI DE RISCOS NATURALS
I EMERGÈNCIES DE LES ILLES BALEARS



Natural risks in the Balearic Islands, a prone-risk Mediterranean Region

Prof. Dr. Joan Estrany

Head of the Natural Risks and Emergencies Observatory of the Balearic Islands
-RiscBal

Full Professor in Physical Geography
Universitat de les Illes Balears

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<https://riscbal.uib.eu/>
@RiscBal



- Natural risks in the Balearic Islands, a prone-risk Mediterranean Region



Floods



Mass movements

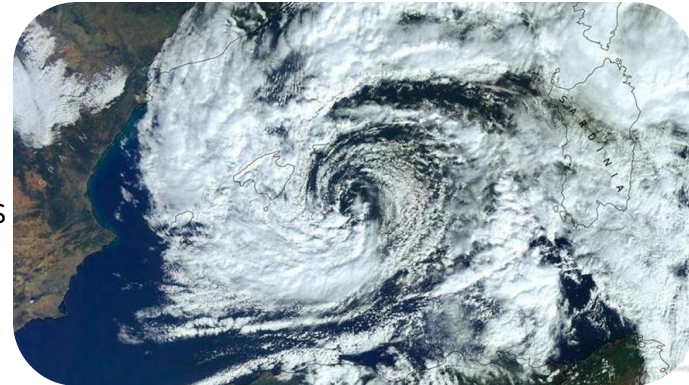


Wildfires



Climate

Destructive storm
Extreme temperatures
Droughts
Soil erosion





Floods

500 years Return Period

Total flooding area

19,014 ha (3.8%)

ARPSI

2,850 ha (0.5%)

No. Buildings

91,085 (16%)

*Palma-Marratxí
Inhabitants*

165,000 (35.6%)



Wildfires

Total forest area

220,786 ha (44.3%)

Impacted surfaces 21st century

Wildfires

9,523 ha (4%)

Destructive storms

16,636 ha (8%)

High wildfire risk

Area

206,640 ha (41%)

Buildings

96,900 (17%)



Mass movements

Area

61,961 ha
(10.8 %)

Municipalities

16

Population

135,000
(11.4 %)

Main road (Ma-10)

7,200 vehicles/day

No. events 21st century

412



Climate

Droughts

Heat waves

Cold waves

Urban Heat Island

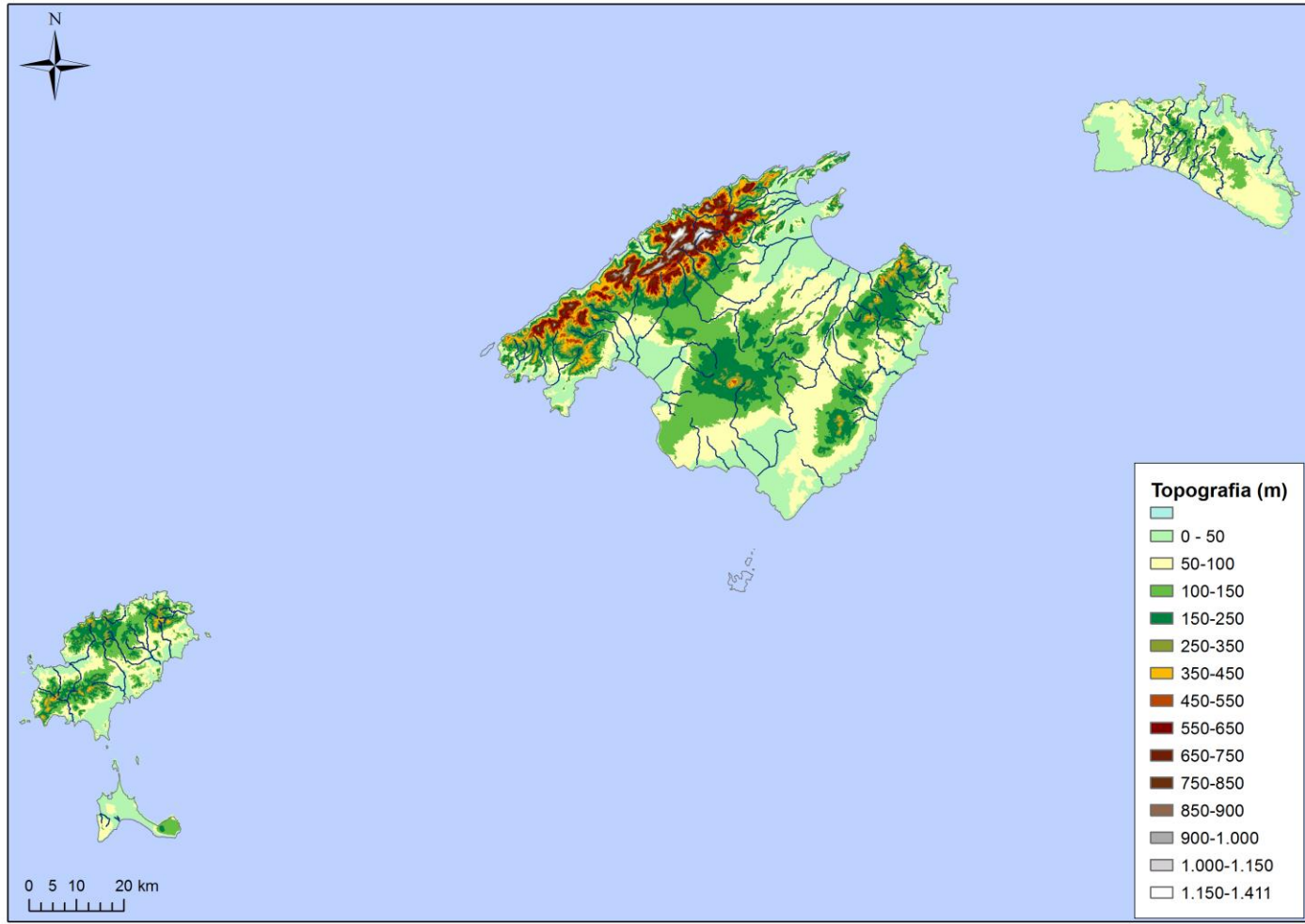
Geographic characteristics and general anthropic interactions

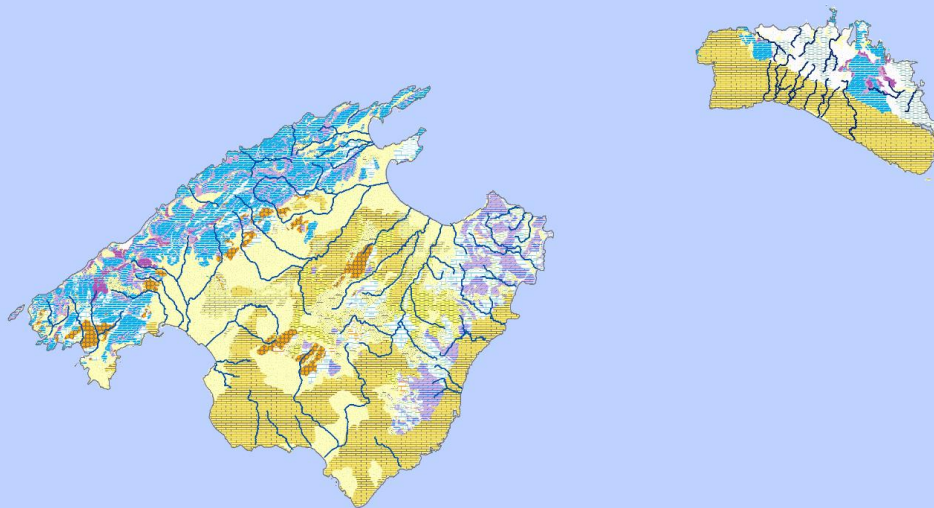


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The surface hydrology of the Balearic Islands (4,992 km²) is mainly composed of small catchments (i.e., <50 km²) where the **absence of precipitation in summer**, the **calcareous substrate** and the overexploitation of groundwater resources generate ephemeral or intermittent flow regimes.

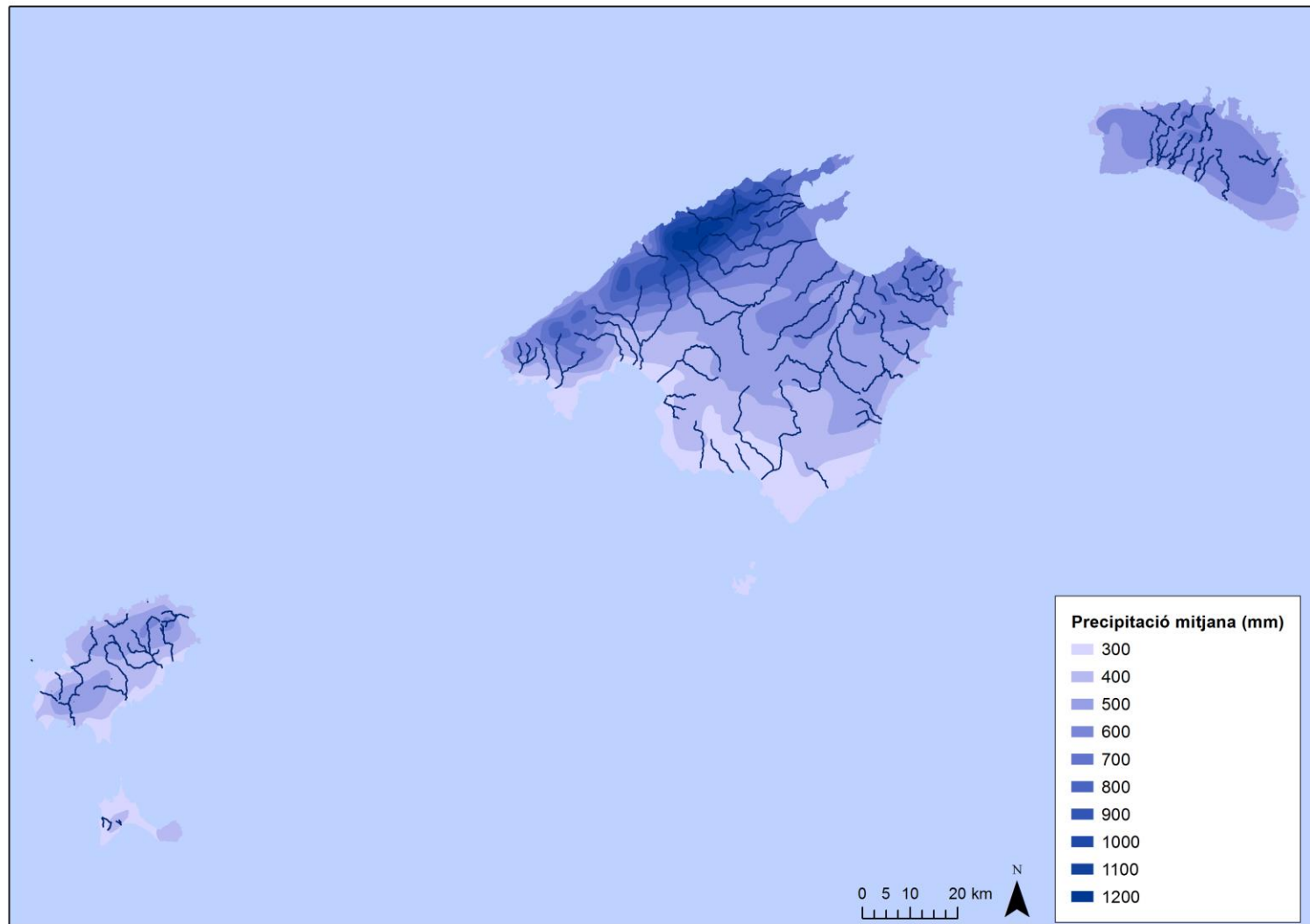




0 5 10 20 km

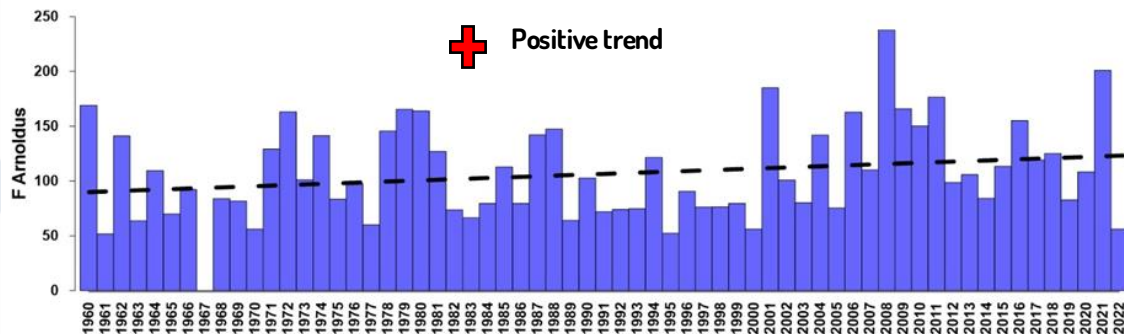
Litologia (%)	Mallorca	Menorca	Eivissa	Formentera
Quaternari	35	1	29	83
Miocè superior (Tortonà-Messinià)	21	52	0	17
Miocè Inferior - Mitjà (Aquitanià - Burdigalià)	7	0	25	0
Oligocè	4	0	0	0
Juràssic Mitjà	9	0	16	0
Triàssic (Keuper)	23	11	25	0
Triàssic Inferior - Mitjà (Buntsandstein)	2	18	5	0
Carbonífer	0	17	0	0



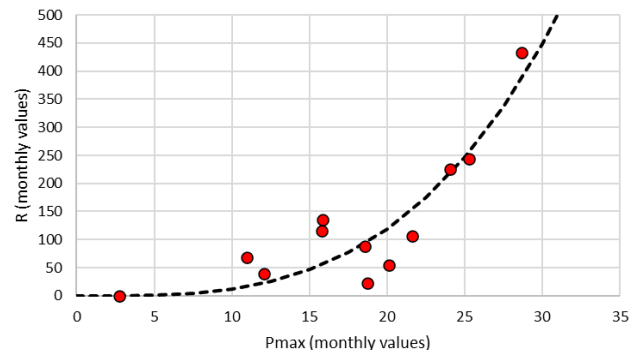


Increasing rainfall erosivity

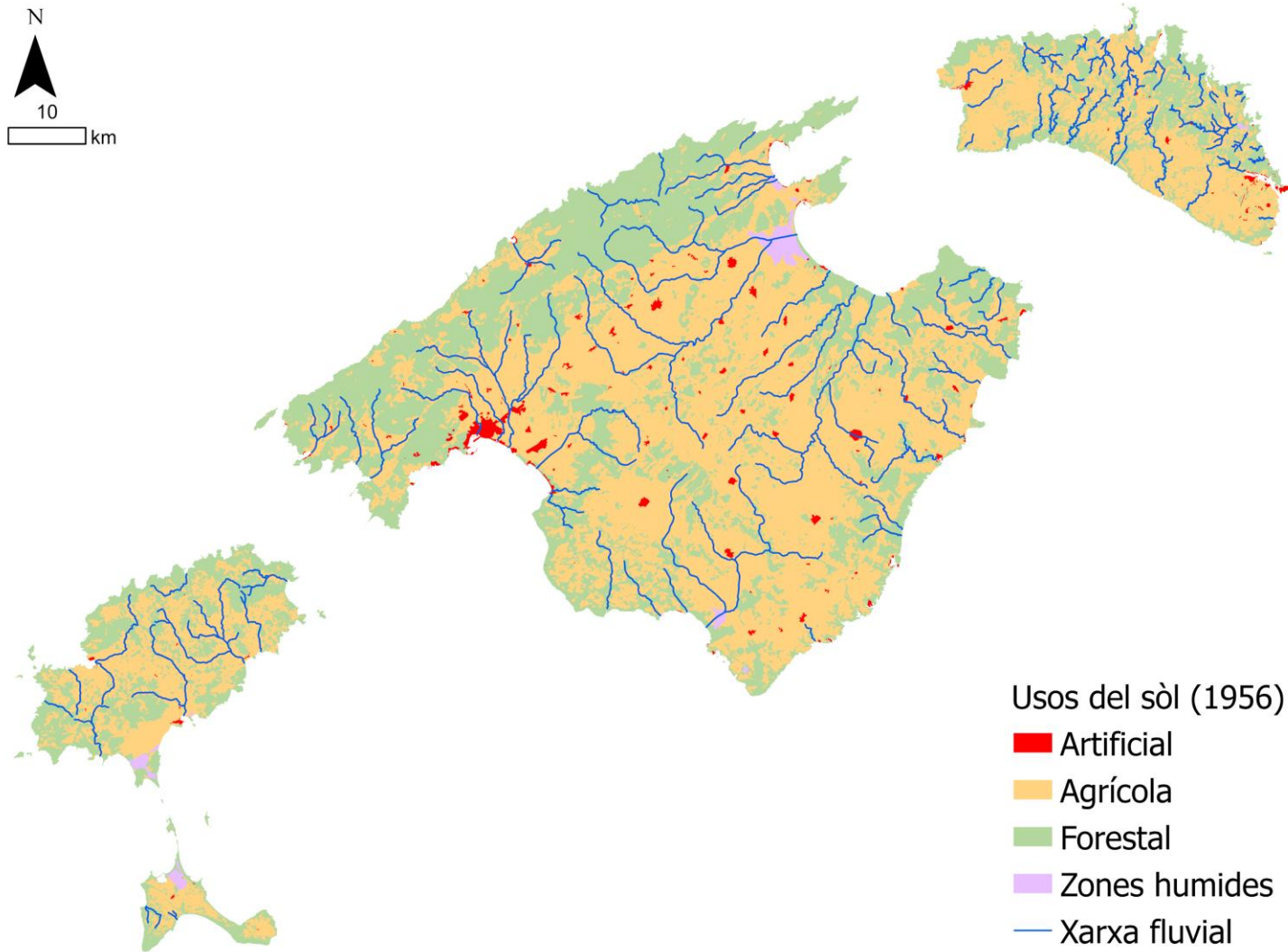
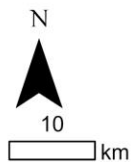
As no detailed data for the catchment was available for the long term, the nearest station with daily data was used to explore long-term rainfall erosivity patterns, using the F Arnoldus as an approach to R-factor of the RUSLE equation.

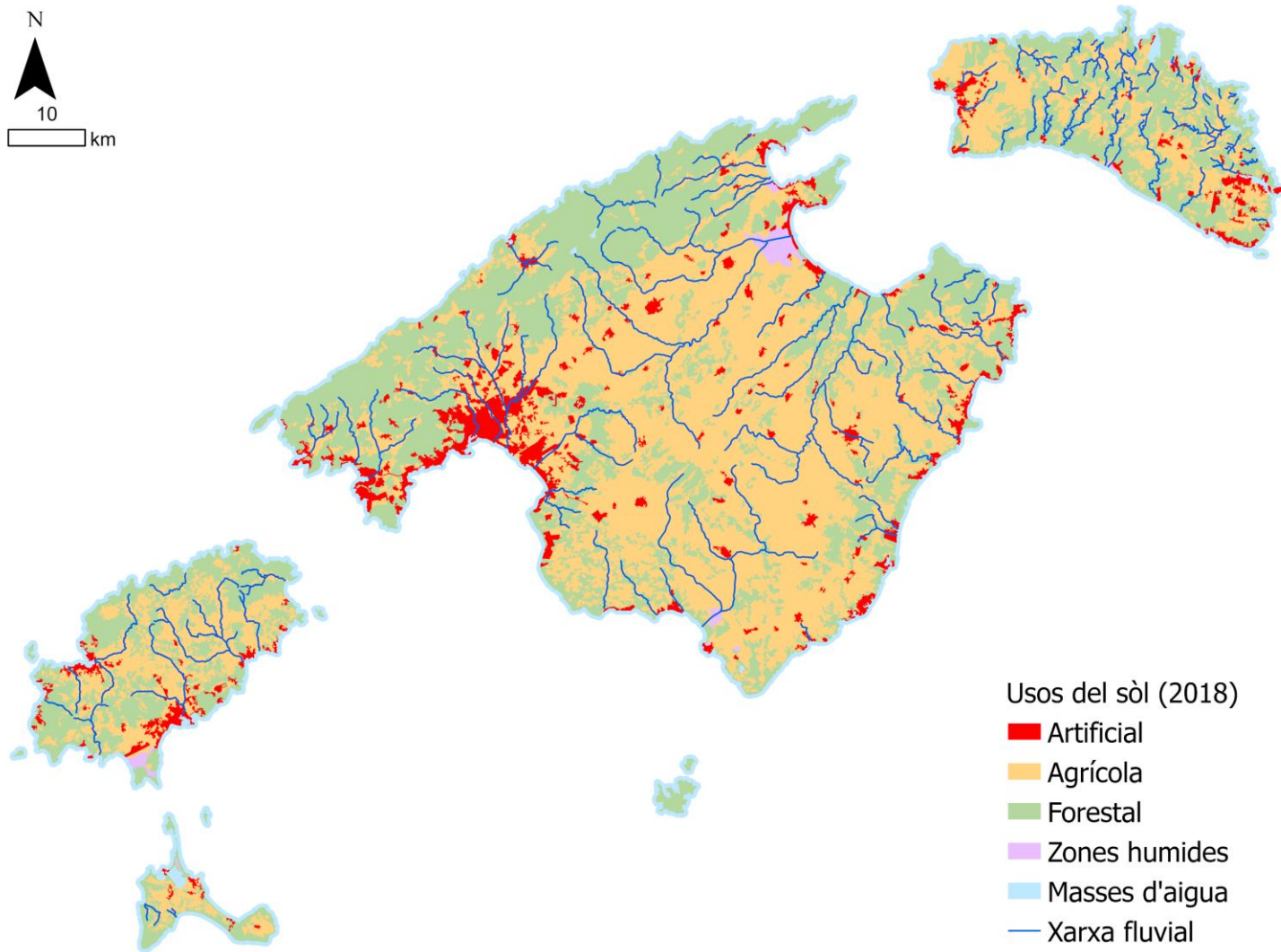
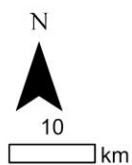


Relationship between mean values of monthly R against mean values of daily Pmax



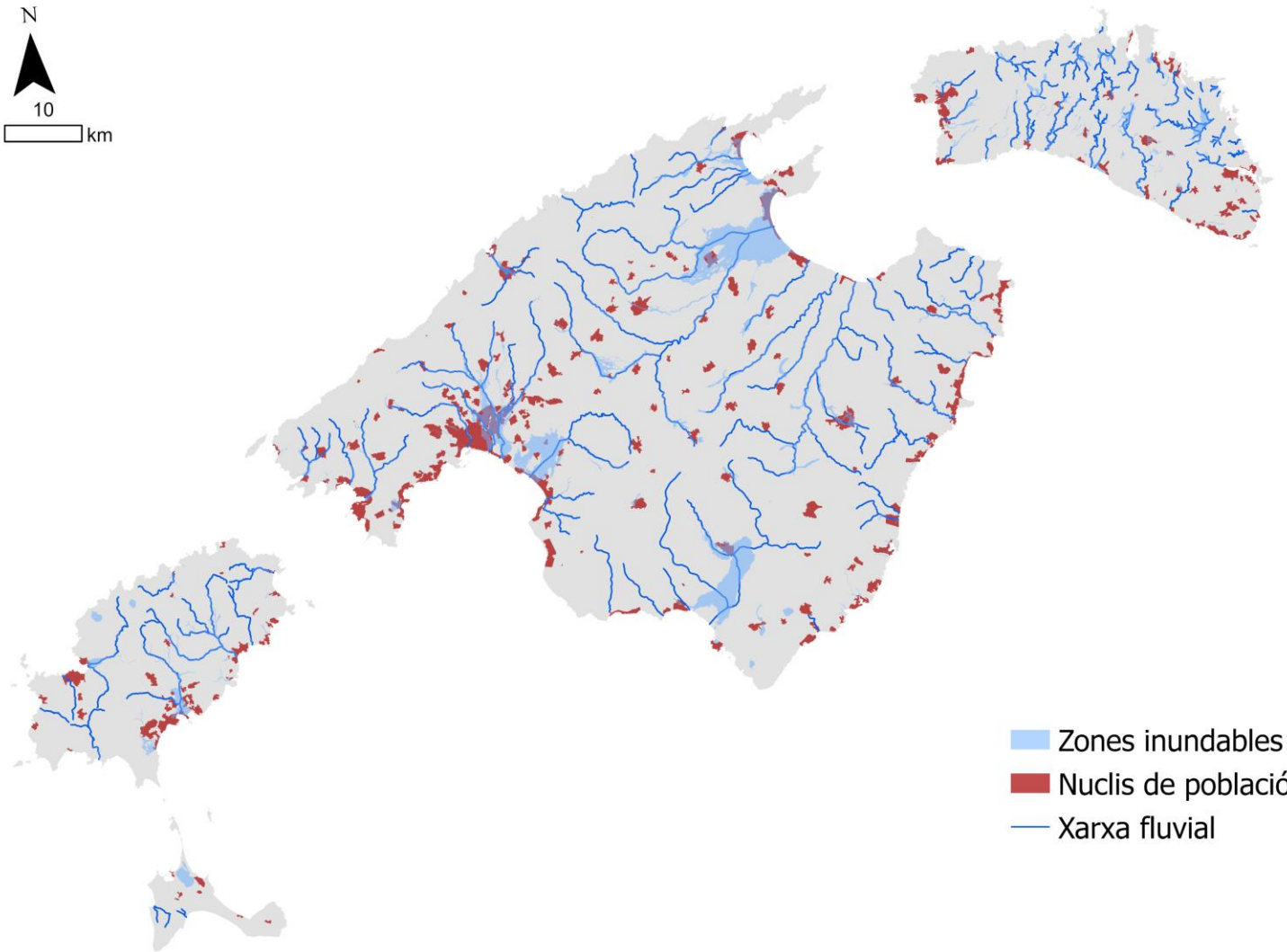
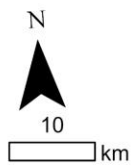
	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
January	0	55	40	82	210	49	5	8	32	30	185	47	167	52	43	0	23	36	39	174	64	10	39	84	75	0	21	20	36	85	83	111	49	50	58	67	19	22	144	13	33	100	223	104	29	84	47	102	16	210	45	52	76	97	16
February	69	12	12	14	21	22	181	10	106	6	22	76	26	55	56	27	117	9	81	219	0	11	0	98	11	43	34	20	36	15	38	42	15	76	17	83	67	43	97	59	15	34	75	43	97	42	21	163	119	59	133	0	0	12	1
March	11	44	55	76	26	101	203	141	17	0	58	157	32	1	57	96	89	106	30	37	27	41	29	72	27	13	4	4	13	37	5	9	5	7	85	12	54	19	50	86	48	55	71	71	32	50	21	110	36	48	107	13	20	82	71
April	68	127	20	54	113	8	120	49	29	67	119	35	105	215	40	0	20	12	73	8	111	45	94		6	30	30	6	48	25	28	12	12	16	135	42	48	0	4	140	5	70	34	22	61	105	72	1	94	11	67	47	180	19	34
May	41	17	38	4	42	8	1	37	69	63	66	2	61	10	5	0	101	50	13		86	22	8	74	58	22	3	3	24	6	22	15	7	32	89	56	83	7	8	14	324	34	202	9	12	4	16	13	11	4	37	17	11	79	64
June	15	17	6	0	50	130	0	75	98	17	6	1	12	11	0	0		6	0	2	59	0	0	0	40	0	5	21	57	58	0	1	16	0	34	1	14	0	3	0	13	3	16	25	2	1	16	11	8	152	32	0	38	11	4
July	2	7		0	0	19	40	1	0	19	18	16	0	14	0	0	0	0	0	70	15	0	0	0	0	0	0	1	1	0	1	0	15	4	19	1	0	9	3	0	2	3	0	3	16	0	0	0	0	3	0	4	0	11	0
August	45	74	8	0	77	62	27	70	1	62	1	3		0	24	23	28	0	0	0	0	59	14	72	0	2	18	9	52	22	18	2	3	3	130	0	9	12	71	92	4	5	1	2	42	75	40	30	2	17	53	26	16	17	3
September	19	18	0	212	217	41	14	63	102	54	1	213	11	27	32	5	32	20	49	16	271	93	2	66	7	106	114	73	123	59	5	99	89	87	23	75	4	121	168	61	22	303	69	51	34	33	52	140	72	46	58	87	123	59	45
October	6	115	71	47	74	85	122	49	157	90	232	247	24	16	110	0	11	75	136	32	26	8	114	59	127	103	212	11	87	62	77	30	76	10	70	128	53	32	32	181	177	37	160	51	119	64	16	30	59	35	247	128	29	97	8
November	81	70	17	156	51	0	60	67	7	67	97	40	145	3	114	55	84	193	62	85	40	96	155	32	61	71	67	79	56	126	118	106	15	323	147	65	123	99	3	76	145	34	41	321	164	194	139	35	84	67	71	107	374	73	
December	148	80	90	84	246	162	1	106	48	38	25	140	272	20	53	68	47	97	80	80	25	39	17	45	60	21	63	50	159	91	80	58	40	134	56	76	267	51	266	19	319	149		7	5	83	121	0	285	62	68	55	48	22	

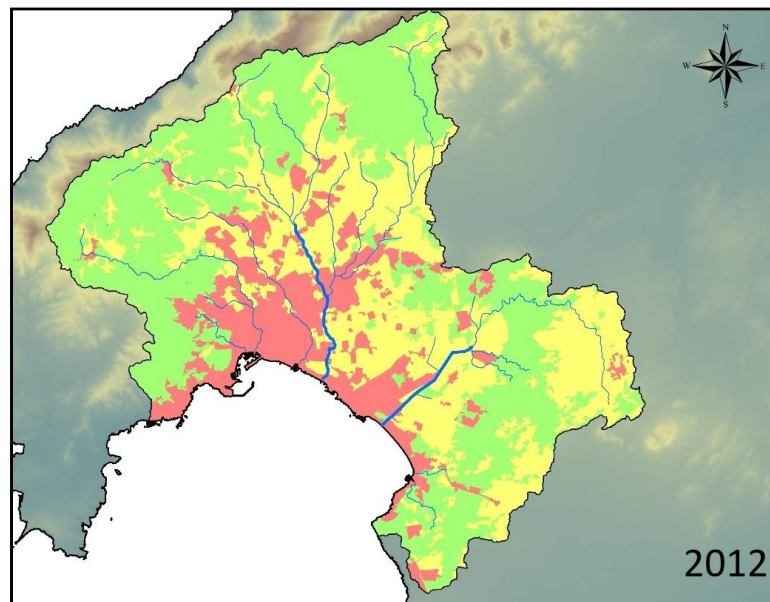
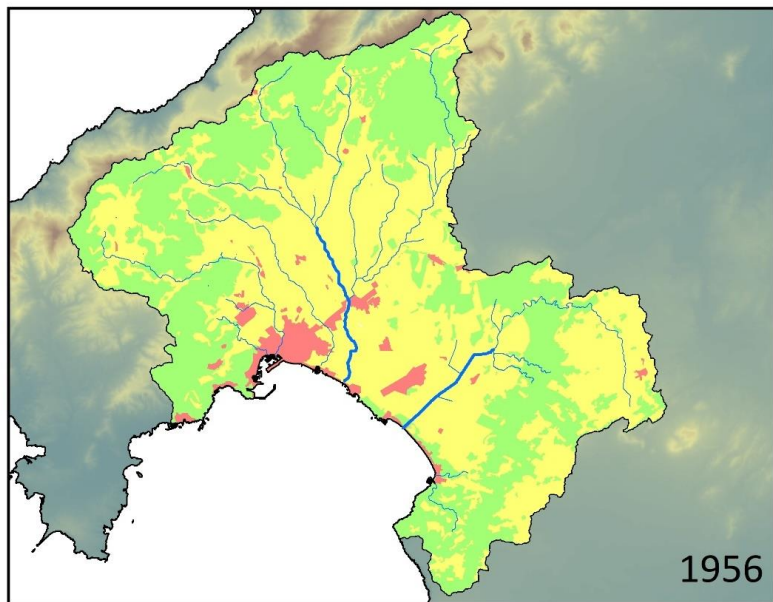




Usos del sòl (2018)

- Artificial
- Agrícola
- Forestal
- Zones humides
- Masses d'aigua
- Xarxa fluvial





Exponential increase in flood zones due to urban expansion

Year	Flood zones (ha)
1956	7
1973	23
1995	179
2000	195
2012	292

Petrus JM, Ruiz M, Estrany J. Interactions between geomorphology and urban evolution since neolithic times in a mediterranean city. In Urban Geomorphology 2018 Jan 1 (pp. 9-35). Elsevier.

Natural Risks and Emergencies Observatory of the Balearic Islands -RiscBal

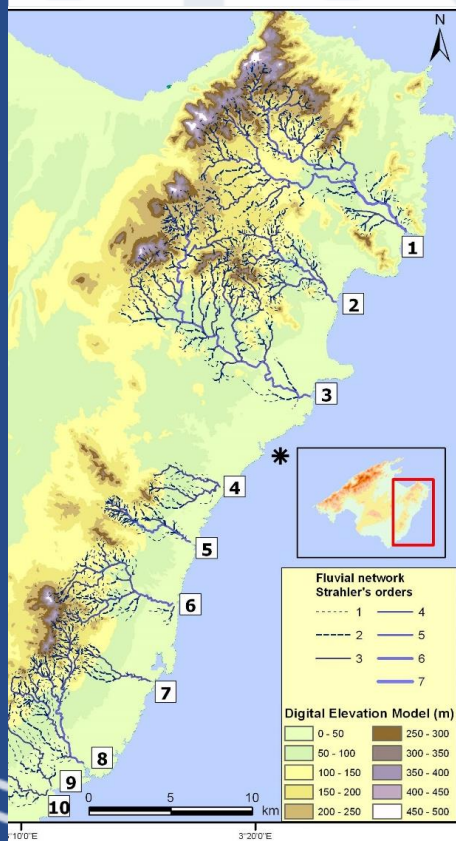


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THE INTEREST FROM STAKEHOLDERS

Flash flood events in the last 175 years

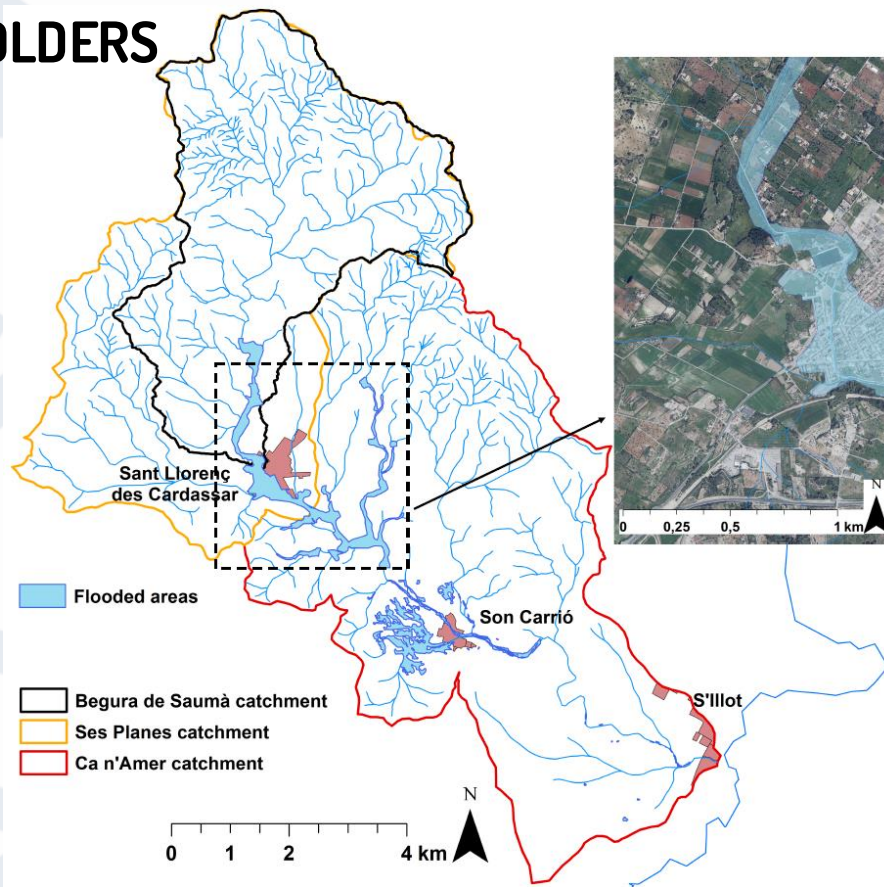


Date	Affected catchments	Intensity
15.09.1850	Whole catchments	****
13.11.1880	8 Portopetra	?
06.11.1891	7 Cala Marçal, 8 Portopetra, 9 Fonts de n'Alis, 10 s'Amarador	****
13.07.1893	2 Estany d'en Xinet	****
?10.1920	7 Cala Marçal	?
05.10.1932	Whole catchments	****
01.11.1943	1 Canyamel, 3 Riu de s'Illot	***
07.11.1952	8 Portopetra	**
04.10.1957	10 s'Amarador	***
30.09.1959	2 Estany d'en Xinet, 3 Riu de s'Illot, Riu de Port de Manacor	****
12.10.1973	3 Riu de s'Illot	**
04.09.1982	3 Riu de s'Illot	*
25.08.1983	Riu de Port de Manacor	**
31.08.1989	4 Estany den Mas	**
06.09.1989	Whole catchments	****
10.11.1990	1 Canyamel, 2 Estany d'en Xinet	***
10.11.1990	8 Portopetra	**
12.10.1994	Riu de Port de Manacor, 4 Estany den Mas, 5 Cala Magraner	***
11.11.2001	8 Portopetra	**
22.11.2007	3 Riu de s'Illot	**
28.09.2008	5 Cala Magraner	*

Estrany J, Gimalt M. 2014. Catchment controls and human disturbances on the geomorphology of small Mediterranean estuarine systems. *Estuarine, Coastal and Shelf Science* 150: 230-41.

THE INTEREST FROM STAKEHOLDERS

Severe flash flood event on 9th October



Estrany J, Ruiz-Pérez M, Mutzner R, Fortesa J, Nàcher-Rodríguez B, Tomàs-Burguera M, García-Comendador J, Peña X, Calvo-Cases A, Vallés-Morán F.J. 2020. Hydrogeomorphological analysis and modelling for a comprehensive understanding of flash-flood damage processes: the 9 October 2018 event in northeastern Mallorca.

Natural Hazards and Earth System Sciences 20(8):2195-220.

THE INTEREST FROM STAKEHOLDERS

Population impacts

- Casualties: 13 persons
- Rescues: 342 persons
- Disappeared: 0
- Slightly injured: 4

Damaged infrastructures

- 4 main roads were closed
- 22 roads with serious damage
- 8 bridges with serious structural damage

Damaged buildings and vehicles

- > 1,000 affected buildings
- 3 demolitions
- 426 damaged
- 7,000 tonnes of removed debris

Severe flash flood event on 9th October

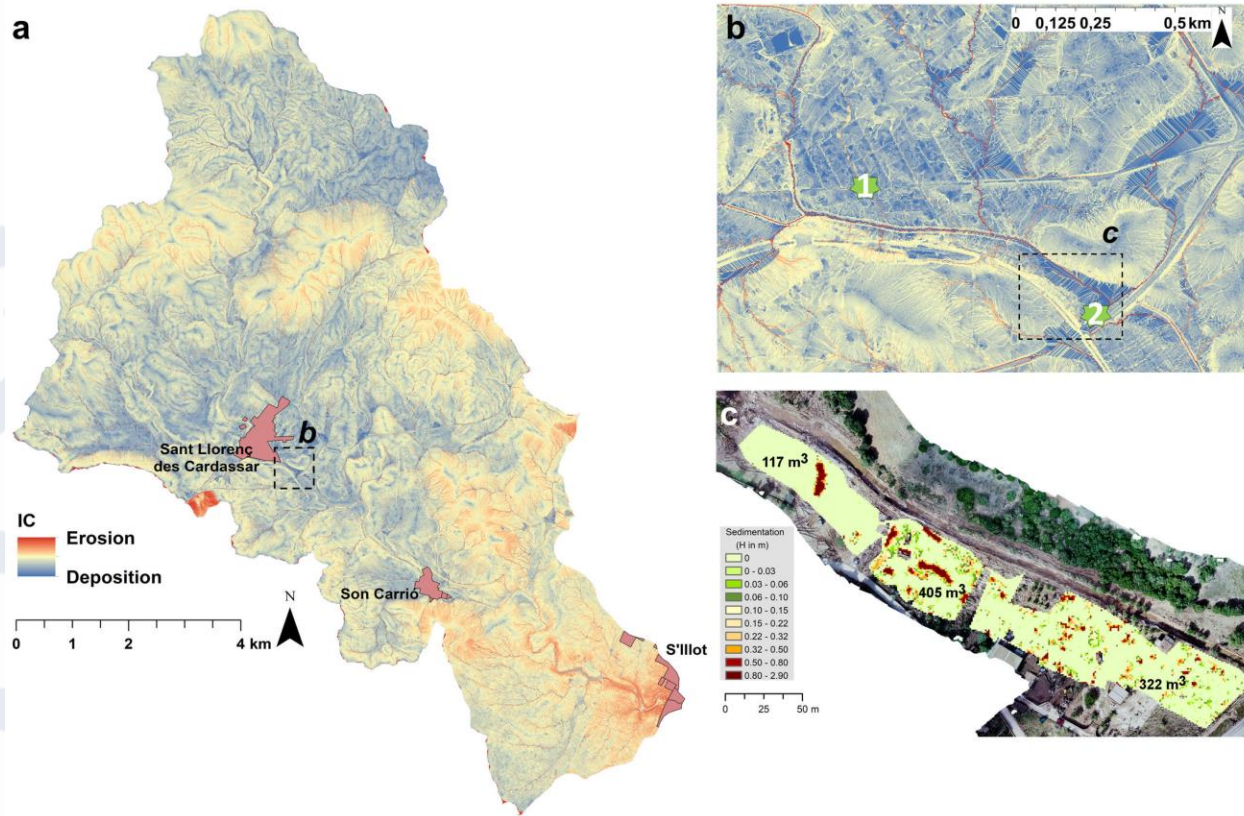


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Floods



Wildfires



Mass movements



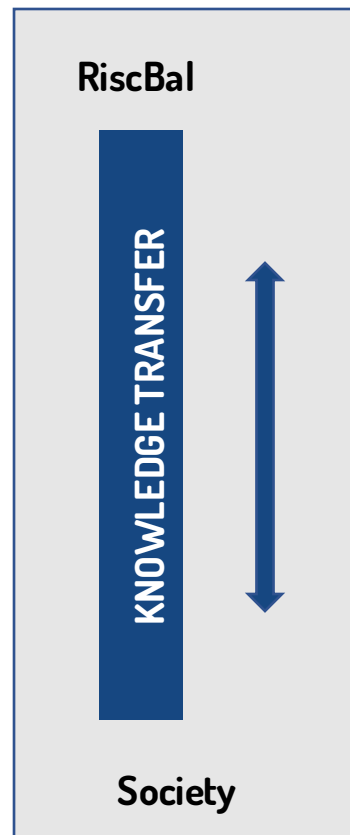
Climatic

Destructive storms

Extreme temperatures

Droughts

Soil erosion



Estimation of the Economic Benefits of RiscBal-UIB's Involvement in Early Warning Systems

Direct Scientific Transfer

RiscBal-UIB acts as a bridge between research and emergency management, providing useful knowledge to public administrations.

European Competitive Funding

Participation in programs like Horizon Europe allows covering up to 100% of project budgets, reducing costs for public institutions.

Annual Investment in R&D&I

38% allocated to staff and 62% sourced from competitive projects.

Application of Advanced Technologies

Deployment of monitoring networks and real-time simulations, with an estimated 30% reduction in operational costs.

High Economic and Social Return

Initial investment: €3–5M

Direct savings over 10 years: €30–50M

Indirect impact: €15–20M (innovation, safe tourism, employment)

Estimated return: €5–10 for every €1 invested

Impact in the Balearic Islands

UIB can generate a return of up to €45M over a decade thanks to its leadership in early warning systems and risk management.

Contribution to Territorial Resilience

RiscBal drives sustainable and adaptive development in the face of global change challenges through applied research and institutional collaboration.

**Five-years
budget 2023-2028**

1.7 million € total budget

**0.5 million € for
monitoring, labwork and
diffusion**

Meteorological stations

Hydrometric stations

UAV flights

**Telecommunications for
stations**

Lab equipment & analysis

Diffusion activities

COMPETITIVE PROJECTS BETWEEN 2021-2026: 1.180.000 €

C2IMPRESS. New integrated multi-hazard and resilient assessment framework focusing on "places and people". 520.000 €

INFLOODMED. Integrated flood risk management in small Mediterranean basins: monitoring and development of protocols for building resilient territories. 180.000 €

VULNERISLAND. Physical vulnerability due to exposure to natural hazards of various territorial components: population, critical infrastructure, buildings, land use, ecosystems and tourism activity, as well as social vulnerability and its components. 75.000 €

MEDHYCON-3. Ecogeomorphological modelling in Mediterranean basins: Multi-scale connectivity thresholds for assessing soil degradation. 105.000 €

TRINB. Mobile app for identifying vulnerabilities in tourist establishments. 300.000 €

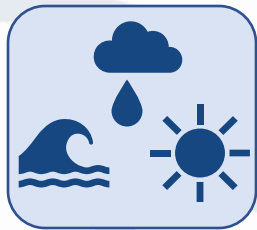


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graph TD; A((Science to management)) --> B((Internet of Things)); B --> C((Open-source)); C --> A;
```

Science to
management

Internet of
Things

Open-source



RiscBal – Control



RiscBal – Analysis



RiscBal – Warnings



Conselleria de Presidència i Administracions Públiques

Direcció General d'Emergències i Interior



Govern de les Illes Balears

Conselleria de la Mar
i del Cicle de l'Aigua



Govern de les Illes Balears

Conselleria d'Agricultura,
Pesca i Medi Natural



Govern de les Illes Balears

Conselleria d'Empresa
Ocupació i Energia

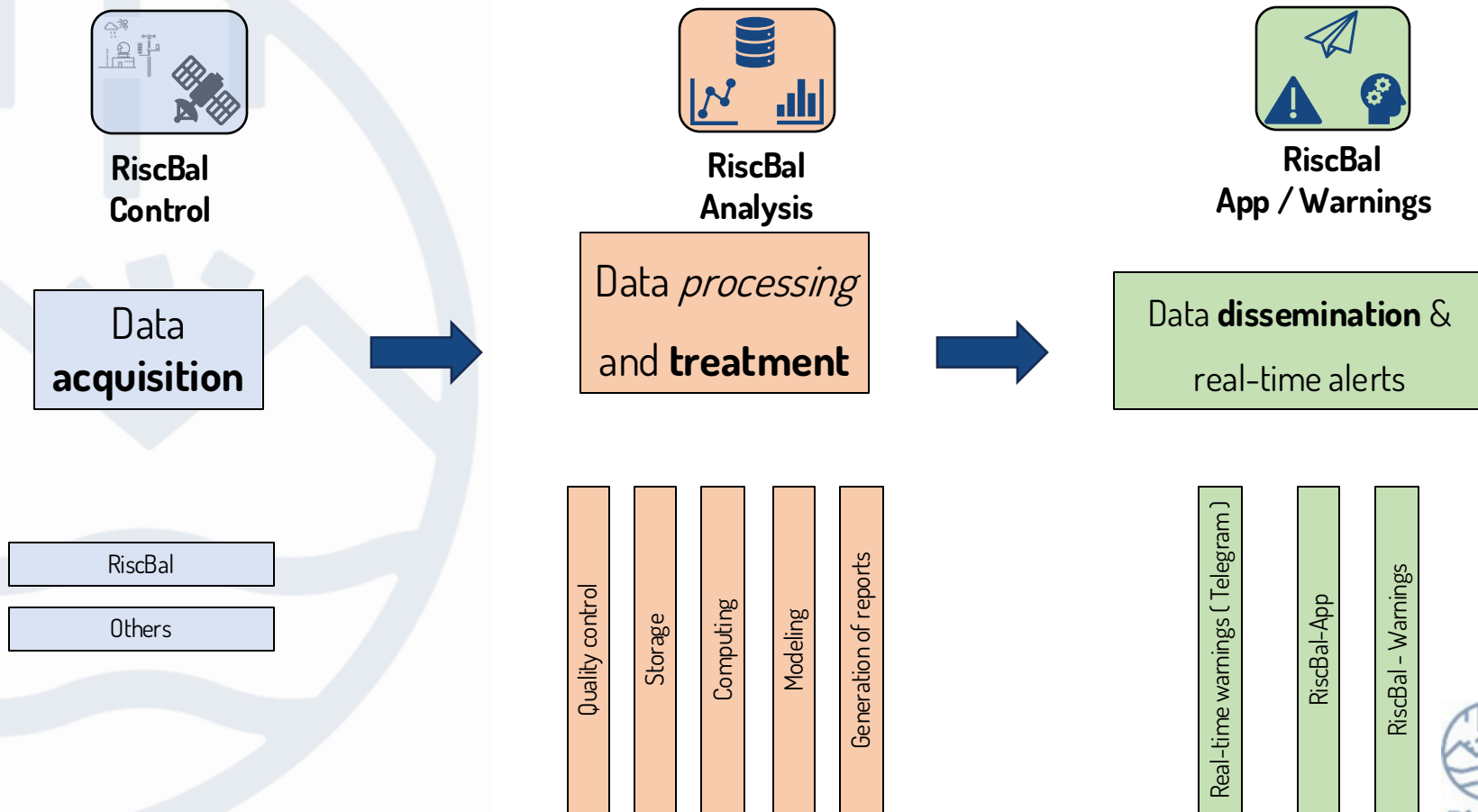


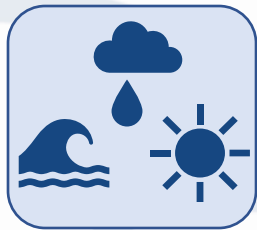
Govern de les Illes Balears

Conselleria d'Economia,
Hisenda i Innovació



Continuous flow of information in RiscBal → systematic in obtaining, processing and disseminating data





RiscBal – Control

Monitoring environmental network for data collection useful in natural risk management

Dynamic data

- *Stations on real time*
- *Remote sensing and modelling*



Semi-static data

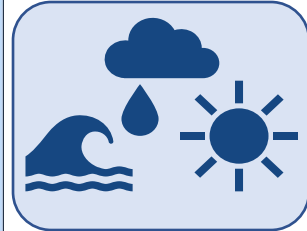
- *Geographic information at different spatial scales*





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RiscBal – Control

95 RiscBal-Control stations

Num.	Types	Freq.
58	Hydrometric	5 min
37	Meteorologic	10 min

Estacions de la xarxa RiscBal

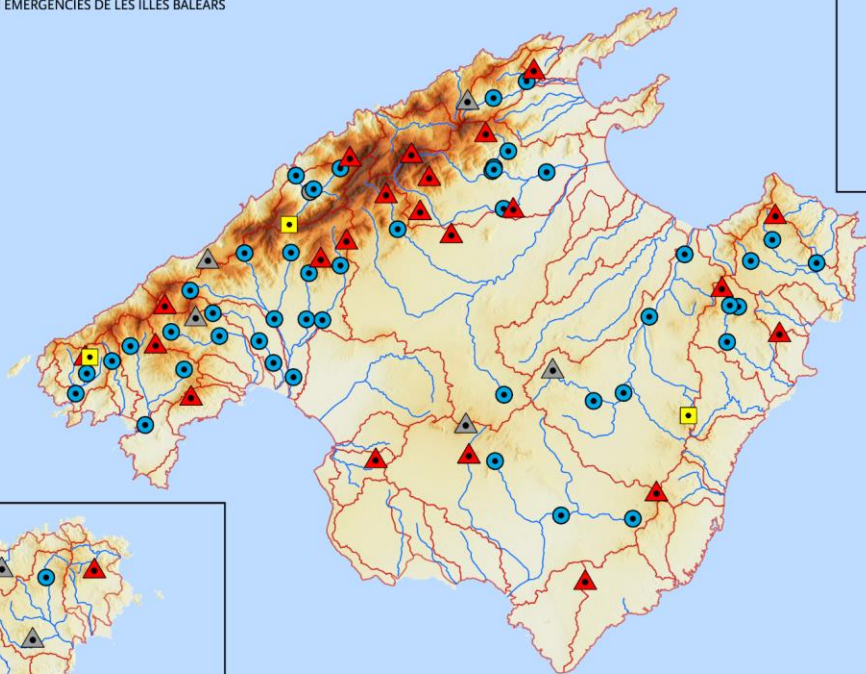
- RiscBal-Hidromètrica
- ▲ RiscBal-Meteorològica
- RiscBal-Hidrometeorològica

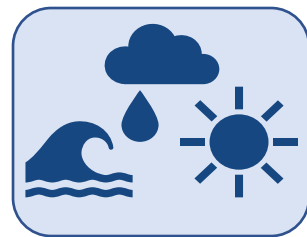
Estacions previstes 2024

- Hidromètrica
- ▲ Meteorològica
- Hidrometeorològica

□ Conques

0 5 10 15 20
km





Hydrometric station

Estació MUR08 - Alcoraia



Dades

Codi	MUR08
Nom	Alcoraia
Tipus	Hidromètrica
Conca hidrogràfica	Muro
Municipi - Illa	Montuïri - Mallorca

Coordenades (UTM)

X: 498.241,423

Y: 4.378.584,909

ALTITUD (msnm): 137



Altres dades

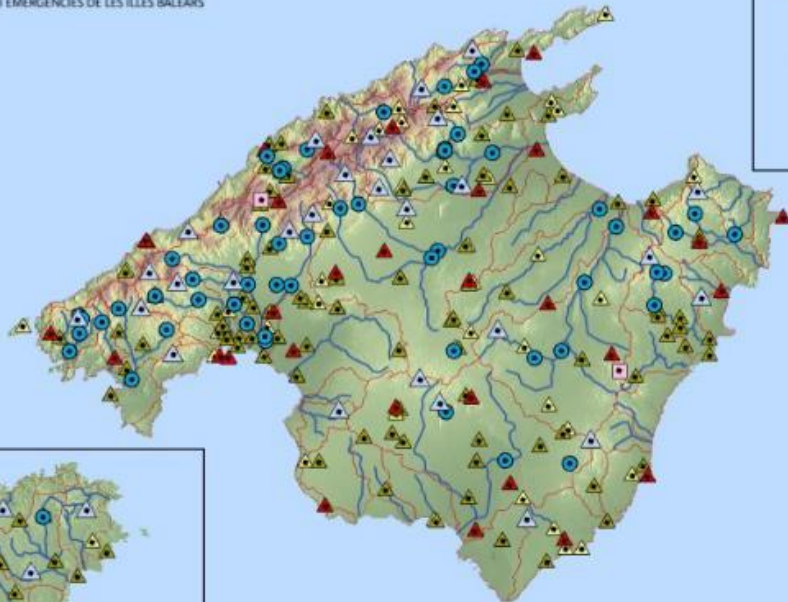
Data d'inici de monitoratge	03/07/2024
Freqüència d'enviament en temps real	5 minuts
Secció d'aigües baixes	No
Sensors	Sonda de nivell: nivell de làmina d'aigua Sonda de nivell: temperatura de l'aigua

RiscBal-Control: dynamic data from stations

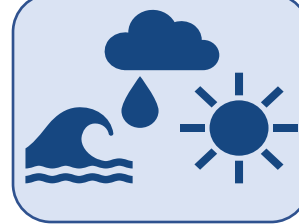
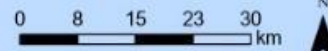


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- RiscBal-Hidromètrica
- △ RiscBal-Meteorològica
- ◻ RiscBal-Hidrometeorològica
- ▲ AEMET
- ▲ Wunderground (cribatge)
- ▲ Balearsmeteo
- ◻ Conques



RiscBal – Control

328 stations

58 hydrometric

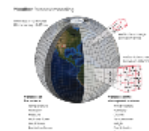
270 meteorological

Num	Network	Freq.
37	RiscBal	10 min
43	AEMET	60 min
68	BalearsMeteo	10 min
122	Wunderground	10 min

RiscBal -Control: dynamic *remote sensing and modelling data*

Information on environmental variables with high spatial and temporal resolution.

Input data



Sources



API

Integration



RiscBal - Data

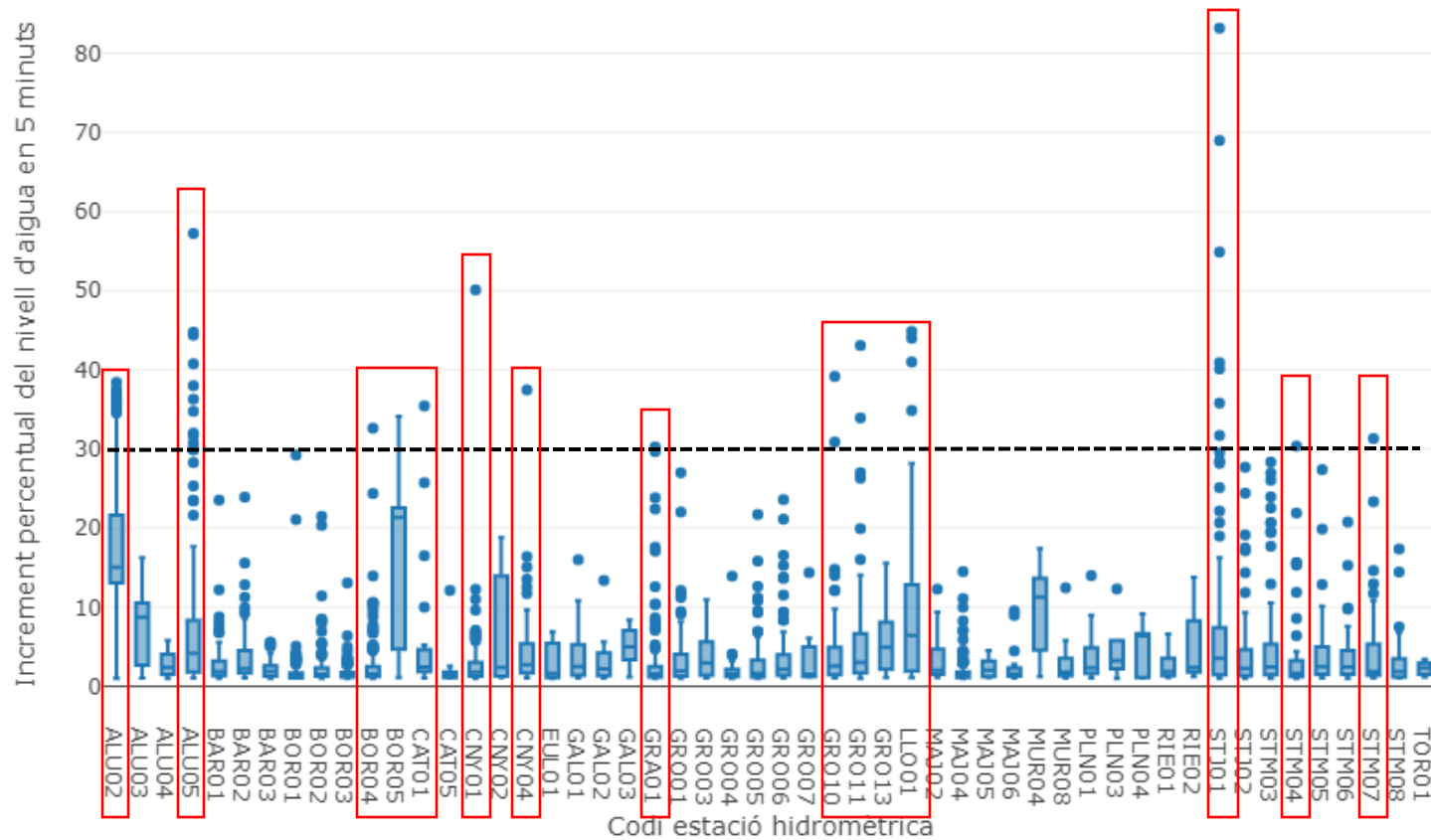
RiscBal Analysis



RiscBal

OBSERVATORI DE RISCOS NATURALS
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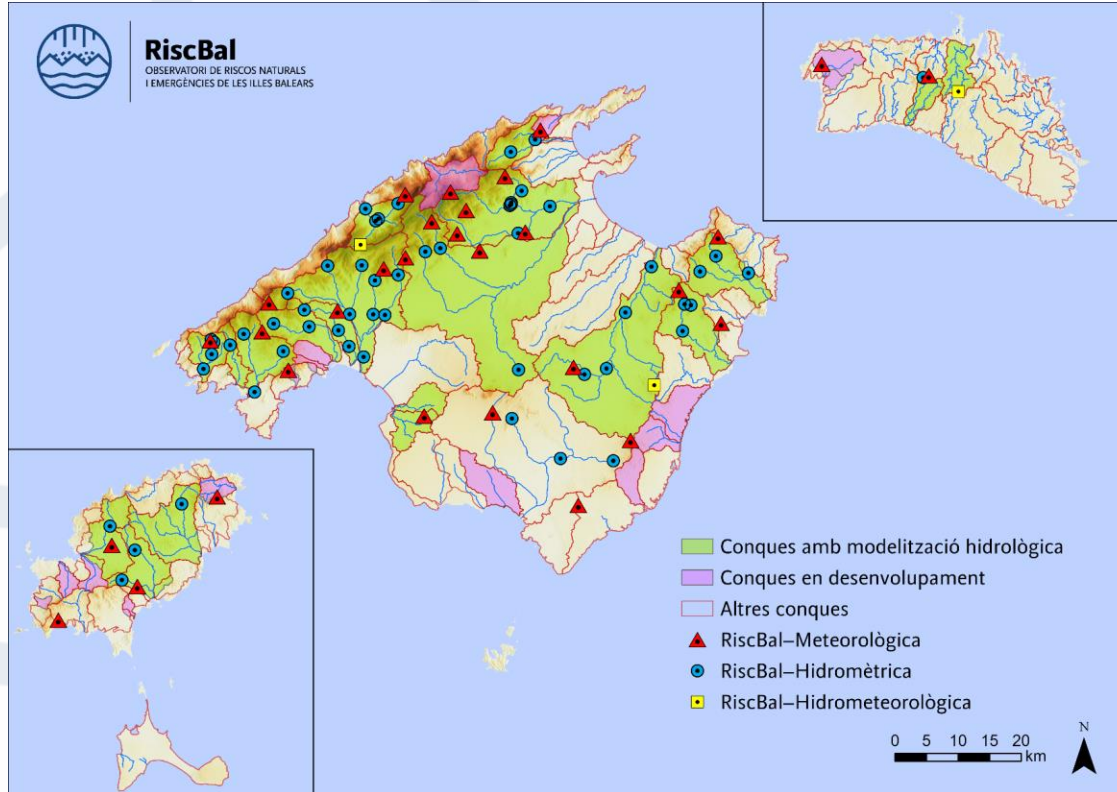
At **15 hydrometric stations**, the water stage goes **from zero to 30% of the channel's capacity in 5 minutes**.



RiscBal-Analysis: dynamic data and modelling

Design and implementation of Early Warning Systems

Flood warning protocol based on **INUNBAL**



Forecasting Index

Flow forecasting through hydrological simulation

Flow simulation in 20 basins every 10 minutes in the RiscBal internal viewer

Developing hydrological simulation projects in 17 more basins.

Incorporation August 2025

RiscBal Warnings and visualization platforms



RiscBal

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Visualization Platforms



Data and indicators queries
Real-time
Daily and monthly data

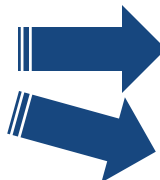


Daily Reports

Data Viewer



EWS with real-time data
(observation and simulation)



Risk Viewer
RiscBal-App

Tourist Establishments Viewer (TRINB)



DADES

AVISOS

VISOR DE DADES

Visor de riscos

VISOR DE RISCOS - EN LÍNIA

INFORMES



RiscBal-App 4+

Visor de riscos Balears

Fundació Universitat-Empresa de les Illes Balears

Dissenyada per a l'iPad

RiscBal - App

FUEIB

Aplicació en temps real sobre els riscos naturals a les Illes Balears



3,2★

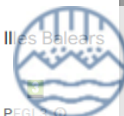
5 ressenyes



Govern

1 k+

Baixades



PEGI 3+

RiscBal
COORDINACIÓ DE RISCOS NATURALS
UNIVERSITAT DE LES ILLES BALEARS

Daily Reports

Publication of **daily and monthly summaries** of the data collected by RiscBal-Control

+ 17 hydrometeorological variables and indicators

Historical since October 1, 2023

Coming soon: Seasonal and annual summaries



RiscBal

OBSERVATORI DE RISCOS NATURALS
I EMERGÈNCIES DE LES ILLES BALEARS



Informe diari de RiscBal-Control, xarxa d'observació ambiental a les illes Balears

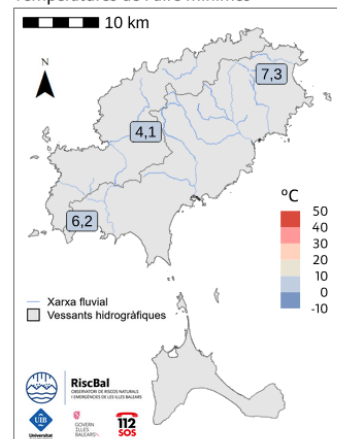
Diari ▾

01/02/2025 📅

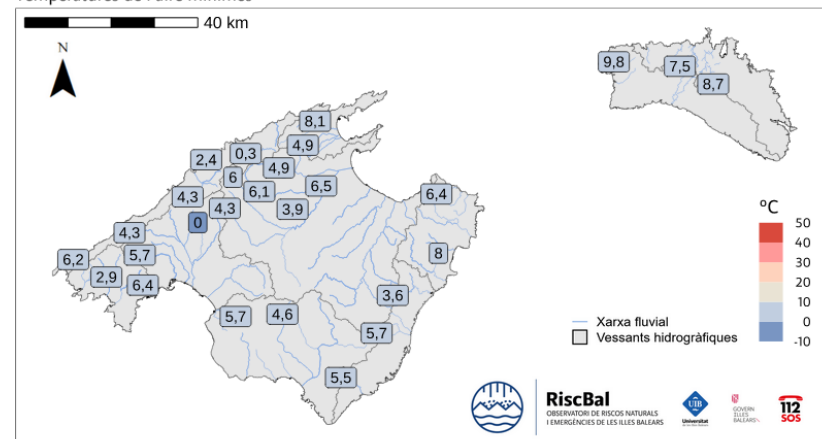
Temperatura de l'aire - Mínima ▾

Mínima diària de la temperatura de l'aire a les estacions RiscBal-Control

Temperatures de l'aire mínimes



Temperatures de l'aire mínimes



Aquesta obra està subjecta a una llicència de [Reconeixement-NoComercial-SenseObraDerivada 4.0 Internacional](https://creativecommons.org/licenses/by-nc-nd/4.0/) de Creative Commons

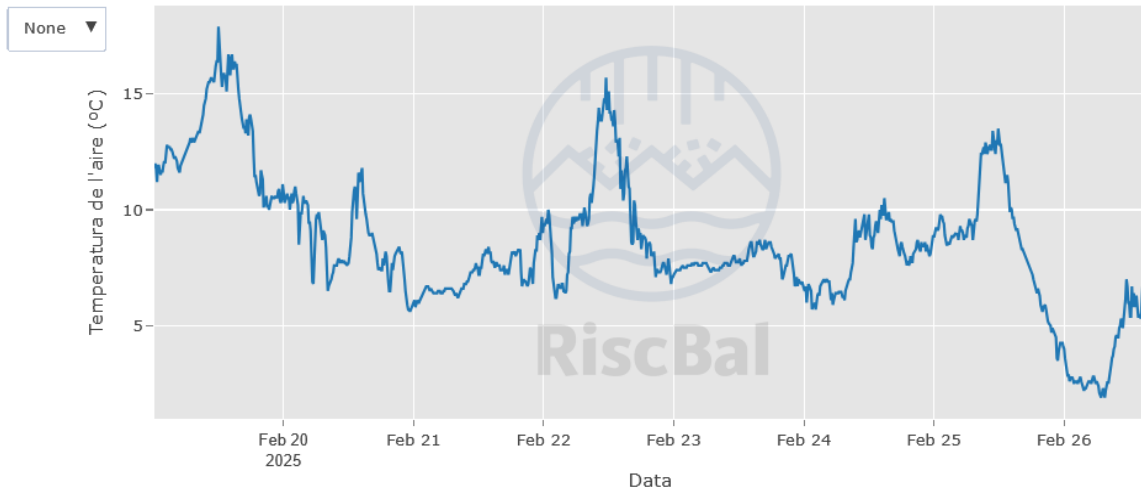
En cas de fer ús de les dades de RiscBal-Control citar la font i incloure la URL d'on es poden consultar les dades. *Dades pendents de validar*

Data Viewer

Visor de consulta de datos en tiempo real y últimos días de RiscBal-Dades

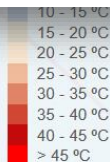


Estació STM01 - Coll des Telègraf (RiscBal - Control)



Tancar

contactar amb riscbal@uib.cat
En cas de fer ús de les dades de RiscBal-Control citar la font i incloure la URL d'on es poden consultar les dades. Dades pendents de validar.



RiscBal-Control & AEMET

Relevant variables and indicators from RiscBal-Data

Multiple query modes (maximums, minimums, and averages)

Dynamic maps and data tables

Check the latest data received

Visualization of data from the last week

Download generated graphics

Risk Viewer – RiscBal App



Benvingut,

Ja estàs llest. Mantingues a tots informats sobre el que està succeint per prevenir riscos a la comunitat

Fet



Risk Viewer – RiscBal App > Main Page

Darrera imatge servida per AEMET: 21-01-25, 10:20 h



Data type selection

Precipitació acumulada 1h (mm)

Mapes Base



OSM



Base
topogràfica



Ortofoto



Escala de
grisos

Mapes de precipitació i escorrentia



Precipitació

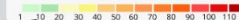


Escorrentia



Cap

Precipitació acumulada 1h (mm)



1h 24h

Hydro

Meteo

1h 24h

Meteo

0 m

Normal

Menorca

Observació del nivell d'aigua

0 m

Normal

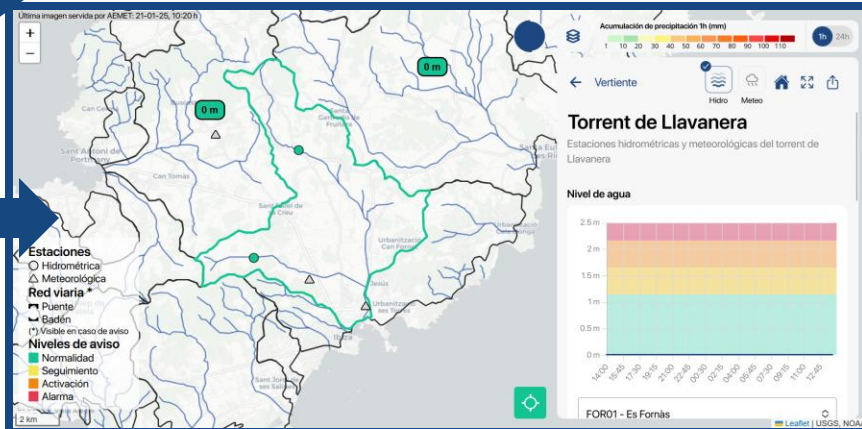
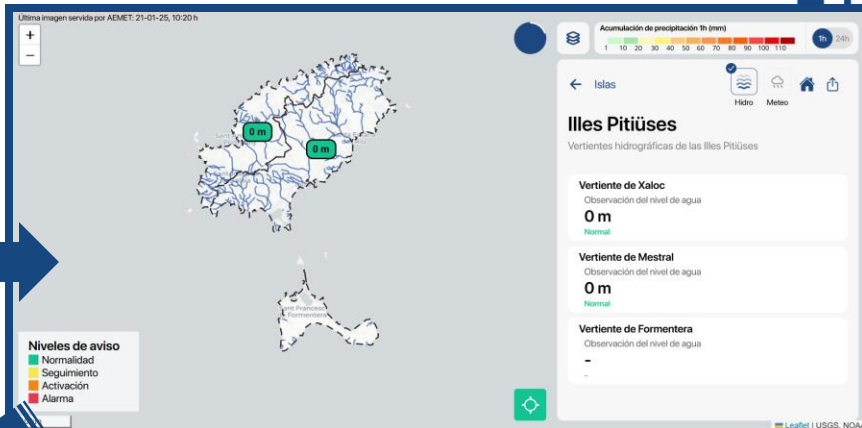
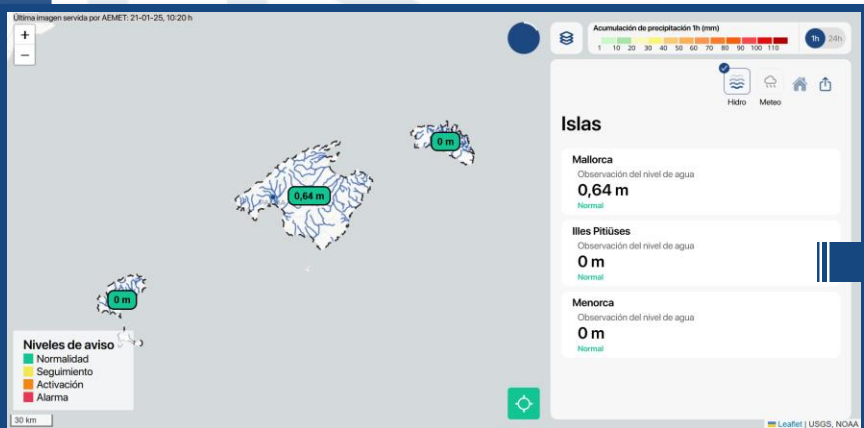
Nivells d'avís

- Normalitat
- Seguiment
- Activació
- Alarma

20 km

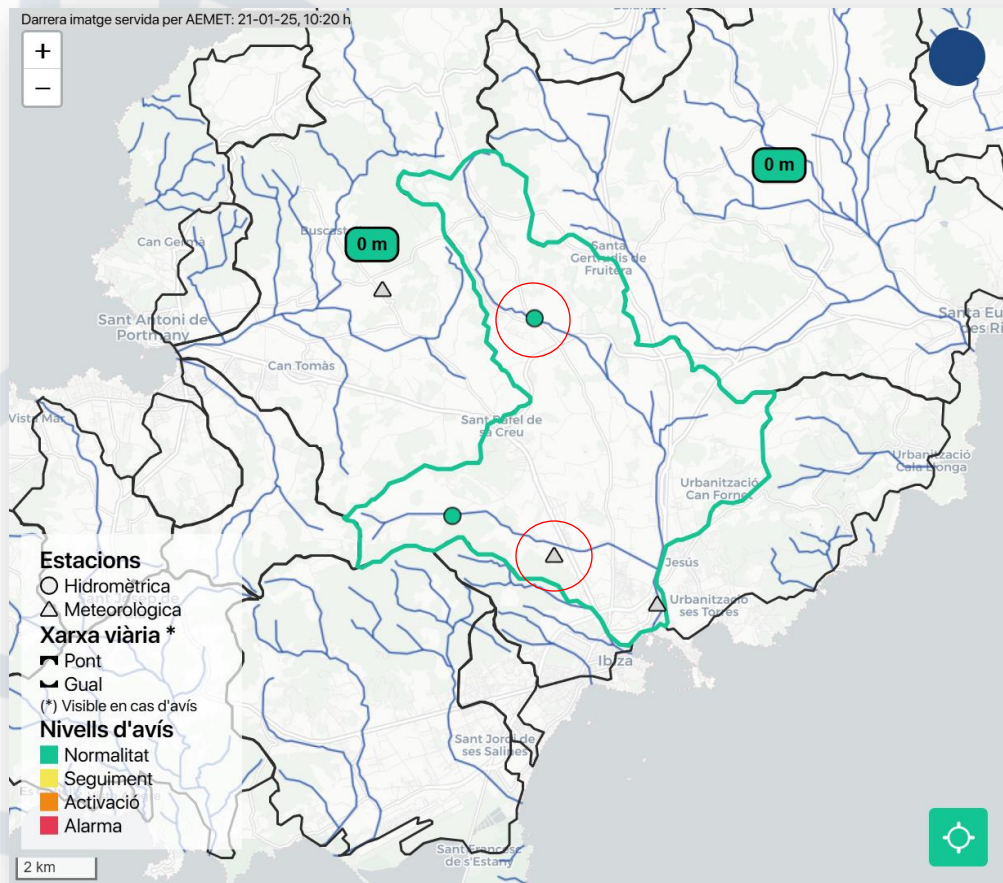


Risk Viewer – RiscBal App > Navigation



Risk Viewer – RiscBal App > Catchment scale

Darrera imatge servida per AEMET: 21-01-25, 10:20 h



Estacions

- Hidromètrica
- △ Meteorològica

Xarxa viària *

- ▬ Pont
- ▬ Gual

(*) Visible en cas d'avís

Nivells d'avís

- Normalitat
- Seguiment
- Activació
- Alarma

2 km



Precipitació acumulada 1h (mm)



1h 24h

← Vessant



Hidro



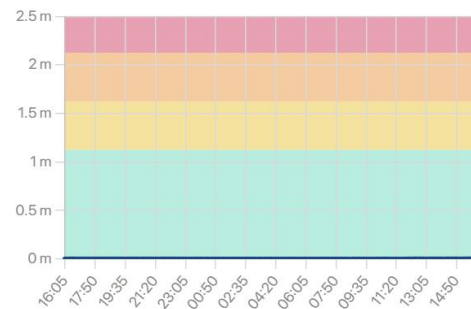
Meteo



Torrent de Llanera

Estacions hidromètriques i meteorològiques del torrent de Llanera

Nivell d'aigua



LLA01 - Pont d'en Lluqui



Estacions hidromètriques

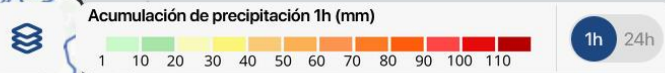
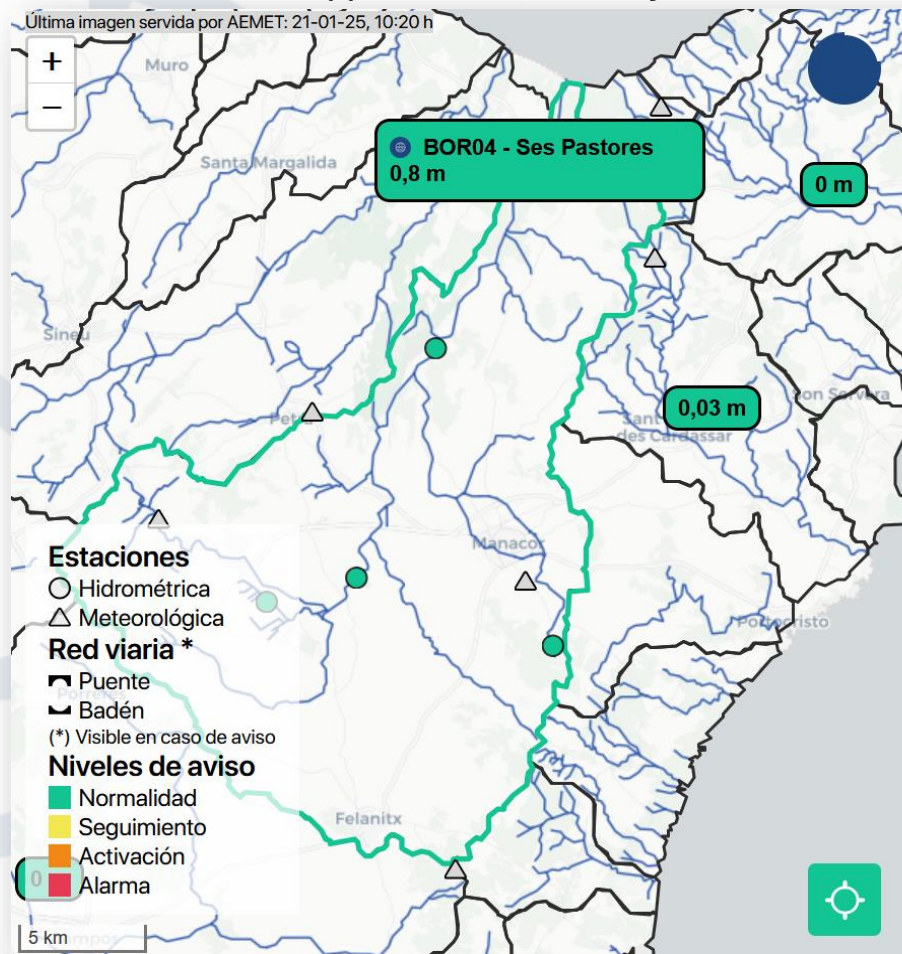
Leaflet | USGS, NOAA



Risk Viewer – RiscBal App > Station scale (hydrometric)



Última imagen servida por AEMET: 21-01-25, 10:20 h

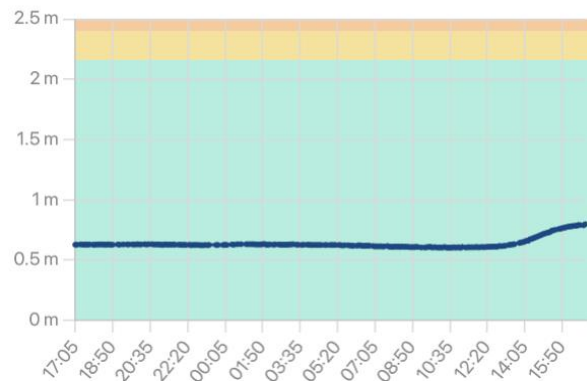


Cuenca

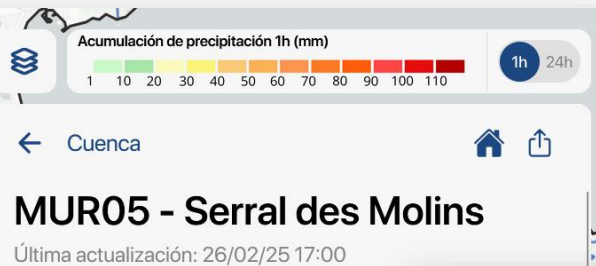
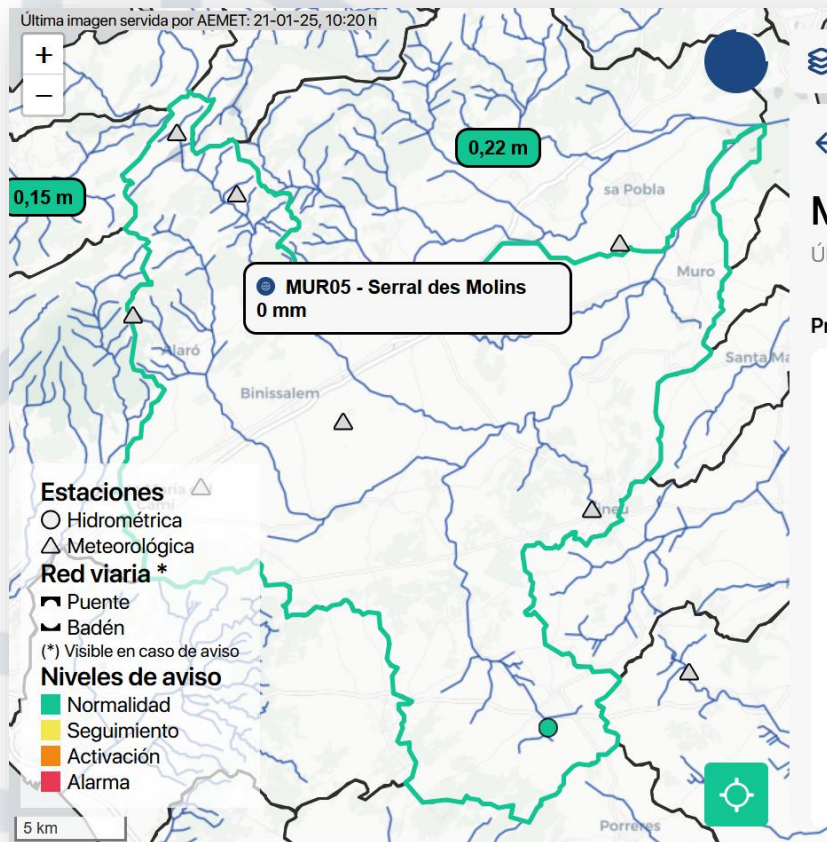
BOR04 - Ses Pastores

Última actualización: 26/02/25 16:55

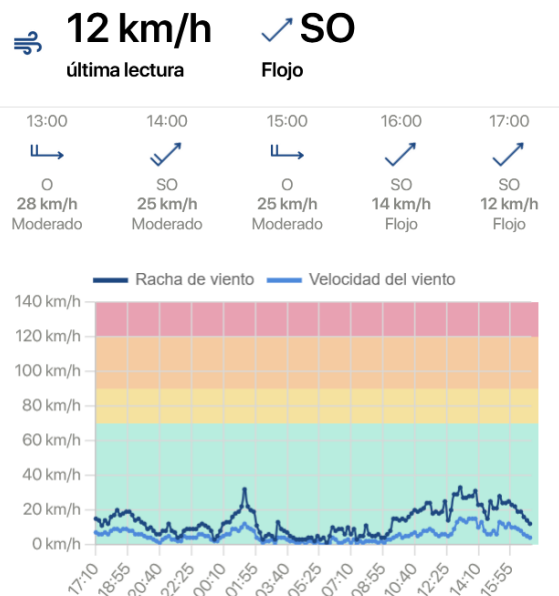
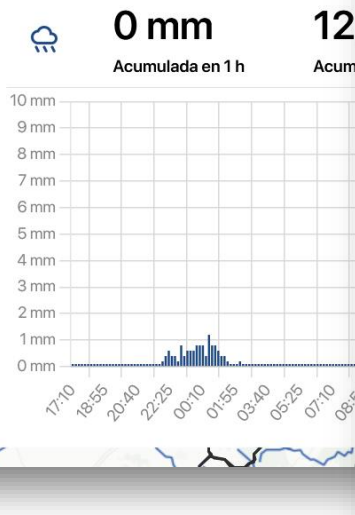
Nivel de agua



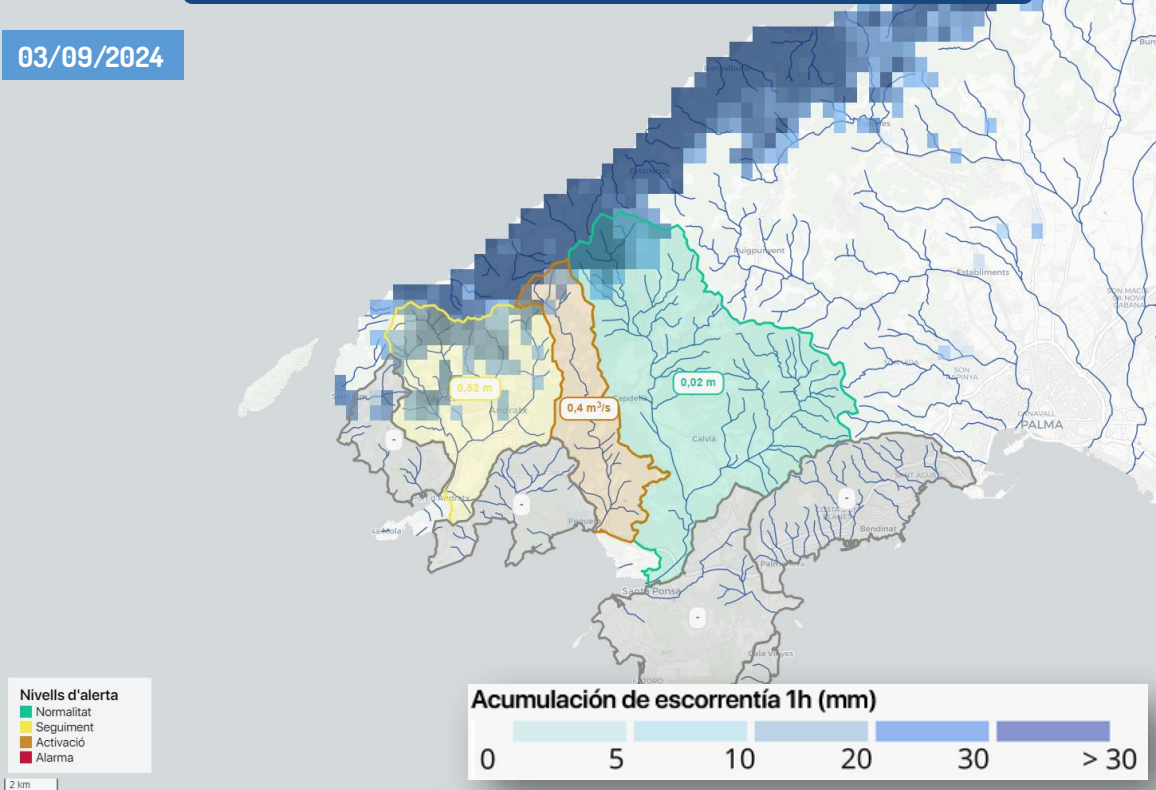
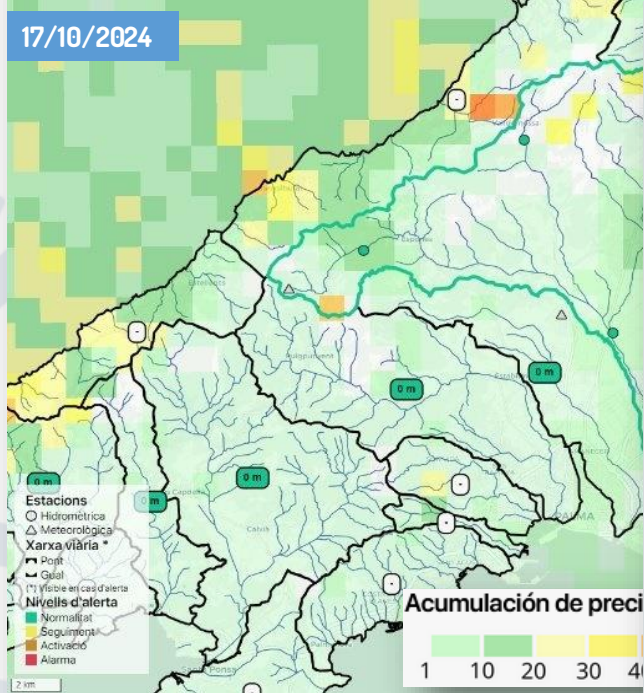
Risk Viewer - RiscBal App > Station scale (meteorological)



Precipitación

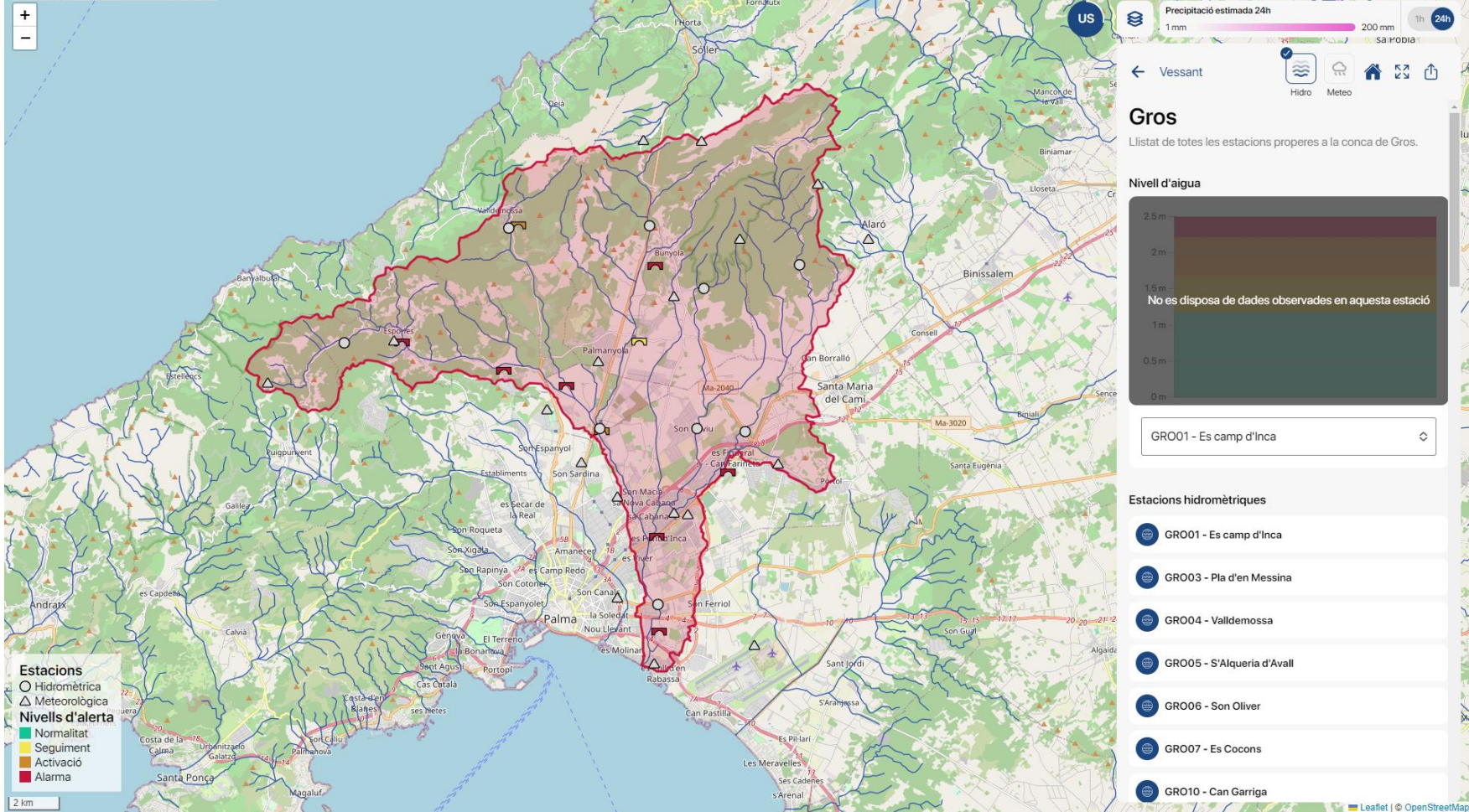


Risk Viewer – RiscBal App > Estimation products

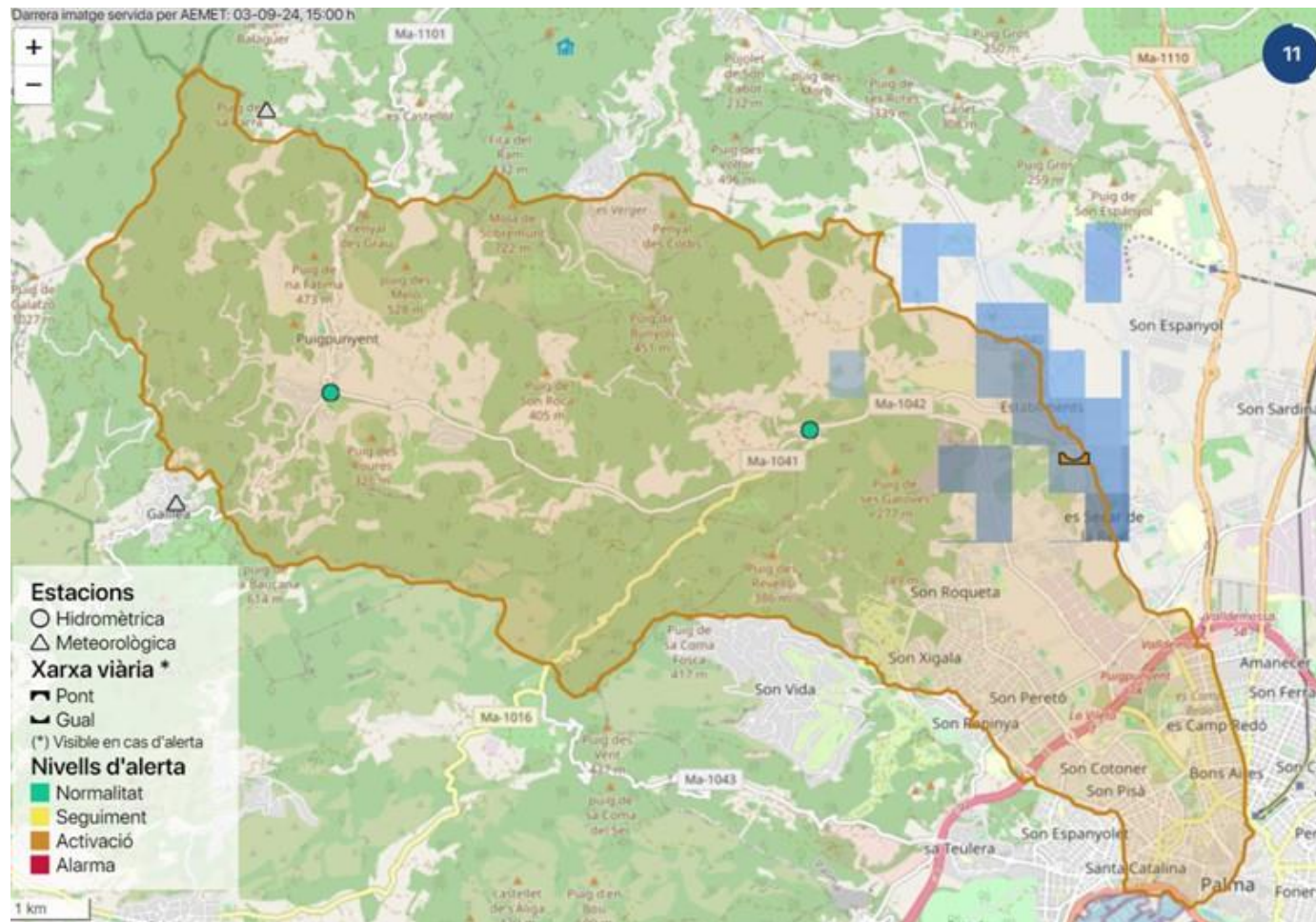


Activation of risk elements: bridges

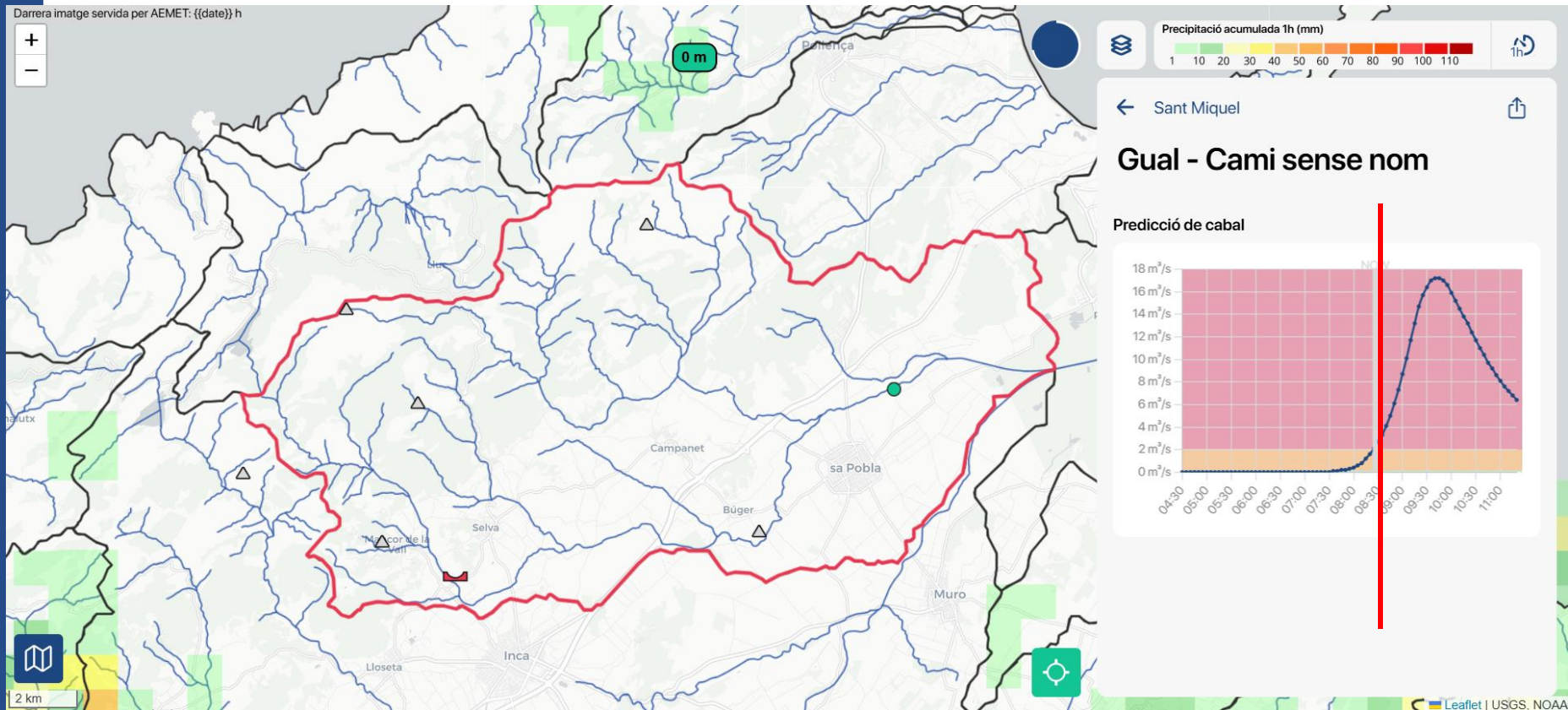
Darrera imatge servida per AEMET: 17-07-24, 15:10 h



Activation of risk elements: fords



Activation of risk elements: fords



The use of the RiscBal platform during real-life events



LLO01 - Es Mercadal

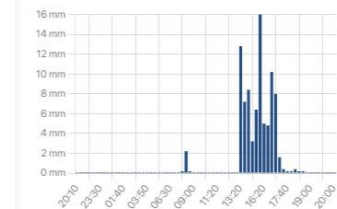
Last precipitation 1 h update at 20:00

Last water level update at 20:00

Water Level



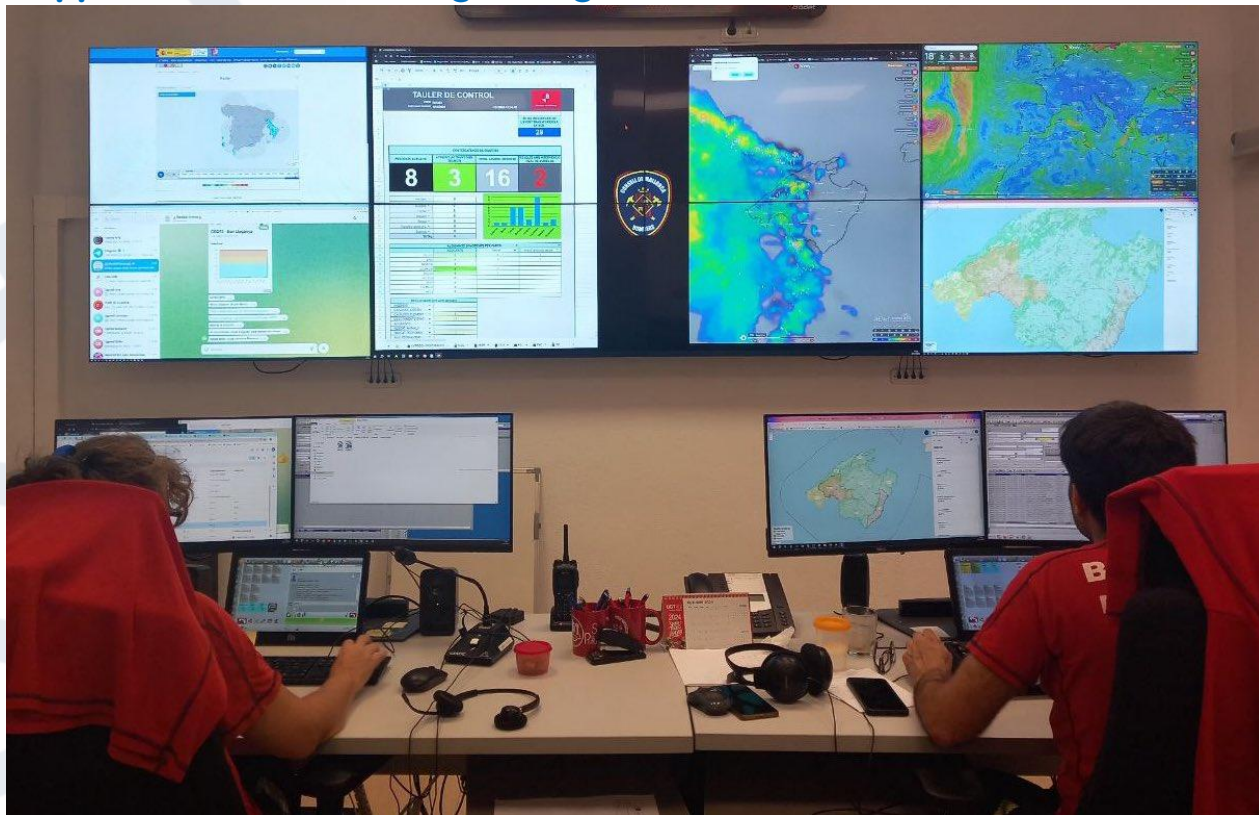
Precipitation



15th August 2024

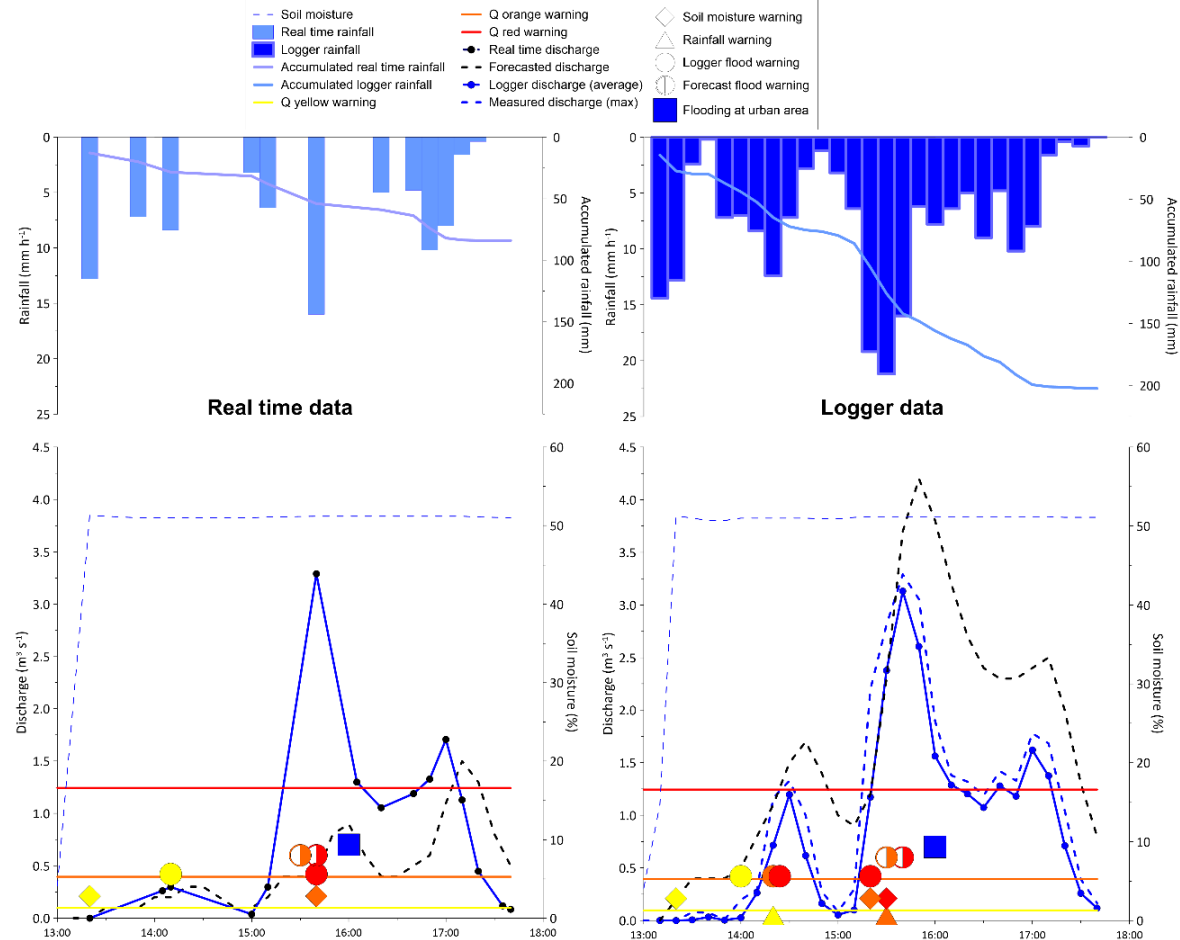
Valorization of the use of RiscBal-Warnings, the data generated and the scientific-technical transfer process

Use of RiscBal-App and RiscBal-Warning during flood events





The use of the RiscBal platform during real-life events



Telecommunications deficiencies and the preliminary implementation of hydrological modelling influenced the response time.

To address these challenges, RiscBal is implementing redundant systems and internal control metrics in the RiscBal-Control network.

Improved data resolution and the integration of machine learning into hydrological modelling will also increase adaptability and efficiency.

Valorization of the use of RiscBal-Warnings, the data generated and the scientific-technical transfer process



RiscBal

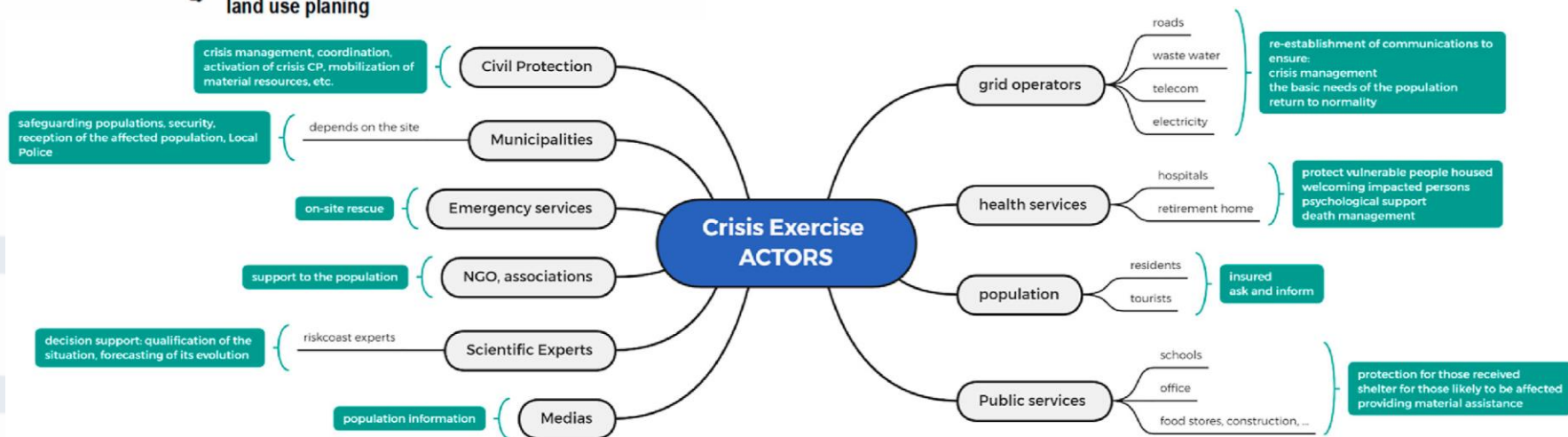
OBSERVATORI DE RISCOS NATURALS
I EMERGÈNCIES DE LES ILLES BALEARS

Valorization of the use of RiscBal-Warnings, the data generated and the scientific-technical transfer process



Royal Decree 524/2023, of June 20, approving the Basic Standard of Civil Protection

- Definition of information and alert systems
- Coordination and efficiency
- Catalogue of risks



Actors in emergency management

Valorization of the use of RiscBal-Warnings, the data generated and the scientific-technical transfer process

Open-data

HIGH-VALUE DATASETS

1 WHAT ARE THEY?

High-value datasets are those whose reuse is associated with considerable benefits for society, the environment and the economy.

Source: Directive (UE) 2019/1024

2 WHICH DATASETS ARE CONSIDERED HIGH VALUE?

Directive (EU) 2019/1024 of 20 June 2019 sets out in its Annex a proposal for 6 thematic categories, which have been defined in the Implementing Regulation (EU) 2023/138, of 21 December 2022.

» A participatory process was carried out with stakeholders and the citizens to develop this list.



GEOESPATIAL

Administrative units

Geographical names

Addresses

Buildings

Cadastral parcels

Reference parcels

Agricultural parcels



EARTH OBSERVATION AND ENVIRONMENT

Hydrography

Elevation

Climate

Protected sites

Energy resources

Air

Nature preservation and biodiversity

Habitats and biotopes

Oceanographic geographical features

Land cover

Waste

Land use

Environmental monitoring facilities

Area management

Noise

Orthoimagery

Soil

Species distribution

Production industrial facilities

Water

Horizontal legislation

Mineral resources

Natural risk zones

Geology

Emissions

Bio-geographical regions

Sea regions



METEOROLOGICAL

Observations data measured by weather stations

Validated observations (climate data)

Weather alerts

Radar data

Numerical weather prediction (NWP)



STATISTICS

Industrial production

Tourism flows in Europe

National accounts - key indicators on corporations

Industrial producer price index breakdowns by activity

Environmental accounts and statistics

Employment

EU International trade in goods statistics

Consolidated government gross debt

Unemployment

Current healthcare expenditure

National Accounts - GDP

Inequality

Poverty

Volume of sales by activity

Harmonised Indices of consumer prices

Population, fertility, mortality

National accounts - key indicators on households

Potential labour force

Government expenditure and revenue



COMPANIES AND COMPANY OWNERSHIP

Basic company information: key attributes



MOBILITY

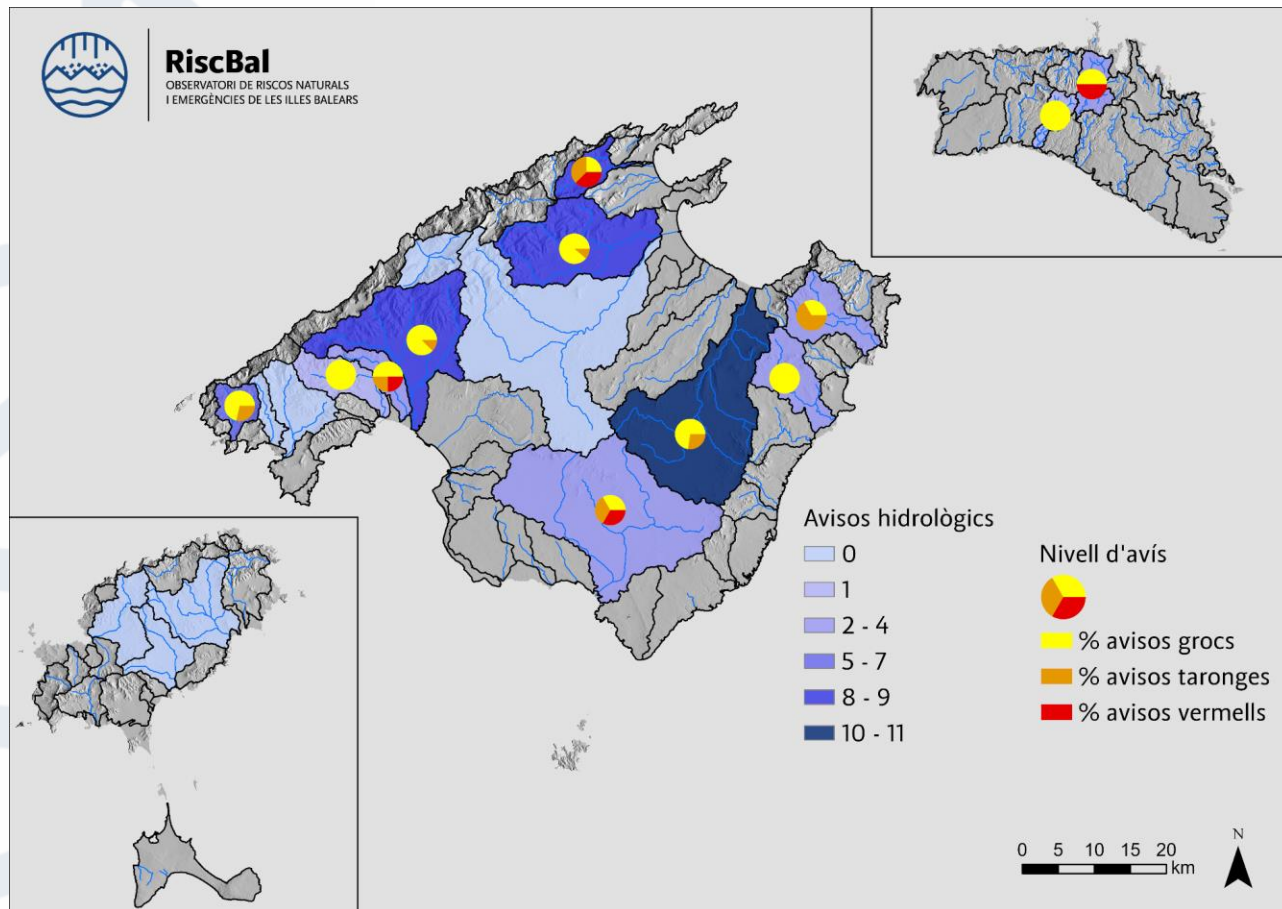
Transport networks

These high-value datasets may be expanded in line with technological and market developments.

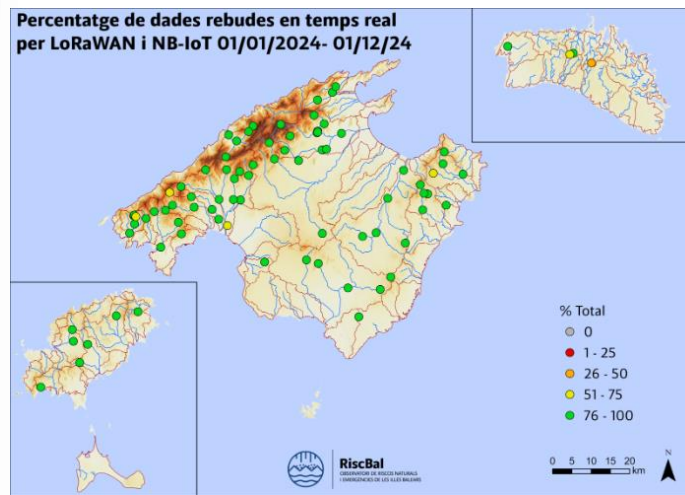
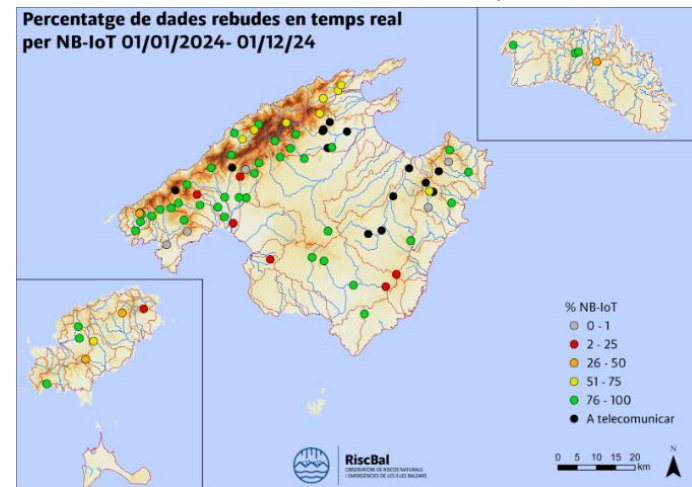
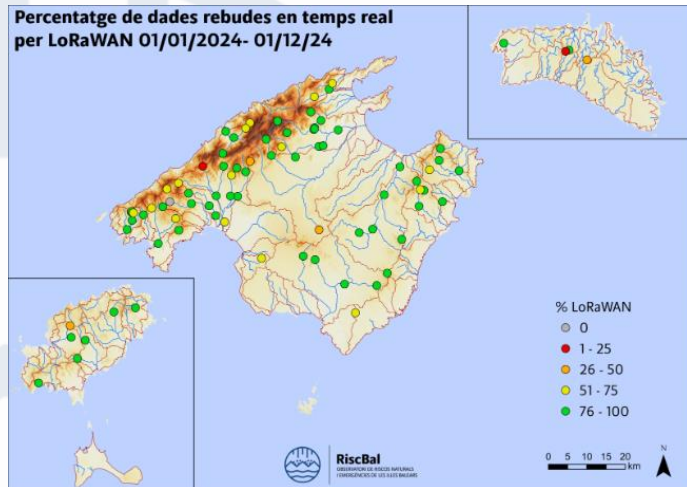
Discover the proposal for the extension of categories drawn up by the European Commission (2023)

Valorization of the use of RiscBal-Warnings, the data generated and the scientific-technical transfer process

Issues generated from October 2022



Valorization of the use of RiscBal-Warnings, the data generated and the scientific-technical transfer process



Future, as close as possible

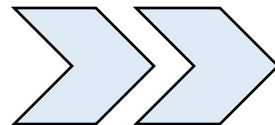
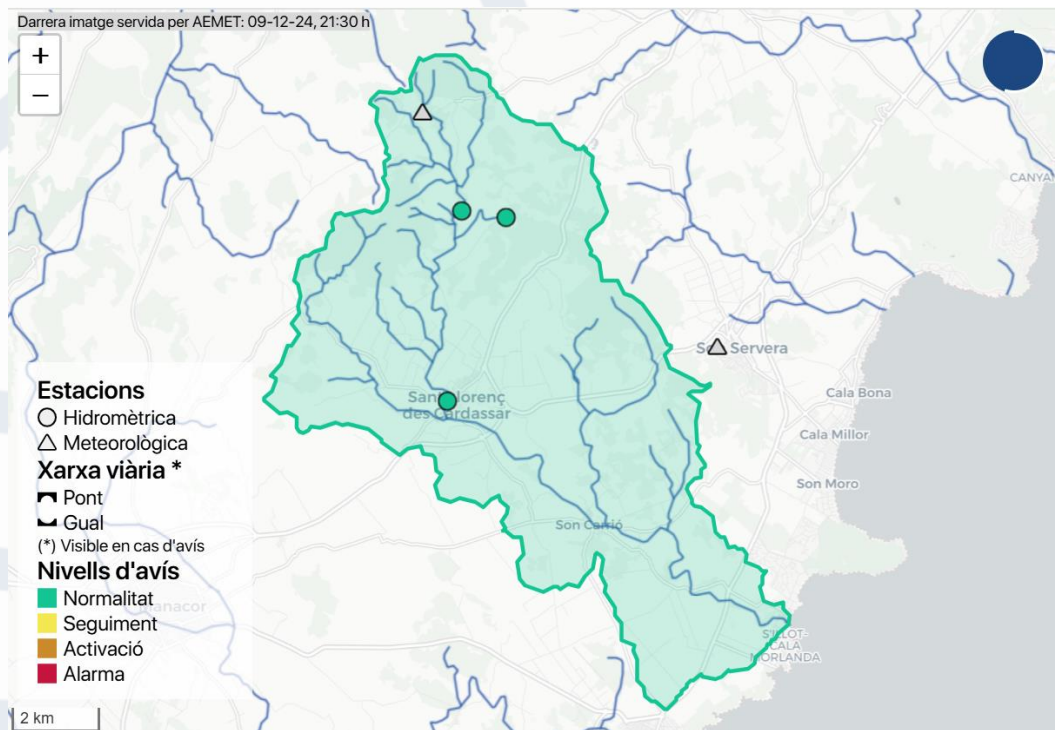


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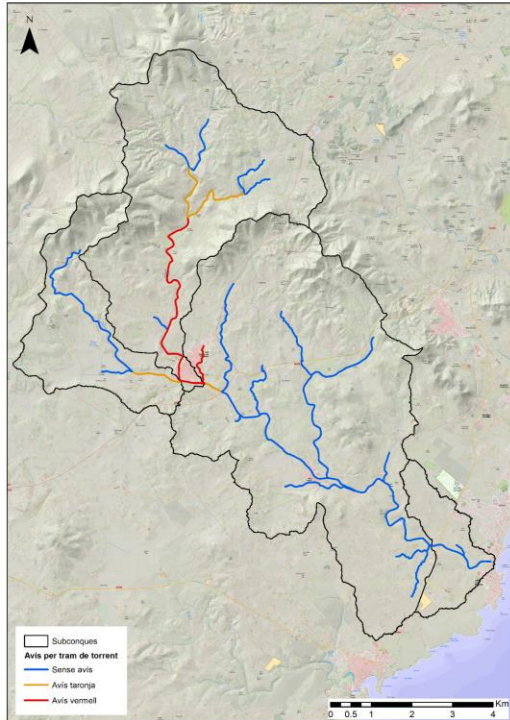
Diseño y puesta en funcionamiento de Sistemas de Alerta Temprana

- De avisos centrados en estaciones a avisos centrados en elementos y personas vulnerables



Design and implementation of Early Warning Systems

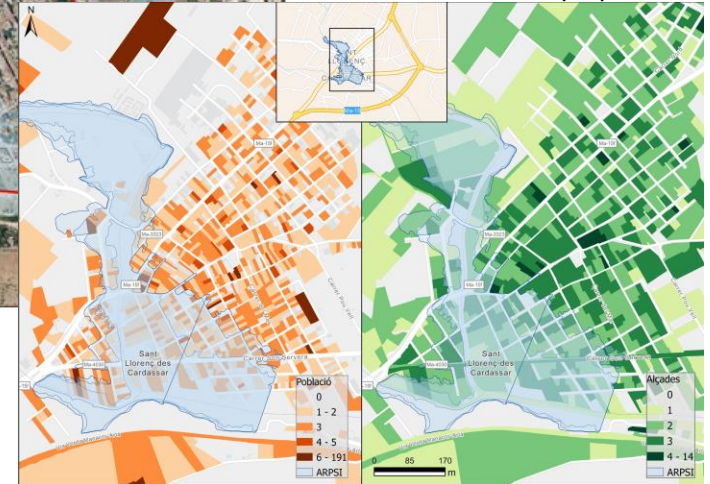
- Warning by longitudinal sections



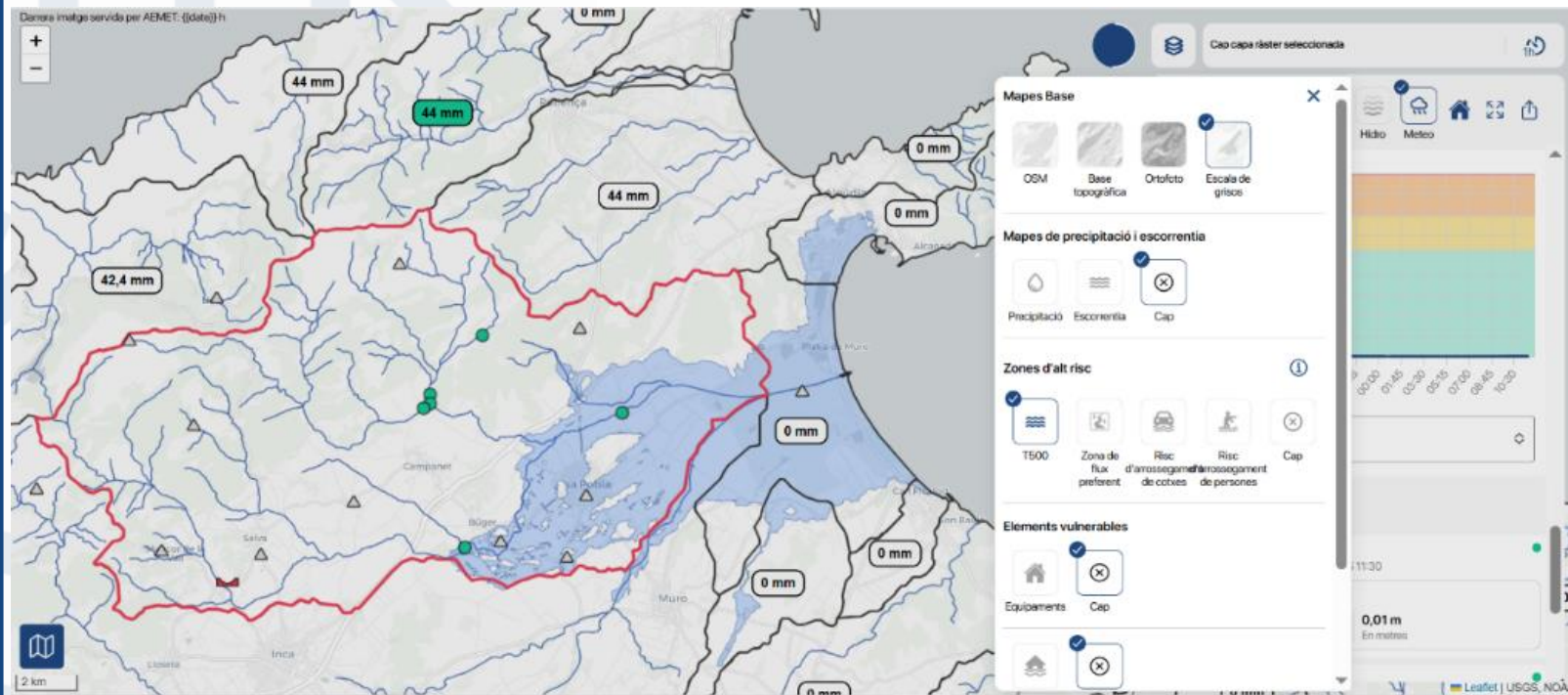
- Specific warnings on public facilities



- Most vulnerable population

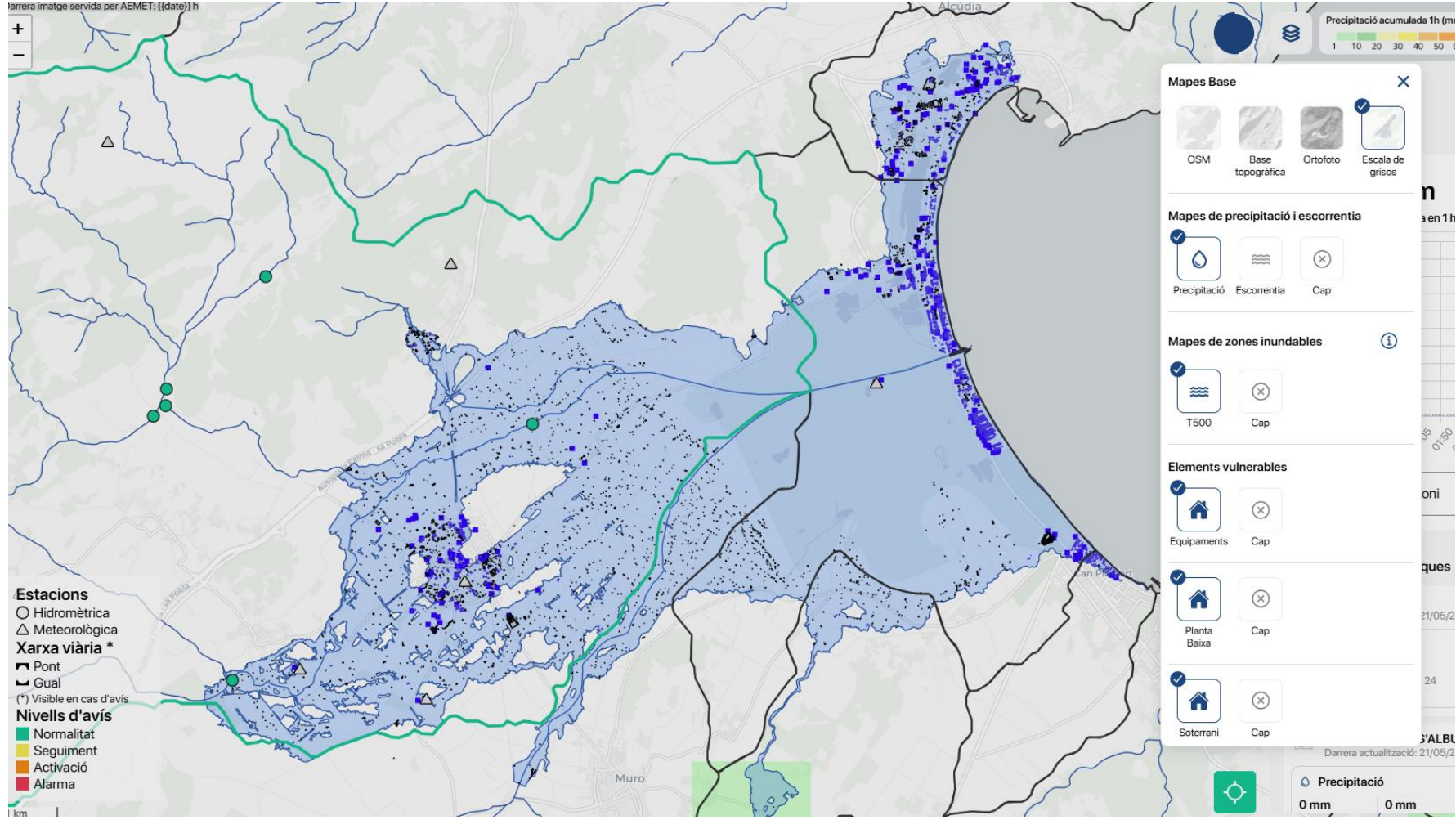


Flood zone under 500 yr return period (beta version)

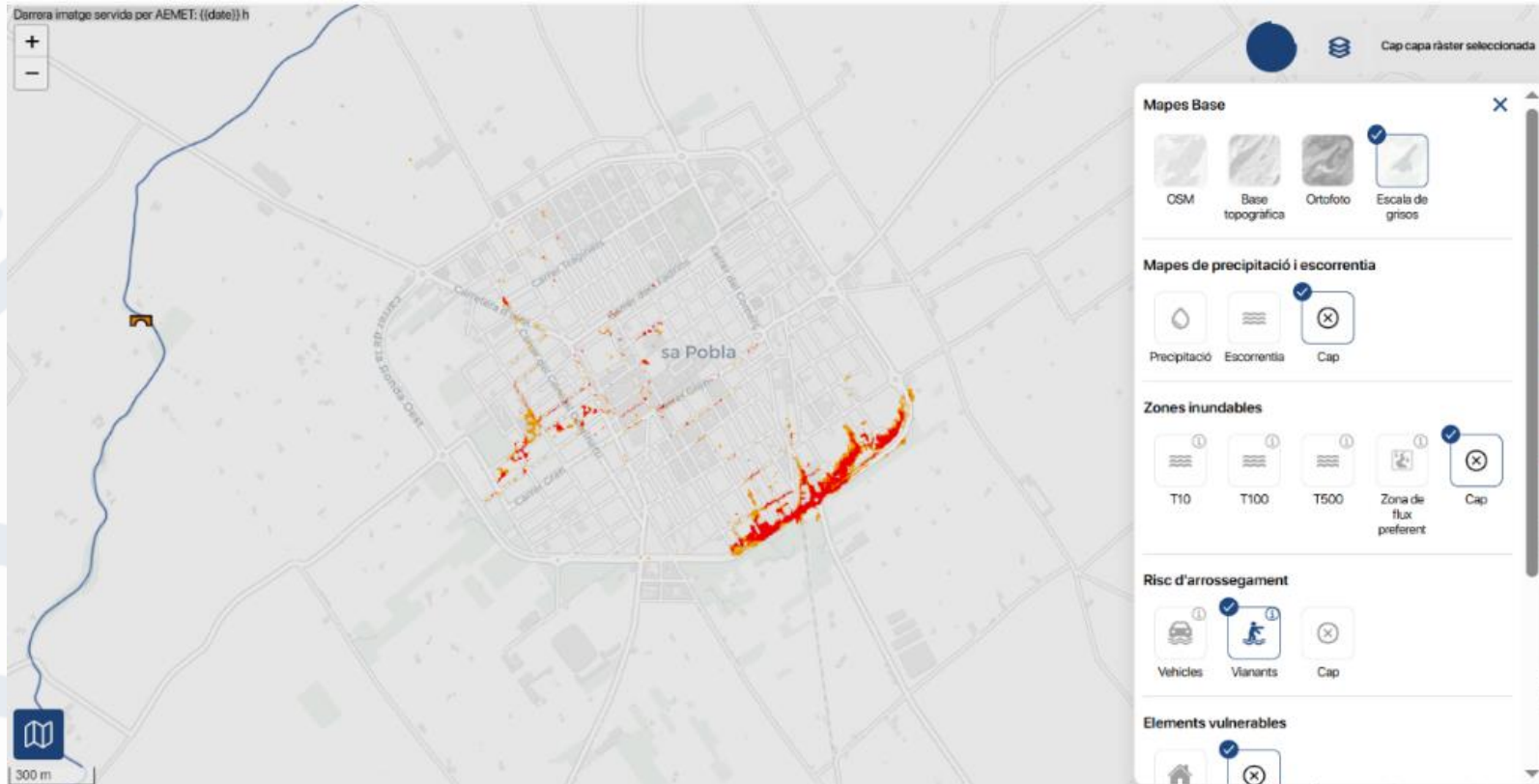


Activation of vulnerable elements (beta version)

larrera imatge servida per AEMET: {{date}} h

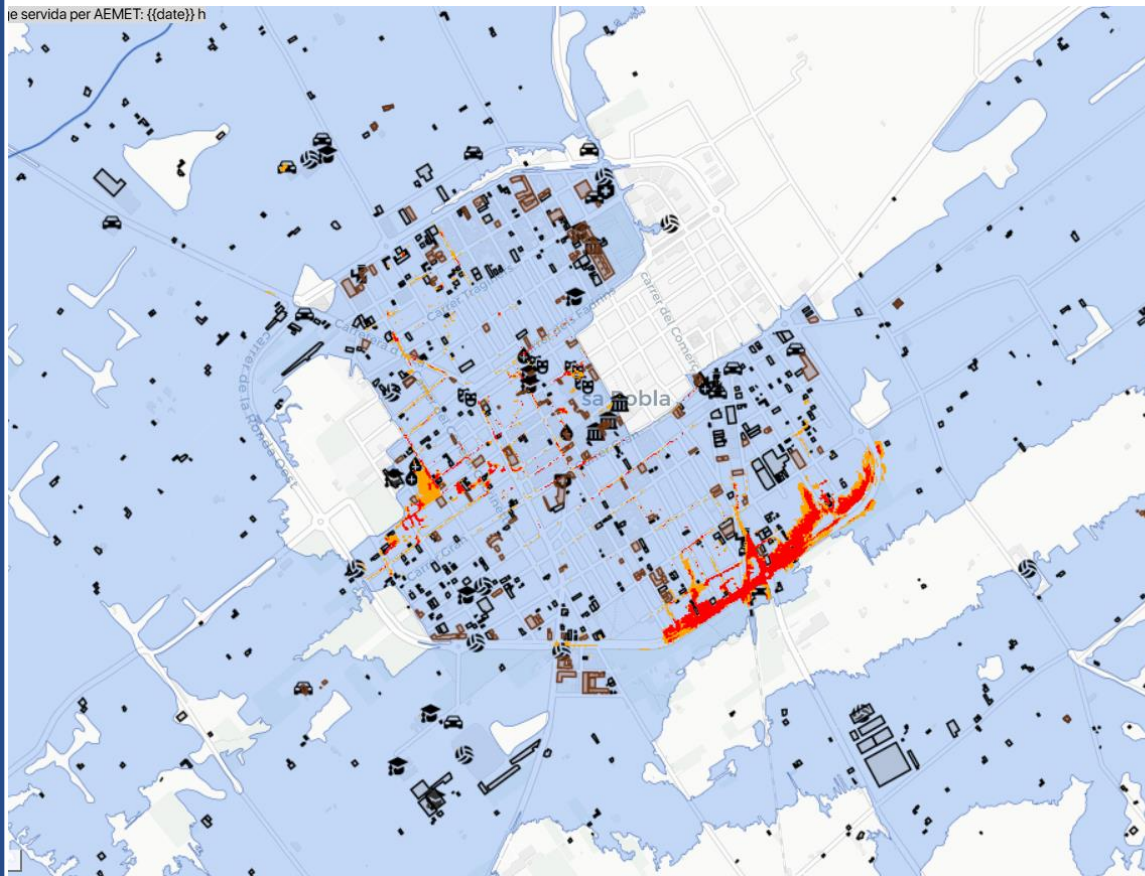


Risk of pedestrian entrainment in Sa Pobla, calculated based on water depth and velocity for a 500-year return period (beta version)



Activation of vulnerable elements (beta version)

se servida per AEMET: {{date}} h



Zones inundables



T10



T100



T500



Zona de
flux
preferent



Cap

Risc d'arrossegament



Vehicles



Vianants



Cap

Elements vulnerables



Equipaments



Cap



Planta
Baixa



Cap



Soterrani



Cap

Risk Viewer– RiscBal App > Future

App multi-risks

Wildfires

Mass movements

Climatic



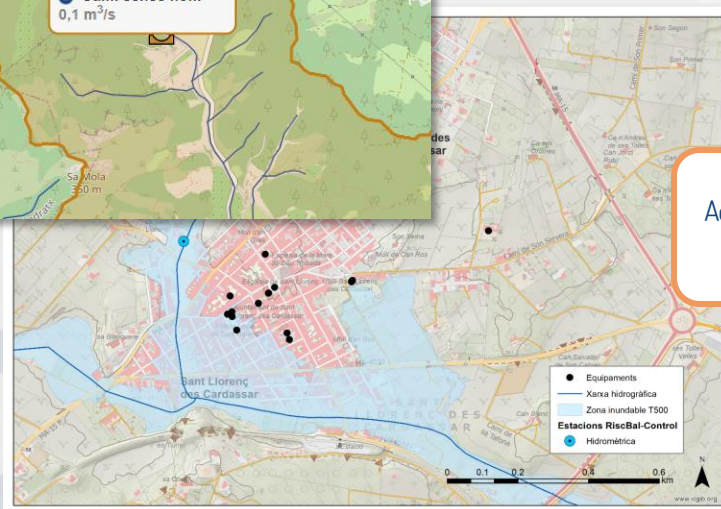
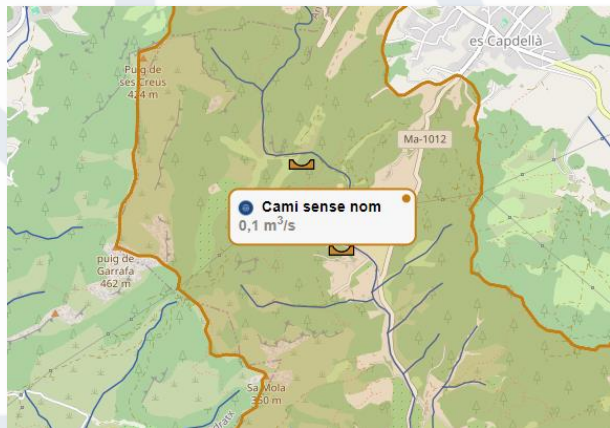
Real-time data

Remote-sensing data

Simulations data



Activation of vulnerable elements in risk zones at the cadastre plot scale



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X: @jjestrany ; @ RiscBal

Thank you for your attention

Team, more than a word, it's a commitment

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Miquel Mir-Gual, Geomorphologist RiscBal

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PhD students

Jaume Company, Ecogeomorphology

Francesc Cuello, Surface hydrology

Alexandre Moragues, GIS & natural risks

Technical staff

Jordi Cloquell, Robotics and automation

Miquel Llompart, Field technician

Pau Morell, GIS

Jaume Ordinas, Multiplatform

Bartomeu Ramis, Computer Engineering

Margalida Ribas, GIS

Martín Rizzo, Databases

Joan Vilella, Computer Engineering



Universitat
de les Illes Balears



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