GEO WEEK & MINISTERIAL SUMMIT 2023

Showcase

#TheEarthTalks

science & innovation
Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA

GEO WEEK 2023 MINISTERIAL SUMMIT

GEO GROUP ON EARTH OBSERVATIONS

#TheEarthTalks

GEO WEEK & Ministerial Summit 2023

GEO WEEK 2023 MINISTERIAL SUMMIT

Leveraging big Earth data and exploring non-satellite data to enhance assessment on climate induced losses and damages

Tuesday 07.11.2023 8:00GMT

Gensuo Jia, CAS Institute of Atmospheric Physics / CBAS/ China-GEO / GEO CC WG

Orestis Speyer, National Observatory of Athens (NOA)/ Greek GEO Office

Alexia Tsouni, National Observatory of Athens / IAASARS / BEYOND Center

Michele Melchiorri , Project Officer - Copernicus GHSL, European Commission - Joint Research Centre

science & innovation
Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA

GEO GROUP ON EARTH OBSERVATIONS

Losses & Damages, a timely affair

In 2022,[1] the Emergency Event Database EM-DAT recorded 387 natural hazards and disasters worldwide,[2] resulting in the loss of 30,704 lives[3] and affecting 185 million individuals. Economic losses totaled around US$223.8 billion. Heat waves caused over 16,000 excess deaths[4] in Europe, while droughts affected 88.9 million people in Africa. Hurricane Ian single-handedly caused damage costing US$100 billion in the Americas. The human and economic impact of disasters was relatively higher in Africa, e.g., with 16.4% of the share of deaths compared to 3.8% in the previous two decades. It was relatively lower in Asia despite Asia experiencing some of the most destructive disasters in 2022.

Economic costs of weather-related disasters soars but early warnings save lives

https://reliefweb.int/report/world/2022-disasters-numbers
https://public.wmo.int/en/resources/atlas-of-mortality

Losses & Damages, a countable affair?

SENDAI FRAMEWORK
FOR DISASTER RISK REDUCTION 2015-2030

A-1 (compound)	Number of deaths and missing persons attributed to disasters, per 100,000 population.
B-1 (compound)	Number of directly affected people attributed to disasters, per 100,000 population.
B-2	Number of injured or ill people attributed to disasters, per 100,000 population.
B-3	Number of people whose damaged dwellings were attributed to disasters.
B-4	Number of people whose destroyed dwellings were attributed to disasters.
B-5	Number of people whose livelihoods were disrupted or destroyed, attributed to disasters.

C-1 (compound)	Direct economic loss attributed to disasters in relation to global gross domestic product.
C-2	Direct agricultural loss attributed to disasters. *Agriculture is understood to include the crops, livestock, fisheries, apiculture, aquaculture and forest sectors as well as associated facilities and infrastructure.*
C-3	Direct economic loss to all other damaged or destroyed productive assets attributed to disasters. *Productive assets would be disaggregated by economic sector, including services, according to standard international classifications. Countries would report against those economic sectors relevant to their economies. This would be described in the associated metadata.*
C-4	Direct economic loss in the housing sector attributed to disasters. *Data would be disaggregated according to damaged and destroyed dwellings.*
C-5	Direct economic loss resulting from damaged or destroyed critical infrastructure attributed to disasters. *The decision regarding those elements of critical infrastructure to be included in the calculation will be left to the Member States and described in the accompanying metadata. Protective infrastructure and green infrastructure should be included where relevant.*
C-6	Direct economic loss to cultural heritage damaged or destroyed attributed to disasters.

https://www.preventionweb.net/sendai-framework/sendai-framework-indicators

Losses & Damages, an attributable affair?

https://www.unep.org/news-and-stories/story/cop27-ends-announcement-historic-loss-and-damage-fund

The establishment of a Loss and Damage Fund was, for many, the highlight of COP 27 and the culmination of decades of pressure from climate-vulnerable developing countries. The fund aims **to provide financial assistance to nations most vulnerable and impacted by the effects of climate change**. While the historic decision was welcomed, this is but the first step, and success will depend on how quickly this fund gets off the ground. Representatives from 24 countries (Transitional Committee) will work together over the next year **to decide what form the fund should take, which countries should contribute, and where and how the money should be distributed**.

Questions to be answered by the Transitional Committee

Differing Approaches Between Developing and Developed Countries

https://www.lossanddamagecollaboration.org/publication/the-unfccc-loss-and-damage-fund-and-related-processes

Losses & Damages, delineating the EO role

Big Earth data assessment of loss & damage

European state-of-the-art and in situ insights

Panel discussion and QA

GEO WEEK 2023 MINISTERIAL SUMMIT

#TheEarthTalks

GEO WEEK & Ministerial Summit 2023

Leveraging big Earth data and exploring non-satellite data to enhance assessment on climate induced losses and damages

Big Earth data assessment of loss & damage

Tuesday 07.11.2023 8:00GMT

Gensuo Jia

CAS Institute of Atmospheric Physics / CBAS/ China-GEO / GEO CC WG

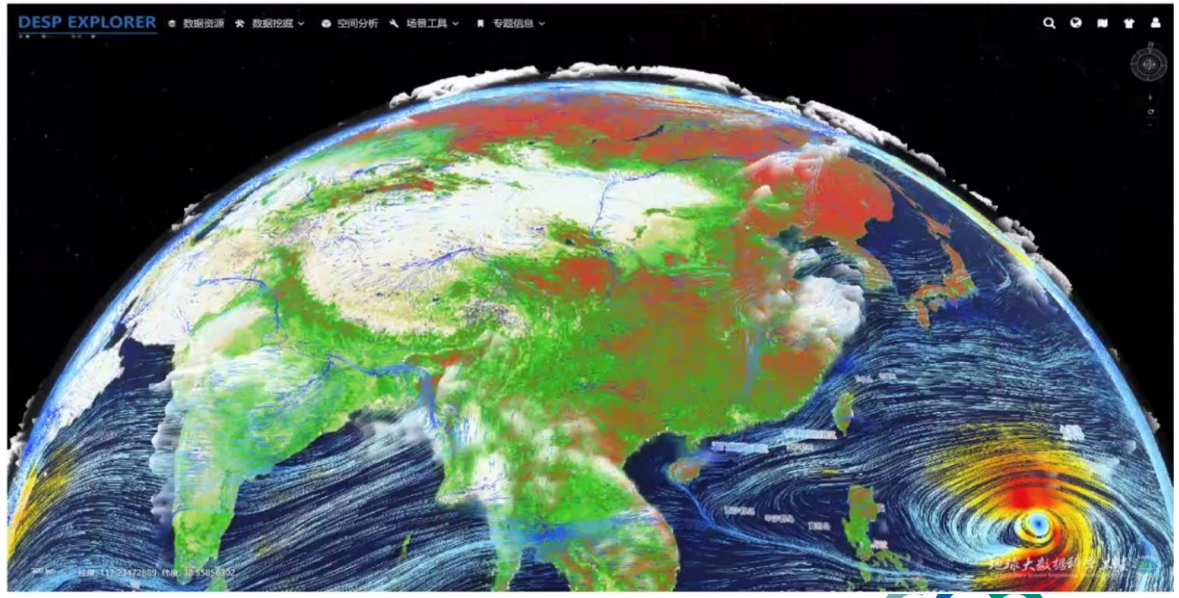
Global polycrisis, climate change & extremes, loss & damage

CASEarth: **Big Earth data** science engineering Program

Empowered by digital Earth, data cloud, AI, open science

Facilitate monitoring, assessment, prediction

Slow and fast processes of ecosystem and social impacts



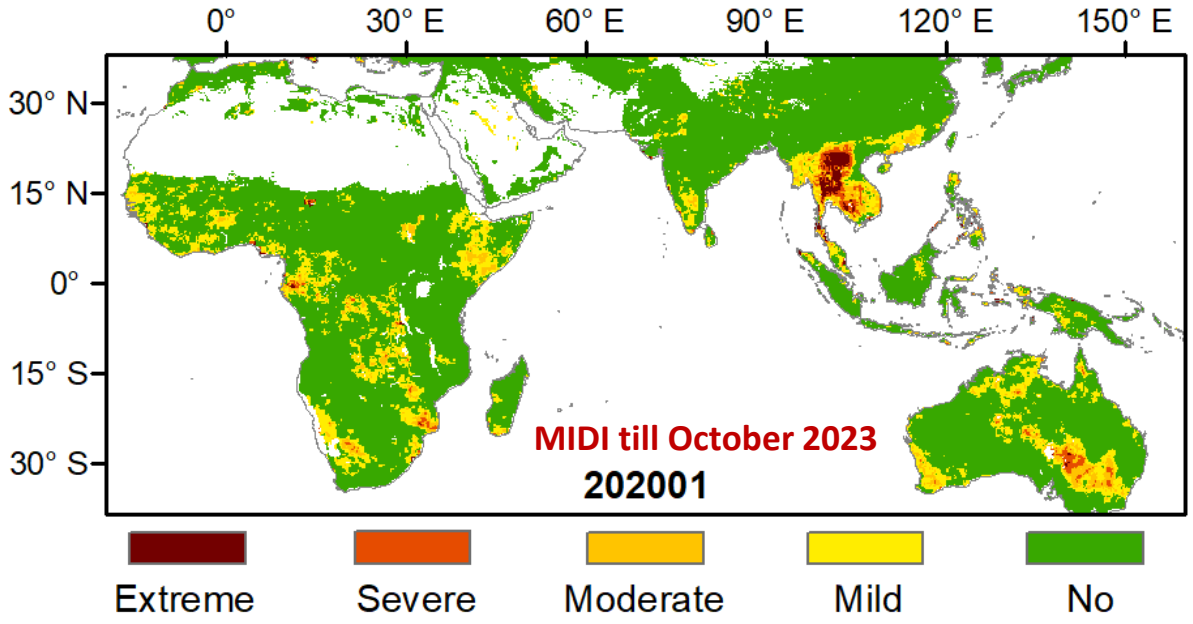
Big Earth data module on climate change **loss & damage**

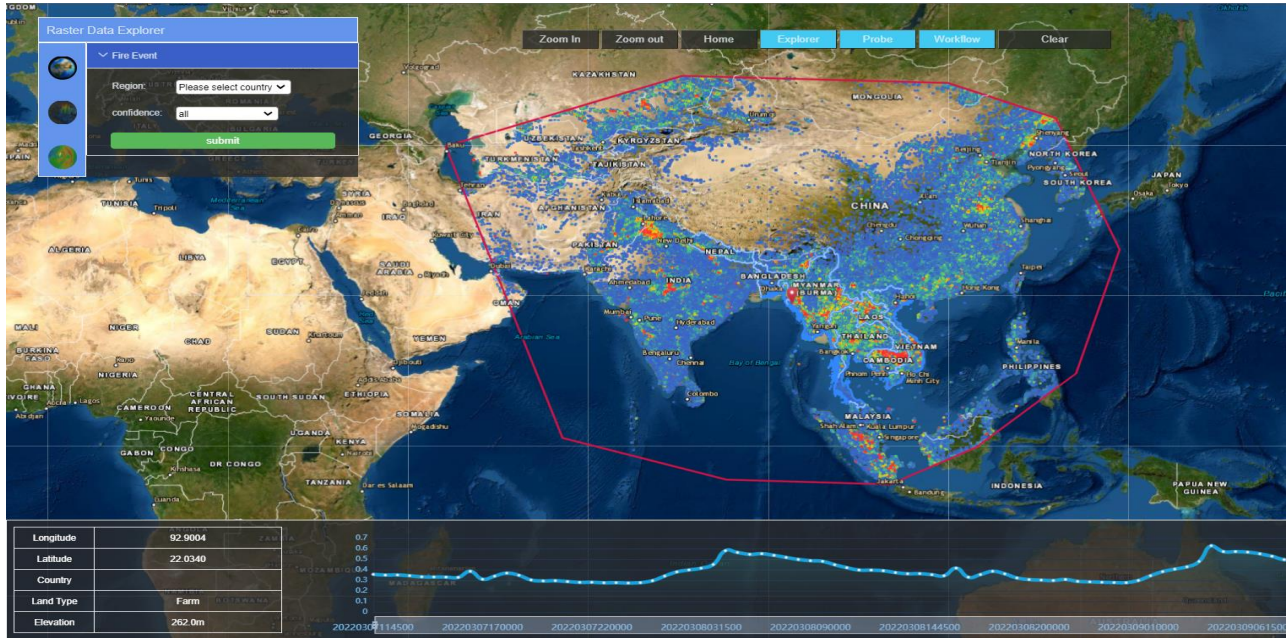
Slow process, e.g. drought, ecosystem degradation and restoration

MIDI water deficit and disturbance index: rainfall + soil water + VPD + EVI

Climate extreme prediction & risks assessment over Africa & Asia

The up-to-date FY-3 monthly MIDI to release soon



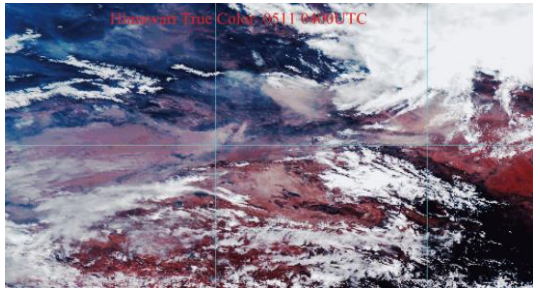


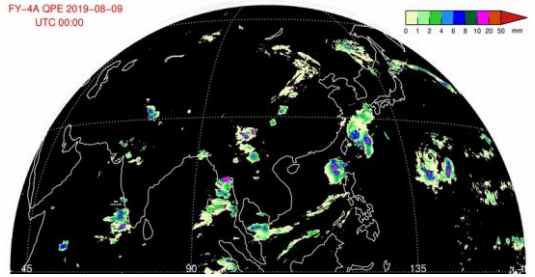
Fast process: fire, flood, hurricane, heatwave

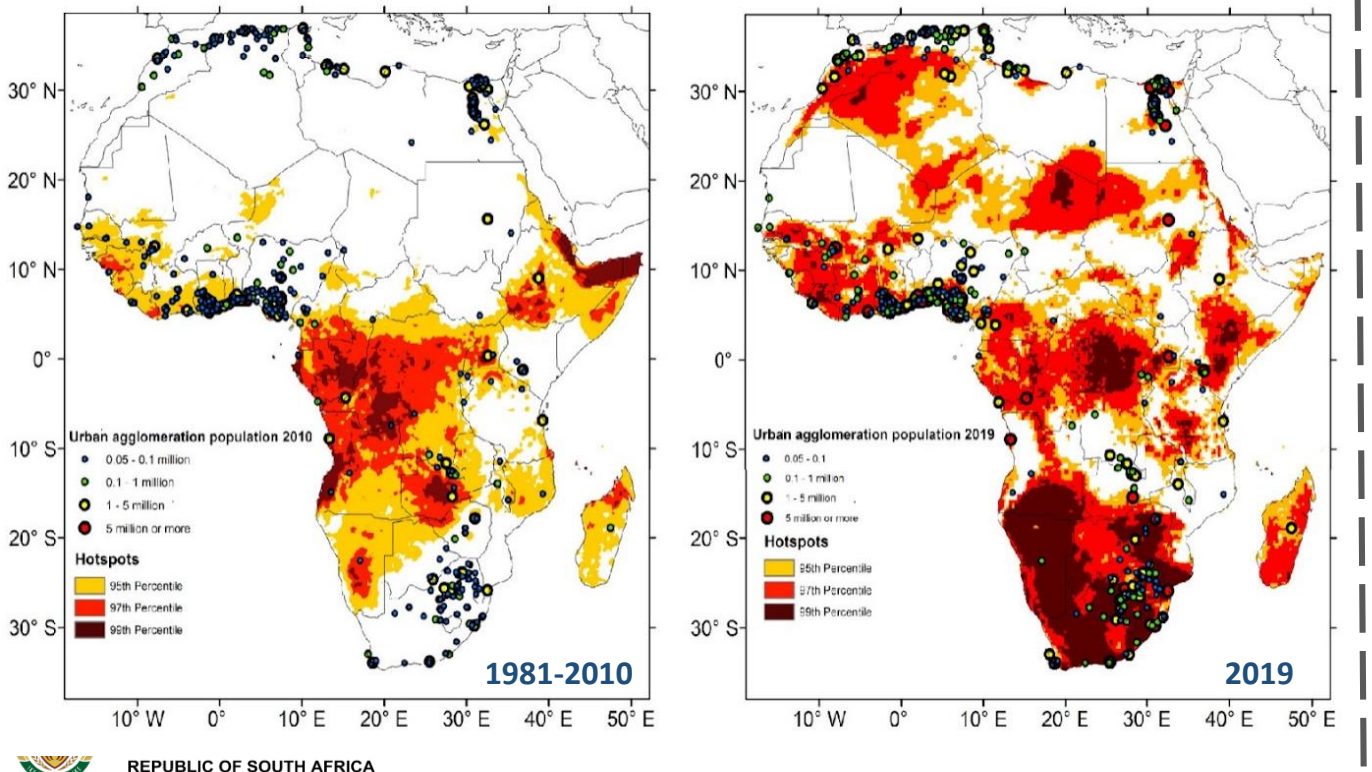
Heatwave hotspots and impacts in Africa

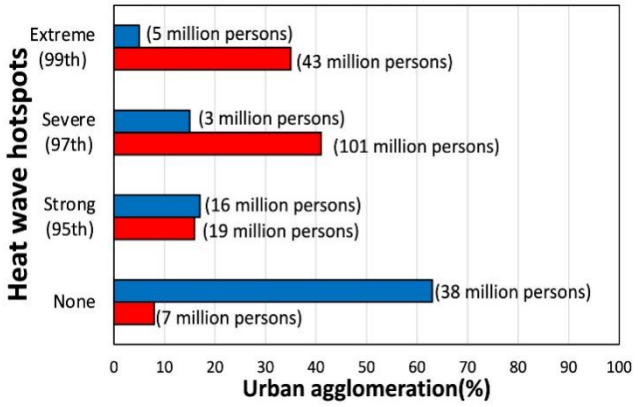
Nighttime heatwaves link to urban clusters

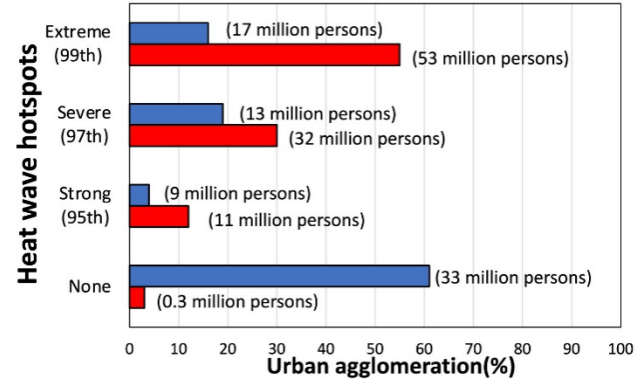
Urban population, water and energy footprint











REPUBLIC OF SOUTH AFRICA

GROUP ON EARTH OBSERVATIONS

Thank you!

jiong@tea.ac.cn

GEO WEEK 2023 MINISTERIAL SUMMIT

#TheEarthTalks

GEO WEEK & Ministerial Summit 2023

Leveraging big Earth data and exploring non-satellite data to enhance assessment on climate induced losses and damages

European state-of-the-art and in situ insights

Tuesday 07.11.2023 8:00GMT

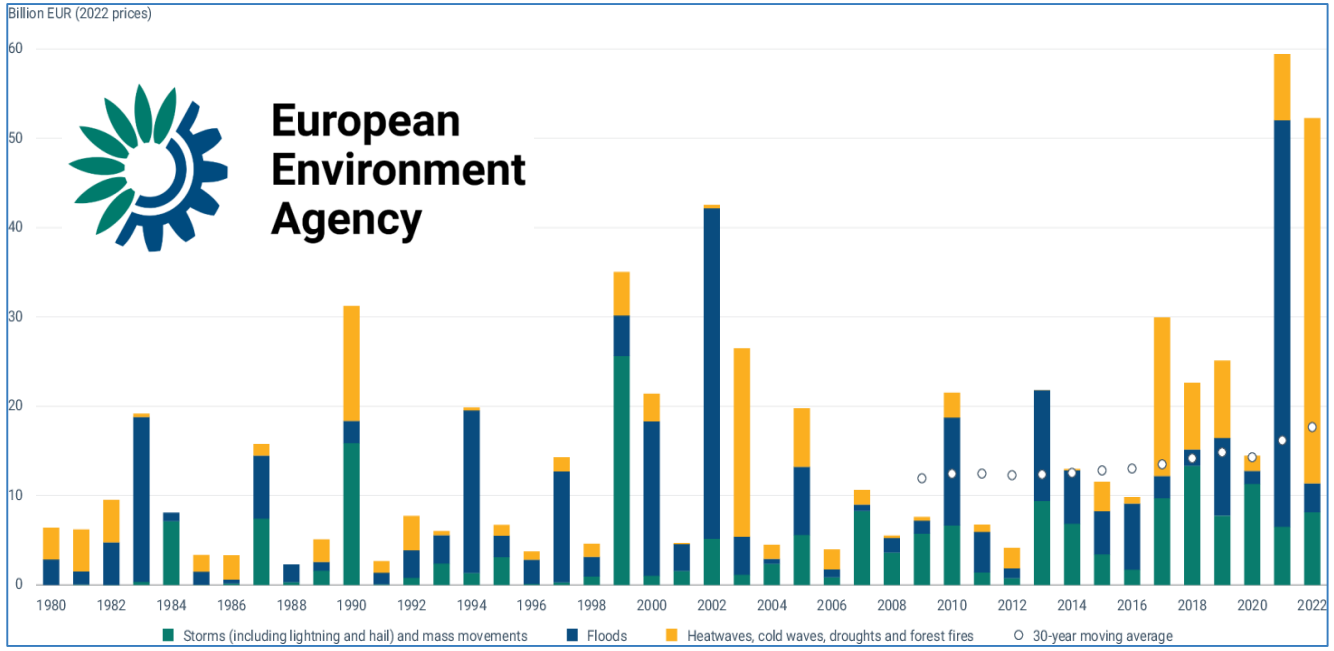
Orestis Speyer

National Observatory of Athens/
Greek GEO Office

science & innovation
Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA

GROUP ON EARTH OBSERVATIONS

EEA: Annual EU-wide indicator with caveats



"Economic losses and fatalities from weather- and climate-related events in Europe" by the European Environment Agency

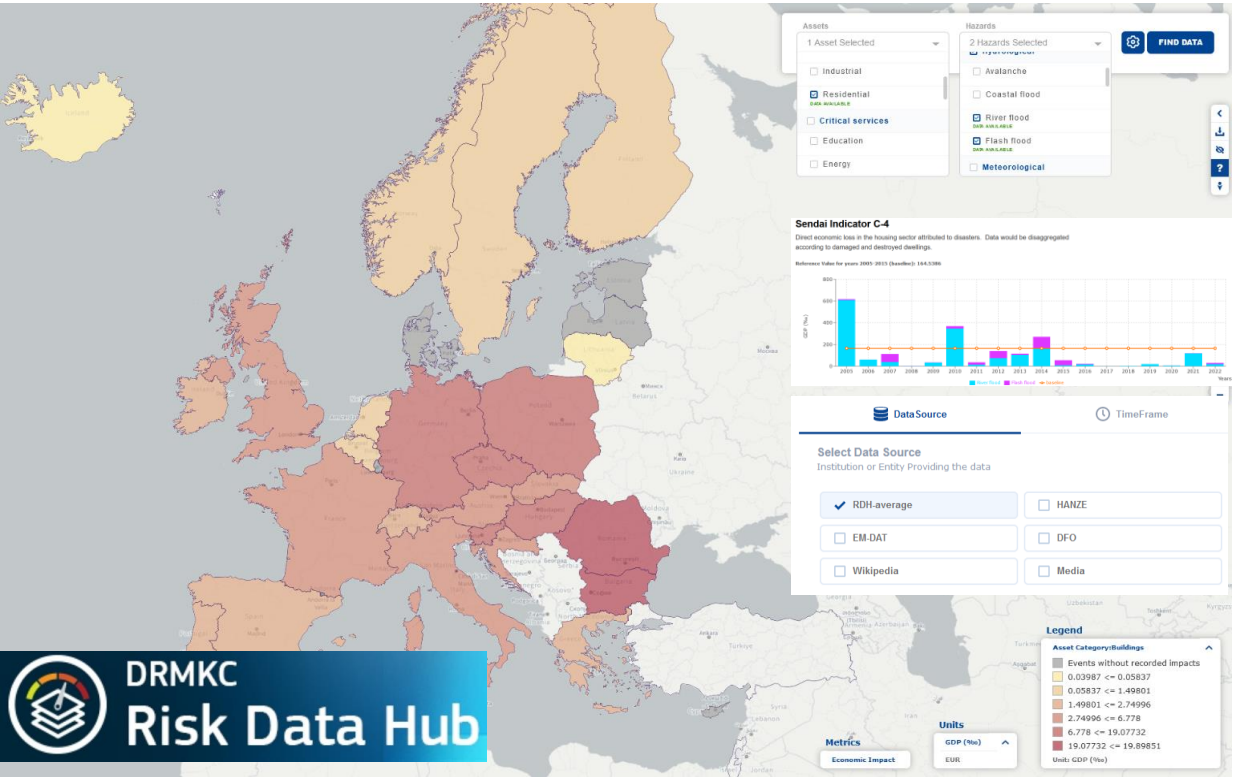
"Based on data from two separate sources (NatCatSERVICE and CATDAT), fatalities during the same period amounted to **between** 85,000 and 145,000."

"During 1980-2020, losses amounted to **between** EUR 450-520 billion in the 32 EEA member countries. Between only one quarter and one third of these losses were **insured**."

"Around **3% of all events** are responsible for 60% of economic losses."

As of October 2023: "**No coherent mechanism** is currently in place for countries to report losses."

Openness and harmonization ongoing



Climate ADAPT

SHARING ADAPTATION KNOWLEDGE FOR A CLIMATE-RESILIENT EUROPE

21 December 2022

UNDP, WMO and UNDRR issue statement on tracking of hazardous events and disaster losses and damages

Risk Information Exchange

RDH: Modules on Risk, Vulnerability, **Losses and Damages**. Harmonization of data sources, Open-source methodologies for risk and vulnerability assessments.

2021 EU Strategy on Climate Adaptation (**more and better** climate-related risk and losses data, **central recording** of this data from the public and private sector)

Member States **reporting** (Sendai, EU Civil Protection)

Losses and Damages, back to (some) in situ basics

European Environment Agency

Contract reference EEA/DIS/R0/21/016

Services supporting the European Environment Agency's (EEA) activities in the context of the EEA-RTD Service Level Agreement on Mainstreaming GEOSS data sharing and management principles in support of Europe's environment

Inventory of L&D Databases

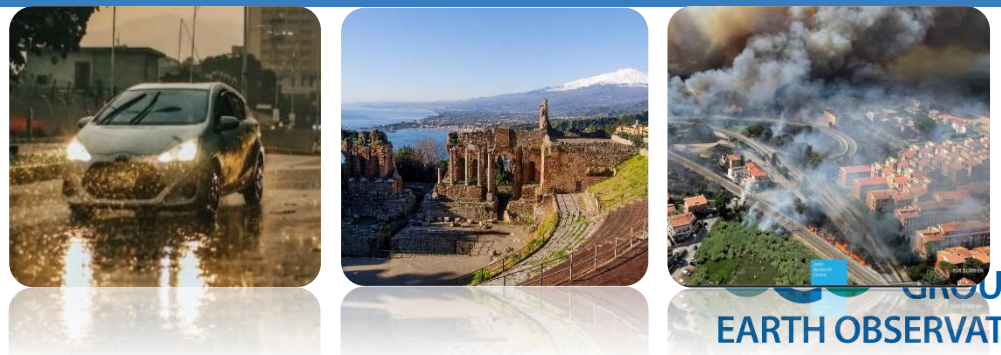
InCASE

L&D Showcases

FFEM-DB - Database of Flood Fatalities from the Euro-Mediterranean region: Research and Academia across Europe.

DALIH - Damage and Loss Inventory for Heritage: University of Porto in cooperation with the ICOMOS International Scientific Committee on Risk Preparedness.

Forest fire authoritative data: per event by delegated entities in the Mediterranean countries.



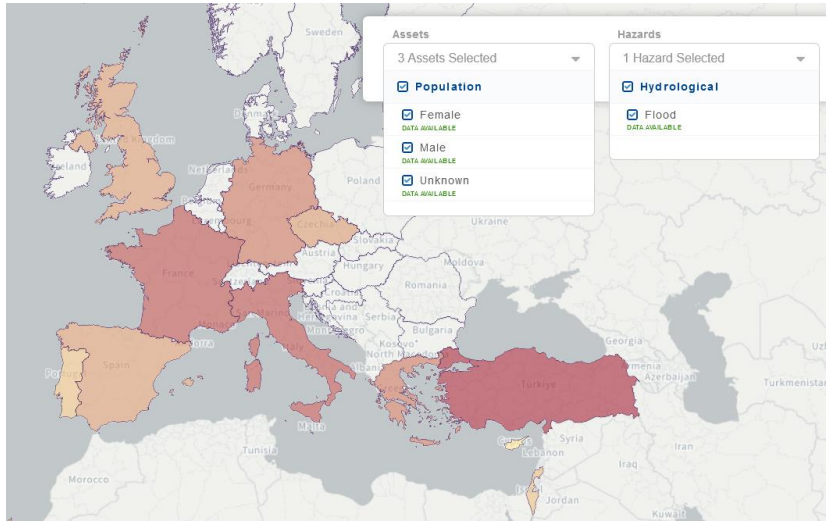
FFEM-DB, from bulk to profiling the circumstances

FFEM-DB tables

FATALITIES		LOCATION		NUTS 3	
FATALITY_ID[A]	Int	FATALITY_ID[A]	Int	NUTS_3_ID[A,B]	Varchar
NUTS_3_ID[B]	Varchar	COUNTRY	Varchar	NUTS_3_NAME	Varchar
DATE	Date	FFEM_STUDY_AREA	Varchar	NUTS_2_ID	Varchar
AGE_STRING	Enum*	STUDY_AREA_ACRONYM	Varchar	NUTS_2_NAME	Varchar
GENDER	Enum*	TERRITORIAL_LV1	Varchar	NUTS_1_ID	Varchar
RESIDENCY	Enum*	TERRITORIAL_LV2	Varchar	NUTS_1_NAME	Varchar
VICTIM_CONDITION	Enum*	TERRITORIAL_LV3	Varchar	NUTS_0_ID	Varchar
VICTIM_ACTIVITY	Enum*	LATITUDE	Decimal	NUTS_0_NAME	Varchar
ACCIDENT_PLACE	Enum*	LONGTITUDE	Decimal	NUTS_3_AREA	Decimal
ACCIDENT_DYNAMIC	Enum*	LOC_ACCURACY	Enum*	NUTS_3_POPULATION	Int
DEATH_CAUSE	Enum*	NUTS_3_ID[B]	Varchar	NUTS_3_POP_DENSITY	Decimal
PROTECTIVE_BEHAVIOR	Enum*			NUTS_3_MALES	Int
HAZARDOUS_BEHAVIOR	Enum*			NUTS_3_FEMALES	Int
				NUTS_3_AGE_0-14_MAL	Int
				NUTS_3_ AGE_0-14_FEM	Int

FATALITIES TABLE

DATE	VICTIM_CONDITION	ACCIDENT_PLACE	PROTECTIVE_BEHAVIOR
Year (yyyy)	By bicycle	Public/private building	Climbing trees
Month (mm)	By boat	Bridge	Driving to avoid danger
Day (dd)	By bus	Campsite/tent	Getting on roof/upper floor
AGE_STRING	By car	Riverbed/riverside	Getting out of the car
Child: 0–14 years	By caravan	Tunnel/underpass	Getting out of buildings
Boy/Girl: 15–29 years	By tractor	Countryside	Grabbing onto someone/something
Young adult: 30-49 years	By van	Ford	Moving to a safer place
Adult: 50–64 years	By other	Recreation area	Getting on the car roof
Elderly: >65 years	Laying	Road	**HAZARDOUS_BEHAVIOR**
GENDER	Standing	Bungalow	Check damage during the flood
M: Male	**VICTIM_ACTIVITY**	**ACCIDENT_DYNAMICS**	Driving on roads closed by police
F: Female	Traveling	Blocked in a flooded room	Fording rivers
RESIDENCY	Recreational activities	Caught in a bridge collapse	Refuse evacuation
Resident	Rescuing someone	Caught in a road collapse	Trying to rescue animals
Not resident	Sleeping	Caught in a building collapse	Refuse warnings
Tourist	Working	Dragged by water/mud	Staying on bridges
	Hunting	Fallen into the river	Staying on river banks
	Fishing	Surrounded by water/mud	Trying to save vehicles
		Hit	Trying to save belongings
		DEATH_CAUSE	
		Collapse/hearth attack	
		Drowning	
		Hypothermia	
		Electrocution	



Coordinates, description, socio-economic profile, contributing circumstances. ***What is the driver of flood fatalities?***

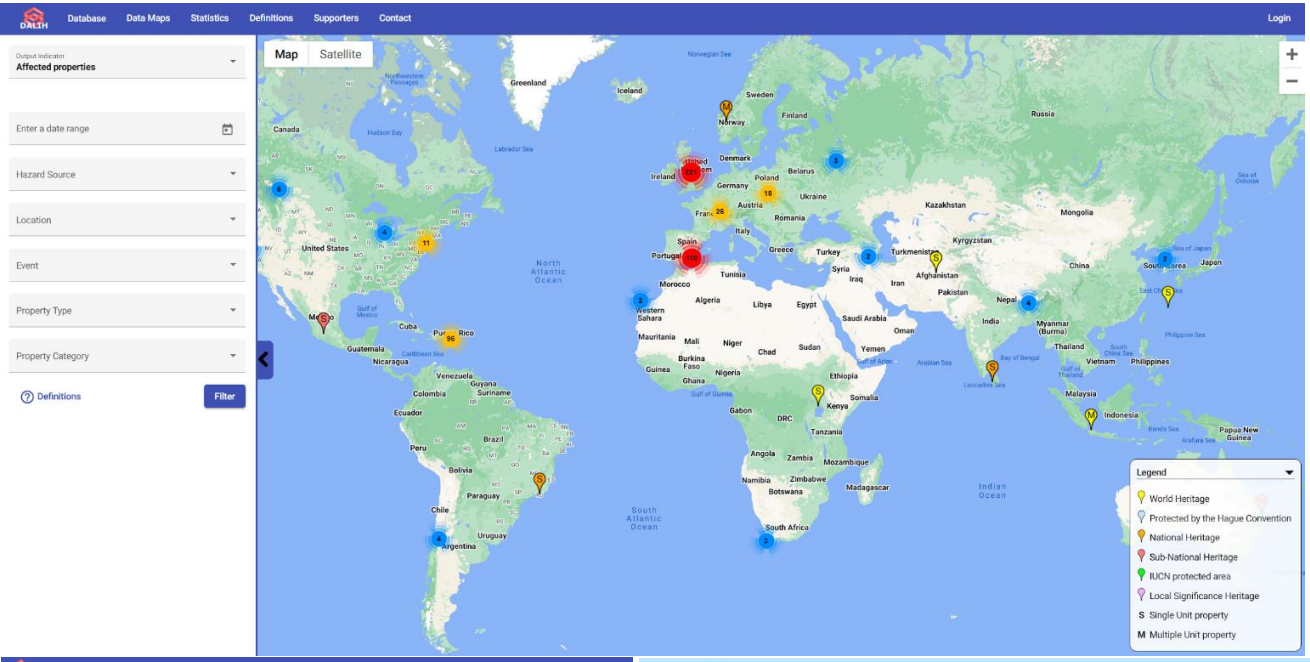
Open, scalable, well structured, gap/duplication estimation

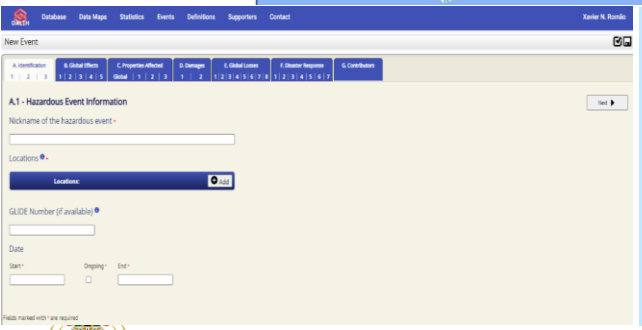
No minimum value for reporting – Leave no One Behind

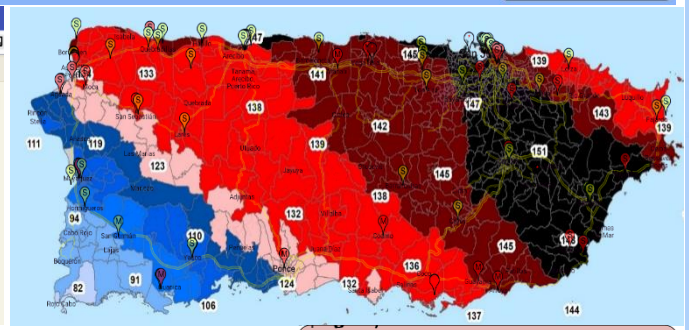
Data sources: authorities, media, scientific literature

https://www.nature.com/articles/s41597-022-01273-x (@ Katerina Papagiannaki)

DALIH, a structured approach for cultural heritage







Main global databases do not entail CH. No systematic collection exists

Data is fragmented

A collaborative database to collect and share, supporting inter alia EU Flood Directive and Sendai reporting

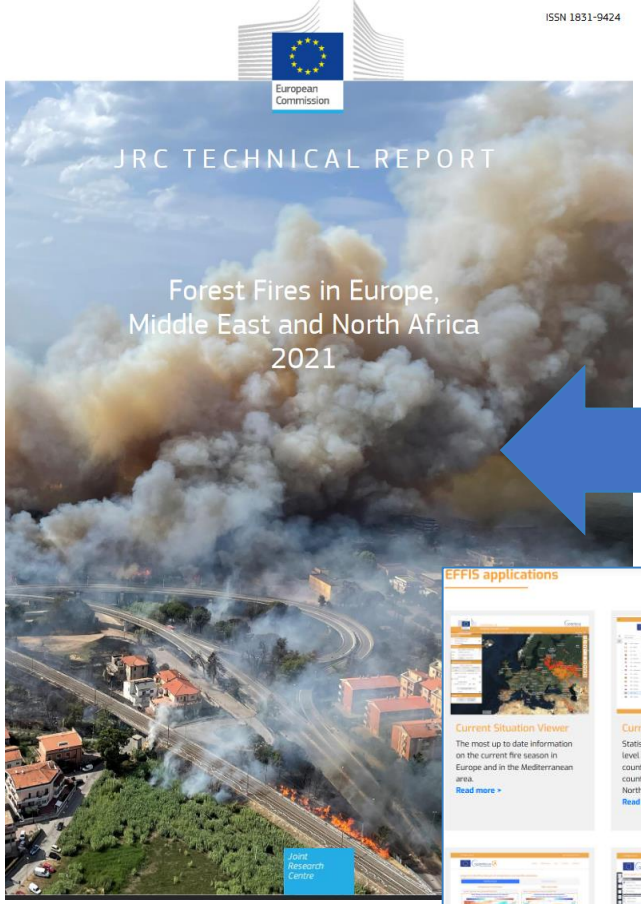
Scalable, a potential standard for loss and damage recording, supported by ICOMOS

Impact modeling support

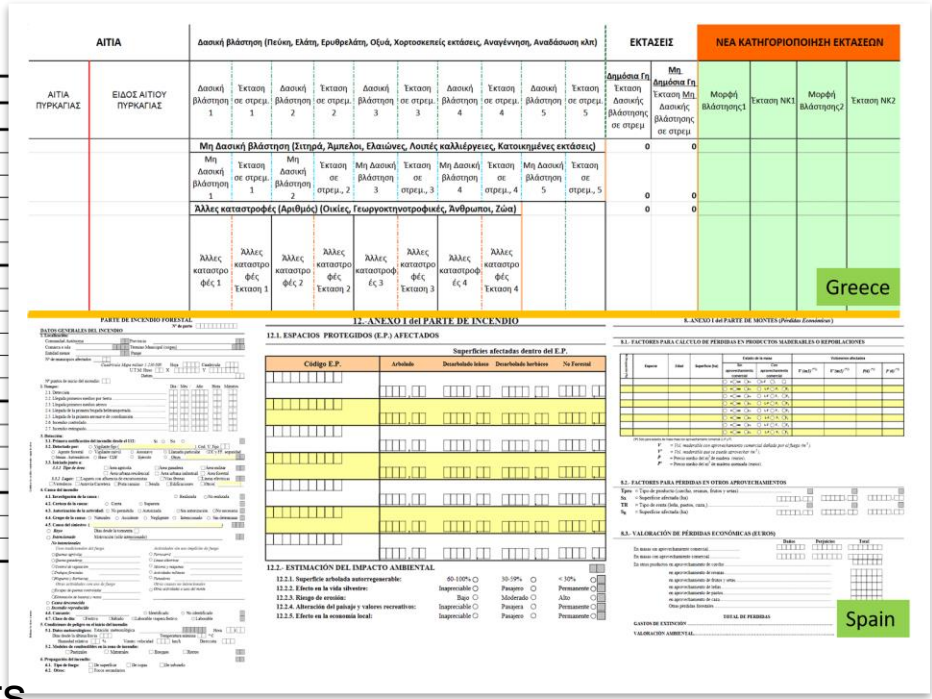
Call for collaboration

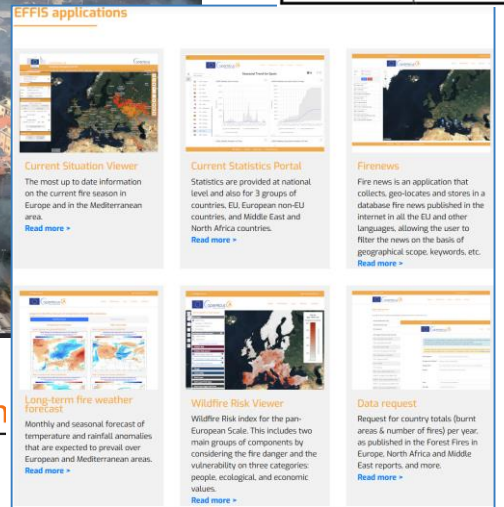
http://dalih.org/app/#/ @ Xavier Romão

Forest fire, a treasure trove of authoritative data



Group	Data field	Field name
ID	Unique Fire identifier	FIREID
TIME OF FIRE	Date of first alert	DATEAL
	Time of first alert	TIMEAL
	Date of first intervention	DATEIN
	Time of first intervention	TIMEIN
	Date of fire extinction	DATEEX
	Time of fire extinction	TIMEEX
LOCATION OF FIRE	Province Code (national nomenclature)	PROVCODE
	NUTS3 code	NUTS3
	Commune Code (national nomenclature)	CODECOM
	Commune Name (national nomenclature)	NAMECOM
	Latitude	NORTH
	Longitude	EAST
SIZE OF FIRE (Ha)	Burned Area FOREST	BAFOR
	Burned Area OTHER WOODED LAND	BAOW
	Burned Area OTHER NATURAL LAND	BAONW
	Burned Area AGRICULTURAL LAND	BAAGR
CAUSE OF FIRE	Certainty of knowledge of Presumed Cause (EU code)	CAUSE_KNOWN
	Presumed Cause (EU categories code)	CAUSE_EU
	Presumed Cause (Country detailed categories code)	CAUSE_CO





European variation, >2m events

Remote sensing and in situ data for EFFIS

From minimum requirements to the maximalist Mediterranean

Data for direct and indirect losses and damages

Language barrier, harmonization, best practices

science & innovation
Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA

GROUP ON EARTH OBSERVATIONS

Thank you!

ospeyer@noa.gr