

UNIVERSIDAD  
**EAFIT**



**COP16**  
CALI-COLOMBIA  
Paz con la Naturaleza

Webinar

Un fuerte nubarrón se alza en el

# CIELO

Conoce SIATA, un sistema que genera, traduce, transfiere y difunde alertas para la gestión ambiental.



**UNIVERSIDAD EAFIT** | **SIATA** | **Anea** | **COP16**  
CALI - COLOMBIA

**Daniel Ruiz-Carrascal**  
Coordinador General del Sistema de Alerta Temprana del Valle de Aburrá - SIATA

**Viernes, 4 de octubre de 2024**  
Canal de YouTube EAFIT+ [mas.eafit.edu.co](https://mas.eafit.edu.co)  
9:00 a.m.

Webinar  
**Un nubarrón se alza en el CIELO**

Conoce SIATA, un sistema que genera, traduce, transfiere y difunde alertas para la gestión ambiental.

VERILABIA | INNOVACIÓN

# Generating, translating, transferring, and disseminating user-relevant warning information for effective action

**Maria Eugenia Puerta-Yepes**

School of Applied Sciences and Engineering  
EAFIT University, Colombia

**Camilo García-Duque**

Innovation and Technological Development Directorate  
EAFIT University, Colombia

**Luz Jeannette Mejía-Chavarriaga**

Risk and Climate Change Management Team Lead  
Local Environmental Protection Agency: *Área Metropolitana del Valle de Aburrá*, Colombia

## Observed extreme events



**Extreme heat**

More frequent

More intense



**Torrential rains**

More frequent

More intense



**Fire weather**

More frequent

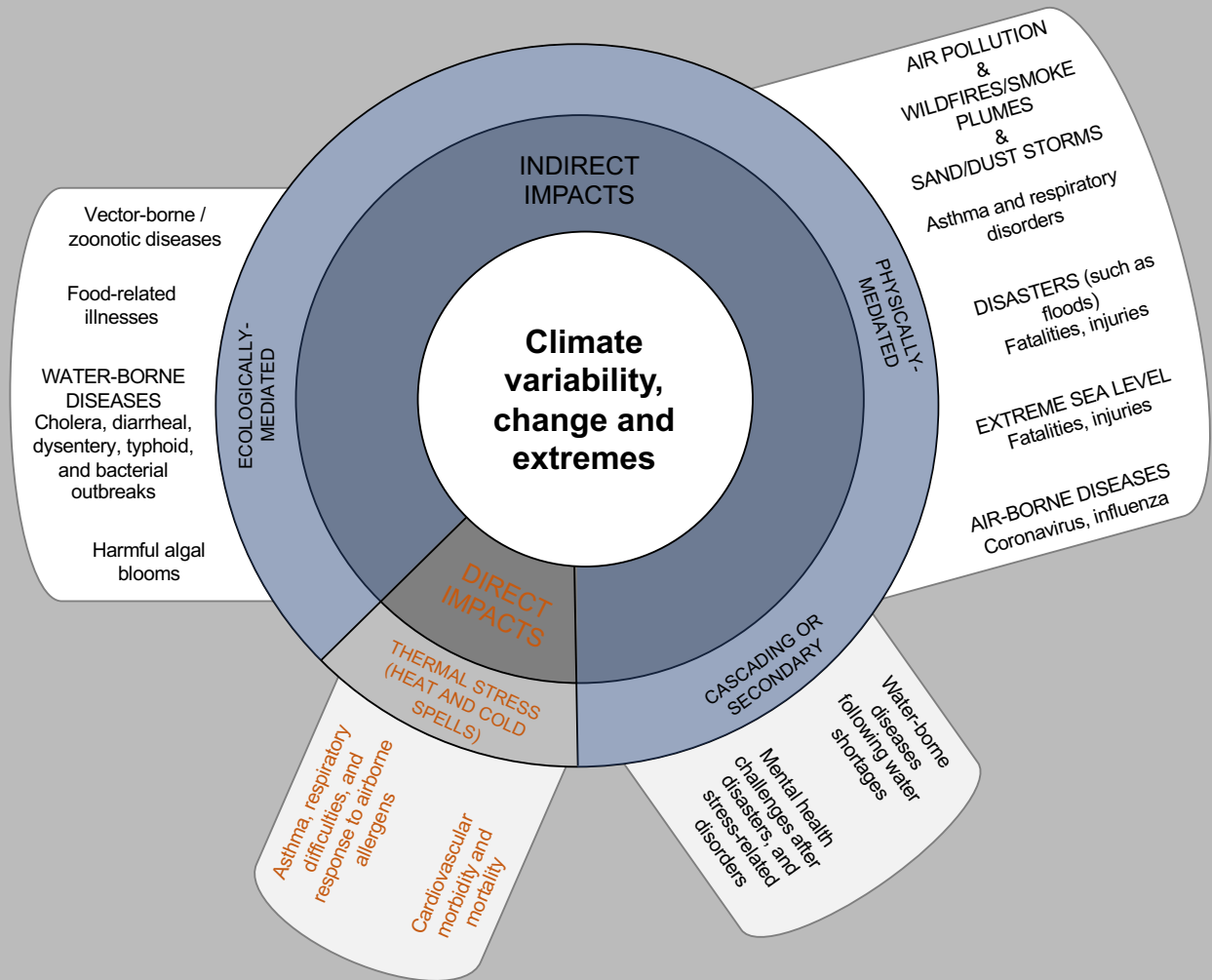
## Projected

Increase in mean  
temperature

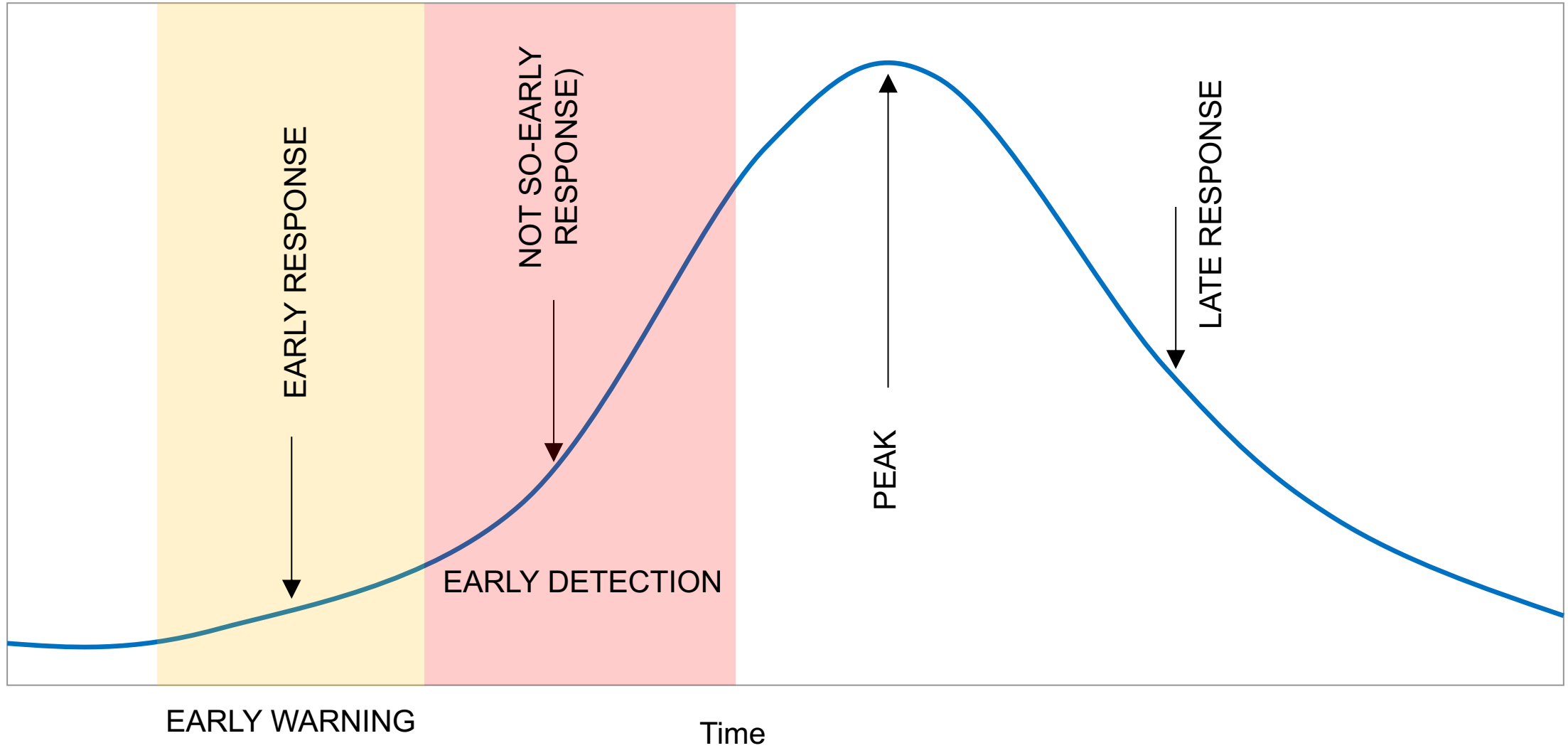
Increased duration  
of warm and dry  
spells

Increased  
occurrence of  
unusually heavy  
rainfall events

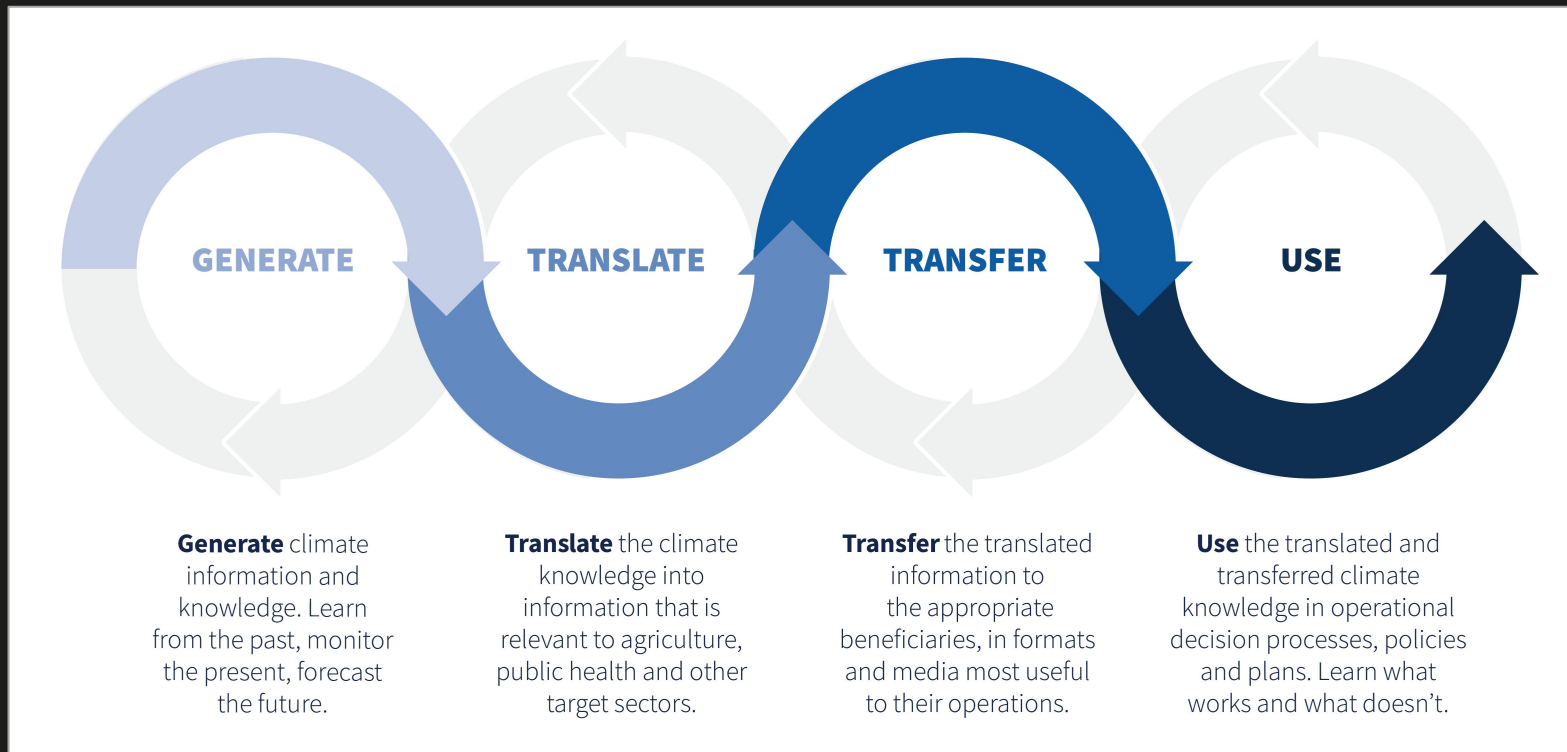
Increased frequency  
of back-trajectories  
from Northern South  
America



The health impacts of climate change, climate variability and climate extremes are not limited to those caused by the occurrence of disasters



## Effective climate services



Generate

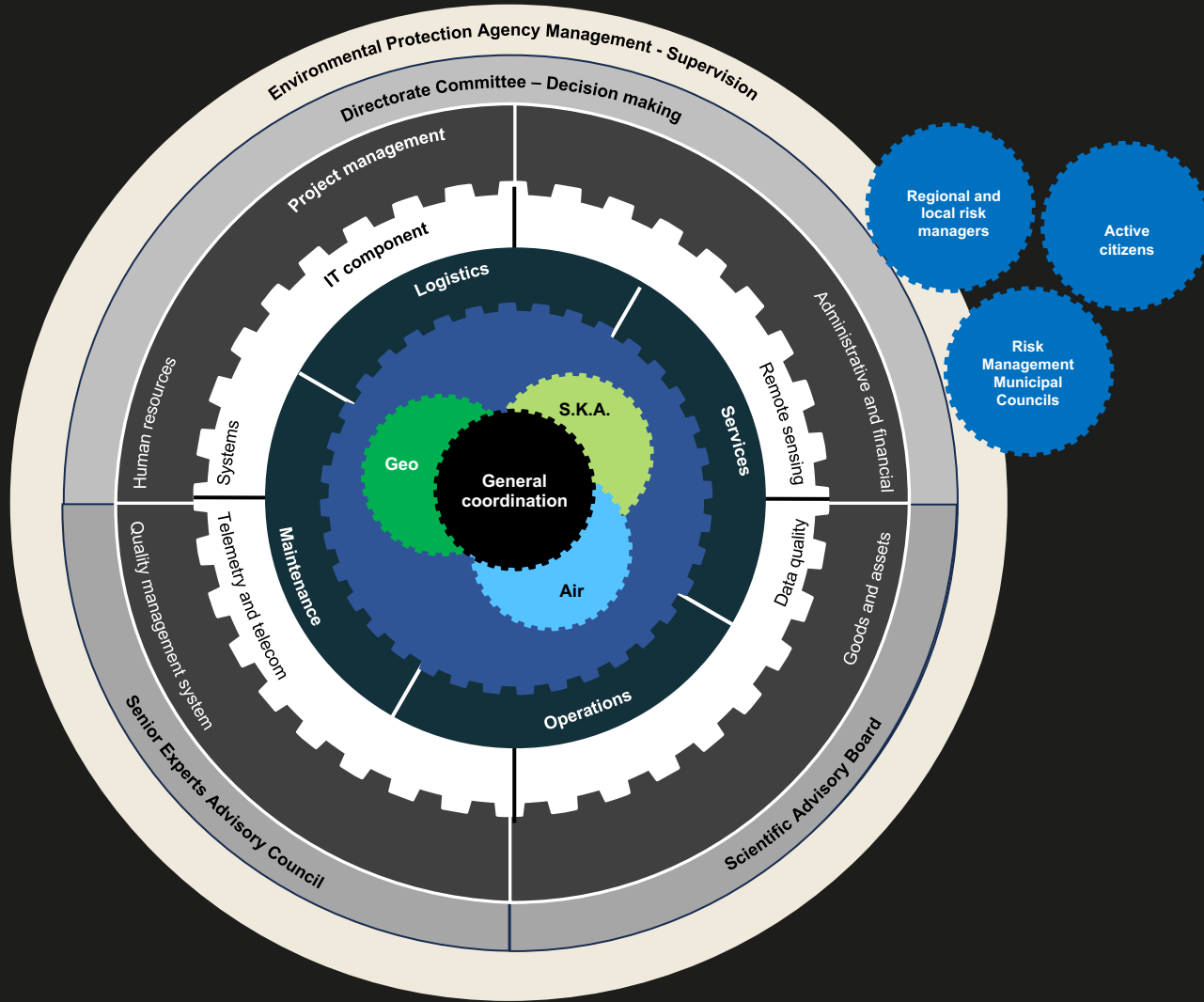
Translate

Transfer

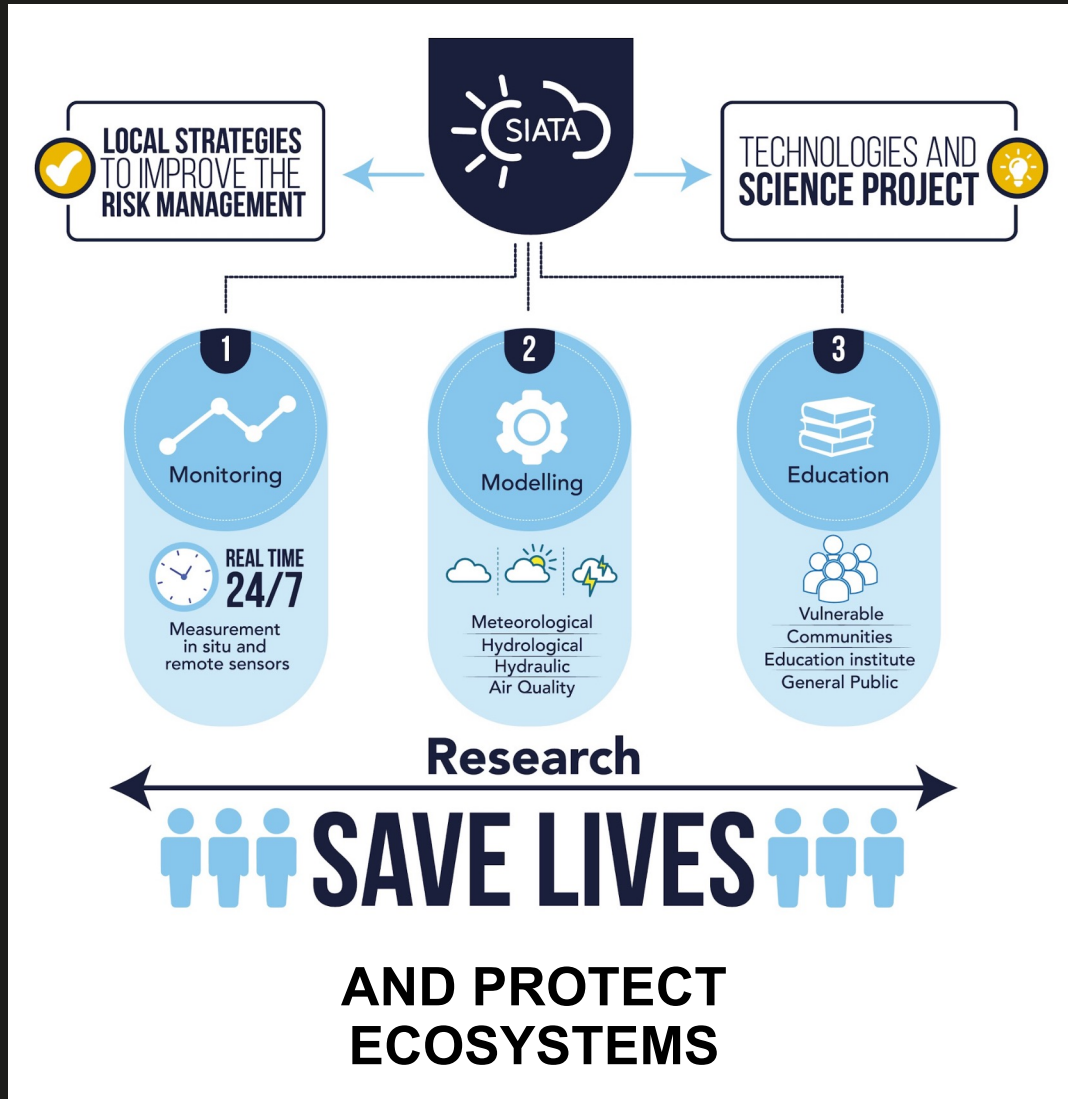
Use

The four pillars that underpin effective climate services.

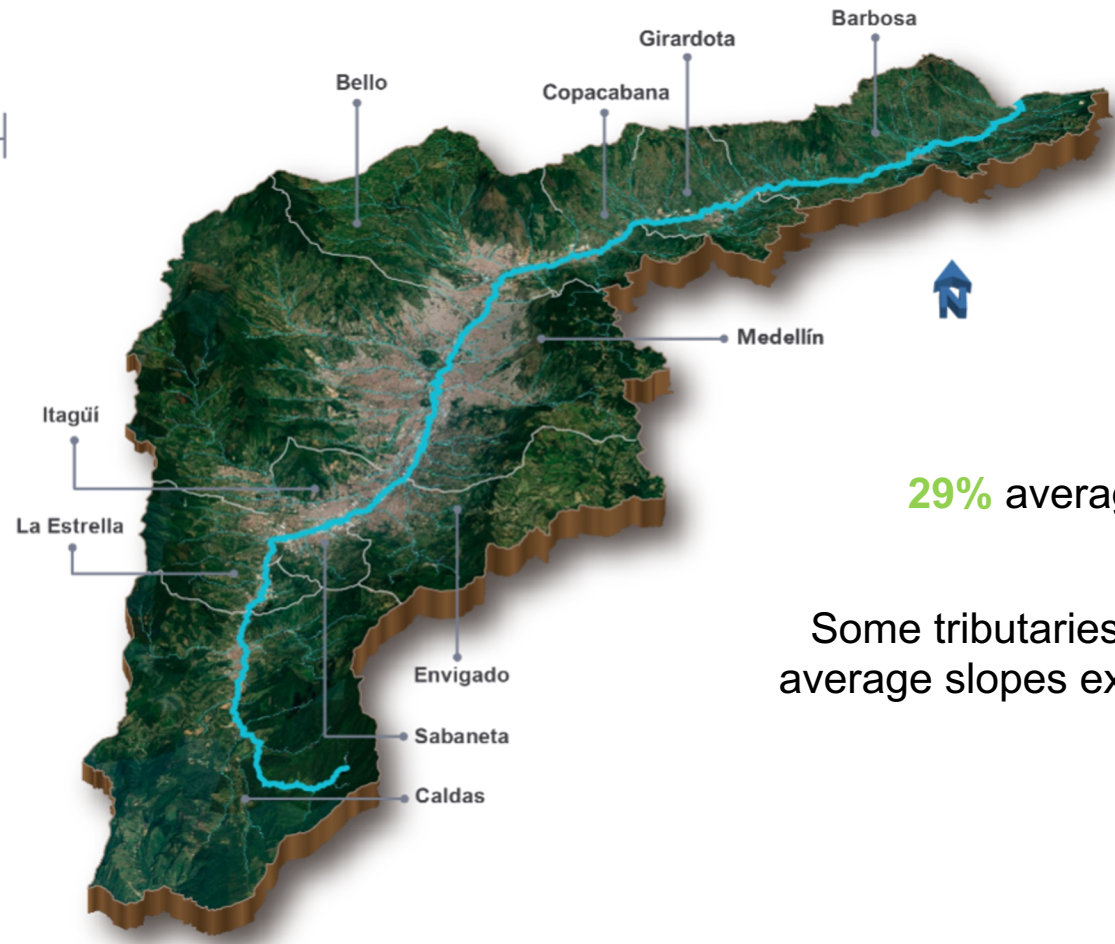
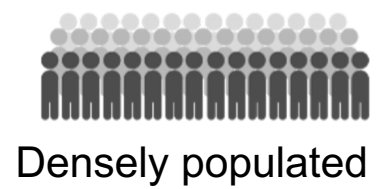
Source: International Research Institute for Climate and Society, Columbia Climate School, Columbia University in the City of New York, USA



Solid and effective organizational structures











Applied research to  
disaster risk  
management



29% average slope of our basin

Some tributaries could have average slopes exceeding 55%

 <b>Wet and dry seasons</b>	 <b>River and pluvial flooding</b>
 <b>Flash floods</b>	 <b>Landslides</b>
 <b>Fires</b>	 <b>Deteriorating air quality</b>
 <b>Earthquakes</b>	 <b>Also, external factors such as Saharan dust and easterly waves</b>

## Local hazards and priorities

Unusually heavy rainfall events

Wind gusts

Landslides

Lightning + hail

River and pluvial flooding

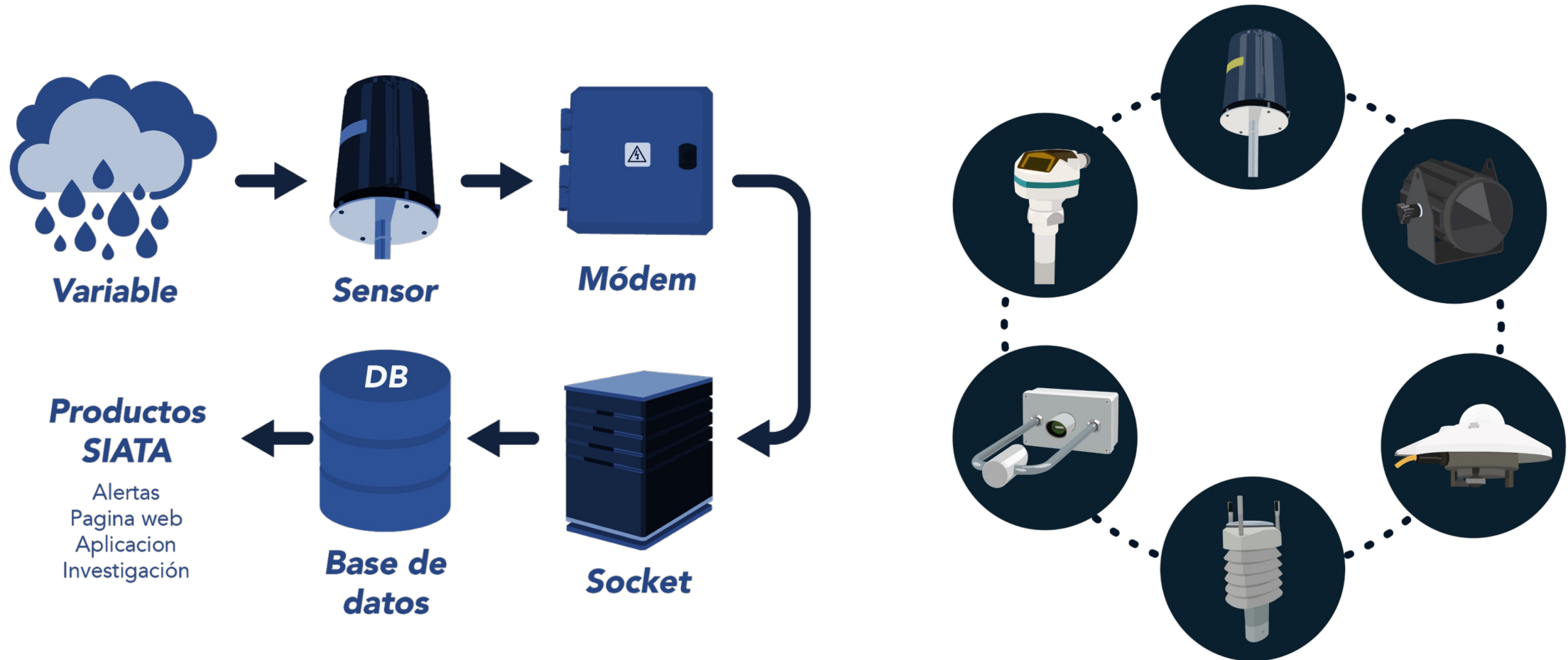
Earthquakes

Heat extremes

Fires

Unfavorable air quality conditions

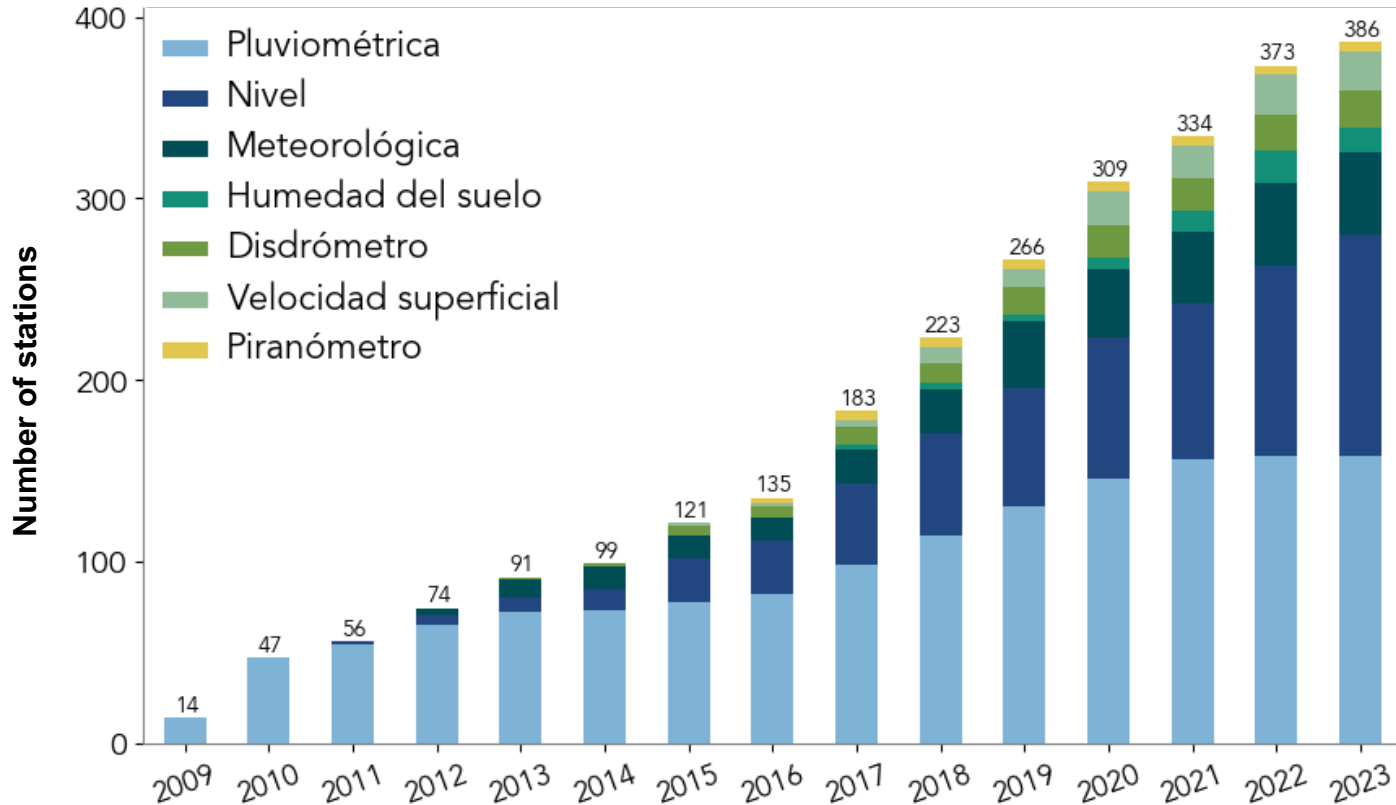
# Monitoring





<https://www.youtube.com/watch?v=Bh0Nb20CuQg>

## 1-min hydrometeorological network



## Database

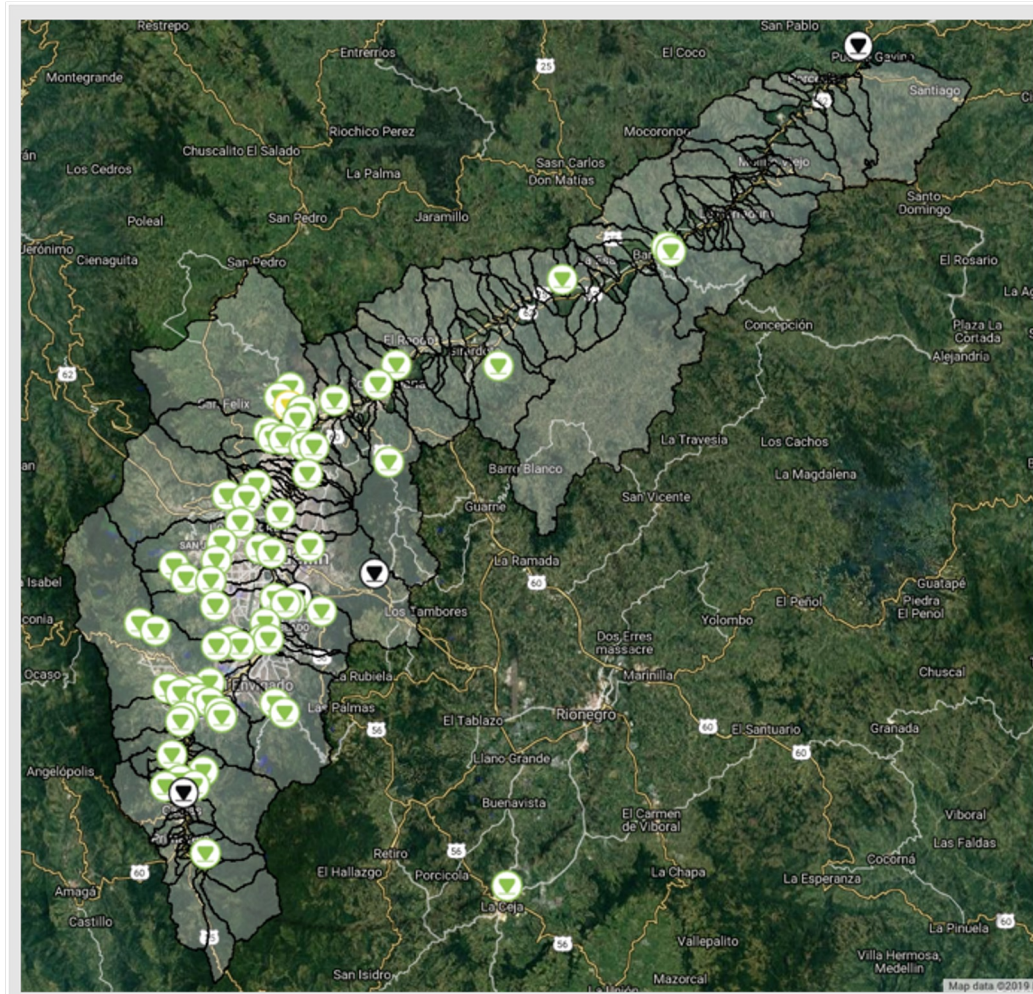
23,160 data every hour

555,840 data every day

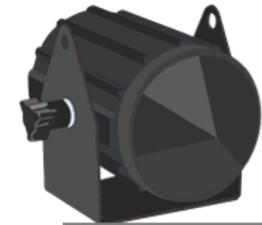
3,890,880 data every week

16,675,200 data every month

# Hydrological monitoring



Quebrada (Creek) #123456789



Surface speed

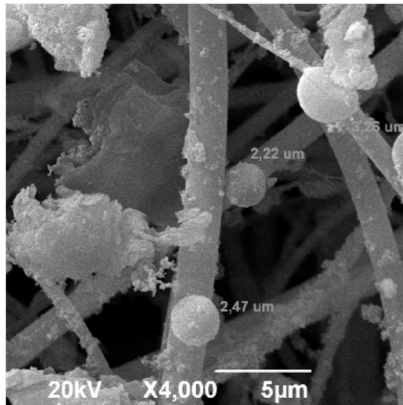


Water level



Cameras

# Air quality component



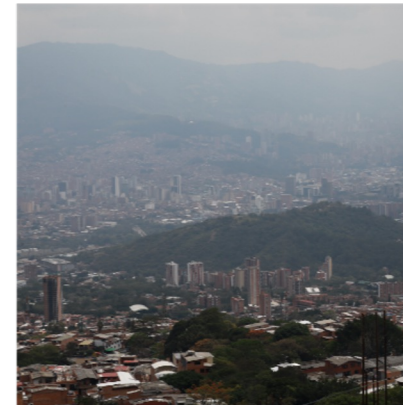
**Air pollutants monitoring**

Material particulado PM2.5 y PM10, Dióxido de azufre, Dióxido de nitrógeno, Ozono, Monóxido de carbono



**Scientific citizens**

- > Nubes
- > Ciudadanos Científicos en bicicleta



**Forecasting air quality episodes**



**Monitoring air quality episodes**

Seguimiento a los episodios entre los años 2016 -2023.

# Social appropriation of scientific knowledge



**Societal**

- > Sistemas de Alerta Temprana Comunitarios (SATC)
- > UMGRD
- > Organismos de socorro
- > Conexiones territoriales



**Education**

- > Semilleros de Ciudadanos Científicos
- > Red de Educadores Científicos
- > Territorio al Aire
- > SIATA para la escuela



**Dissemination**

- > Digital, contenidos, audiovisual, apropiación ciudadana (talleres, stand, visitas, etc.)
- > Ciudadanos Científicos

Research being a cross-cutting theme

# Community-based Early Warning Systems

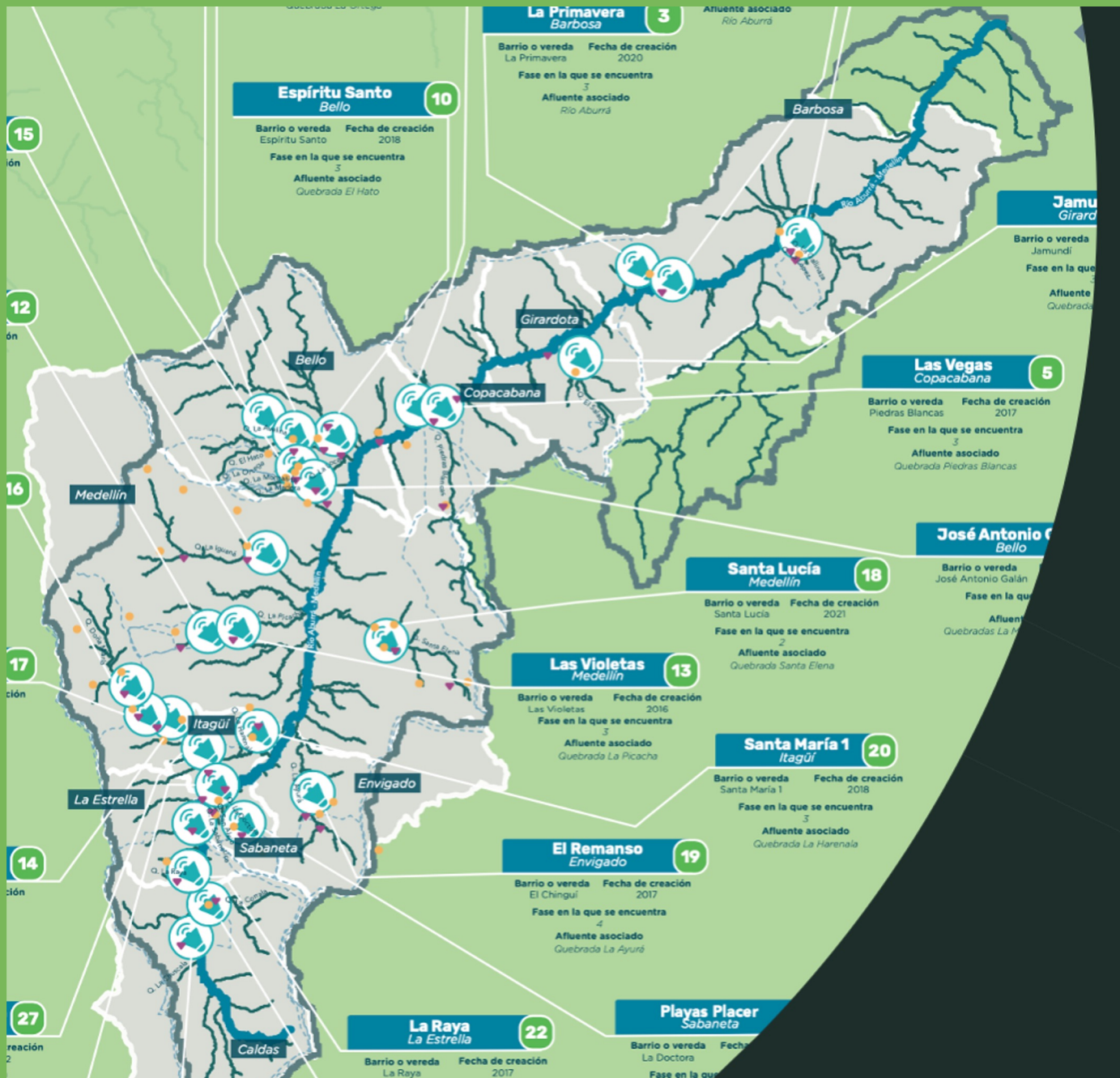
Adapting and developing local technology

Analysis, production and divulgation of information and applied knowledge

Interdisciplinary work among social scientists, meteorologists and hydrologists

Committed communities

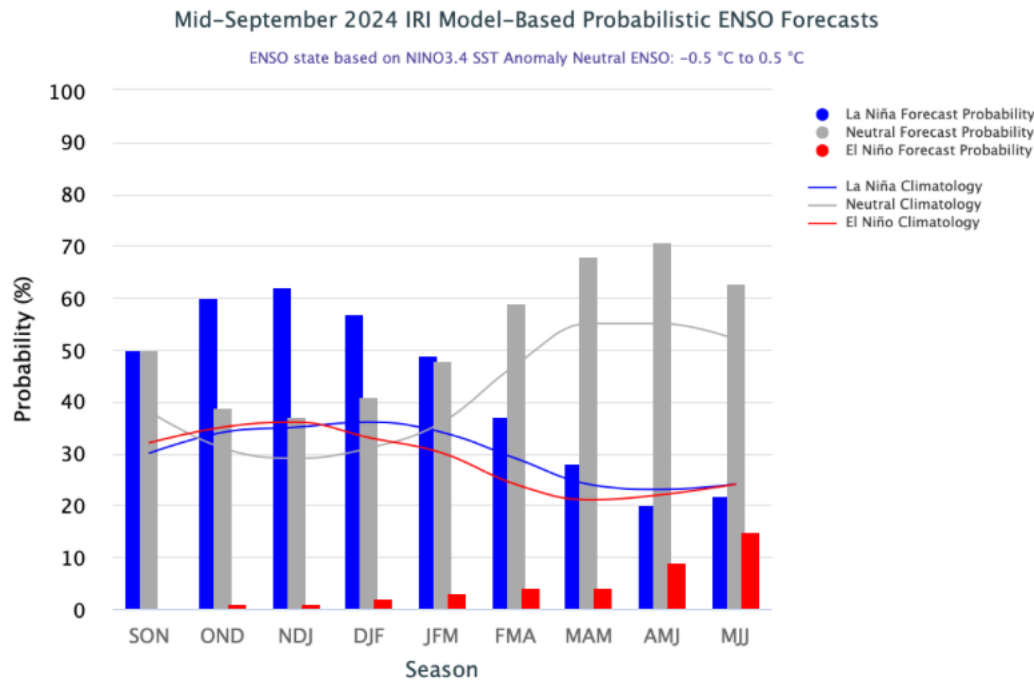
Collaborative effort with municipal risk managers





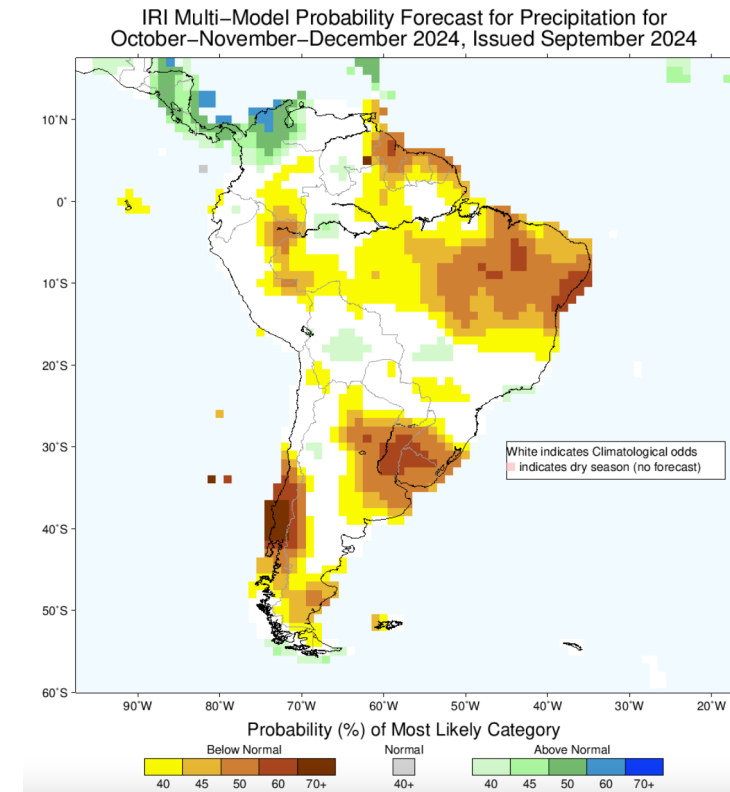
<https://www.youtube.com/watch?v=8aTNHqz2OrU>

# ENSO forecast



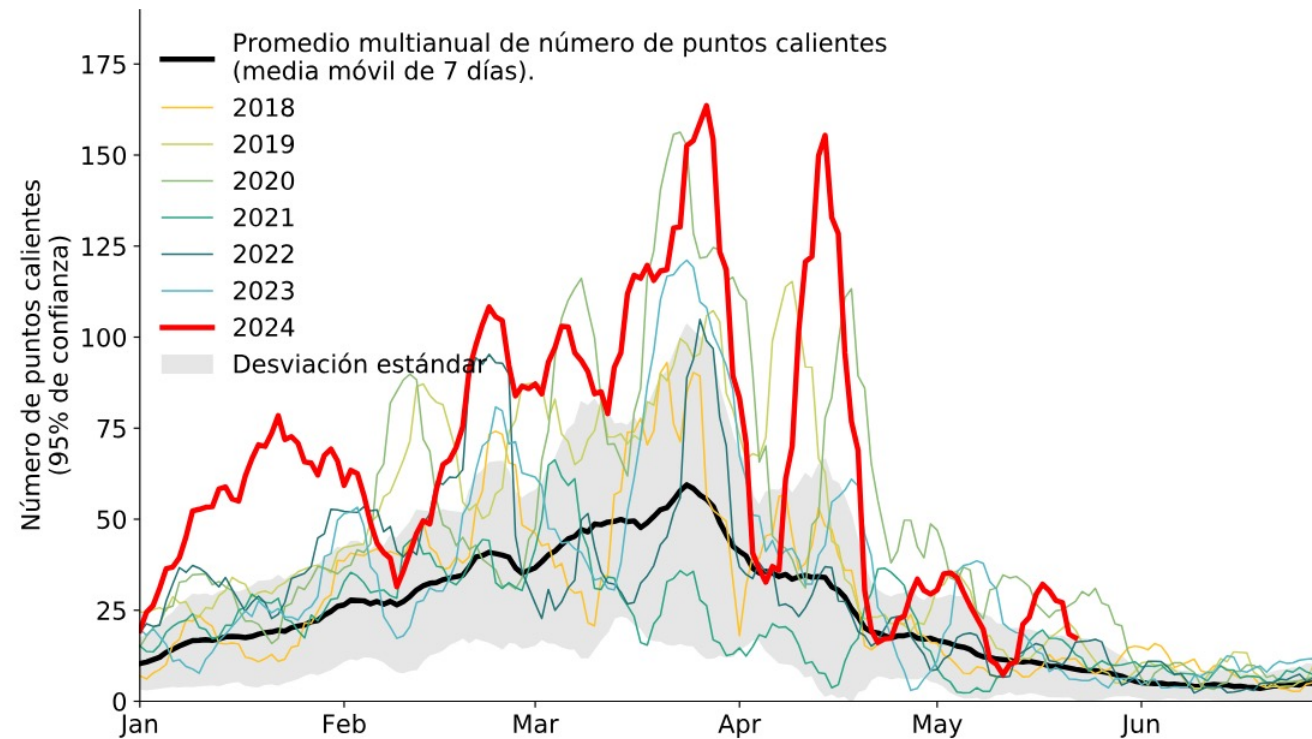
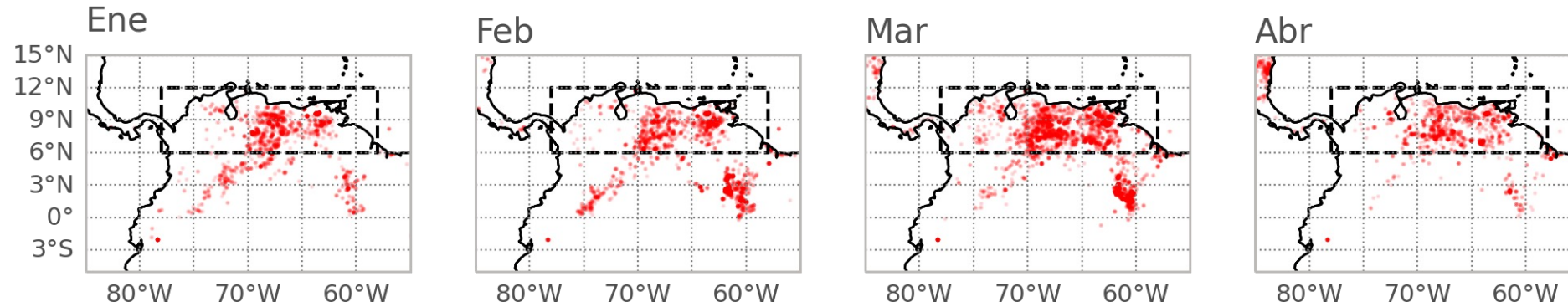
<https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/>

# Seasonal forecast

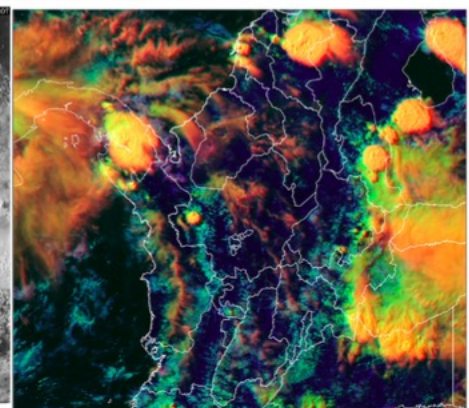
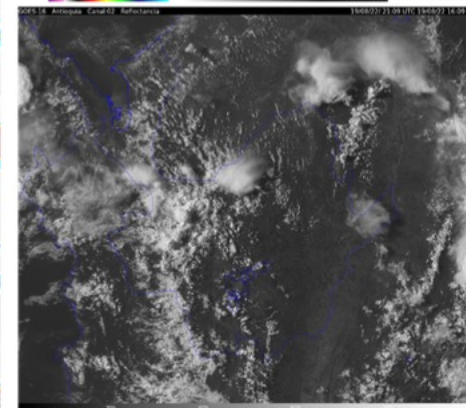
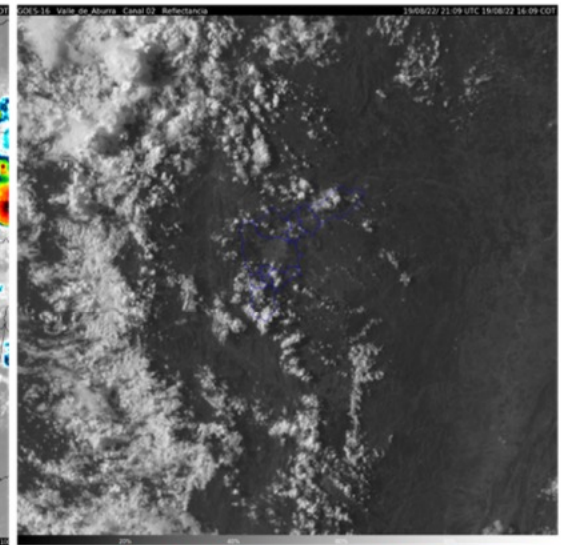
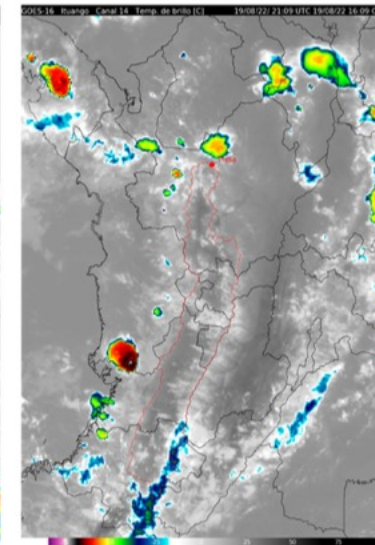
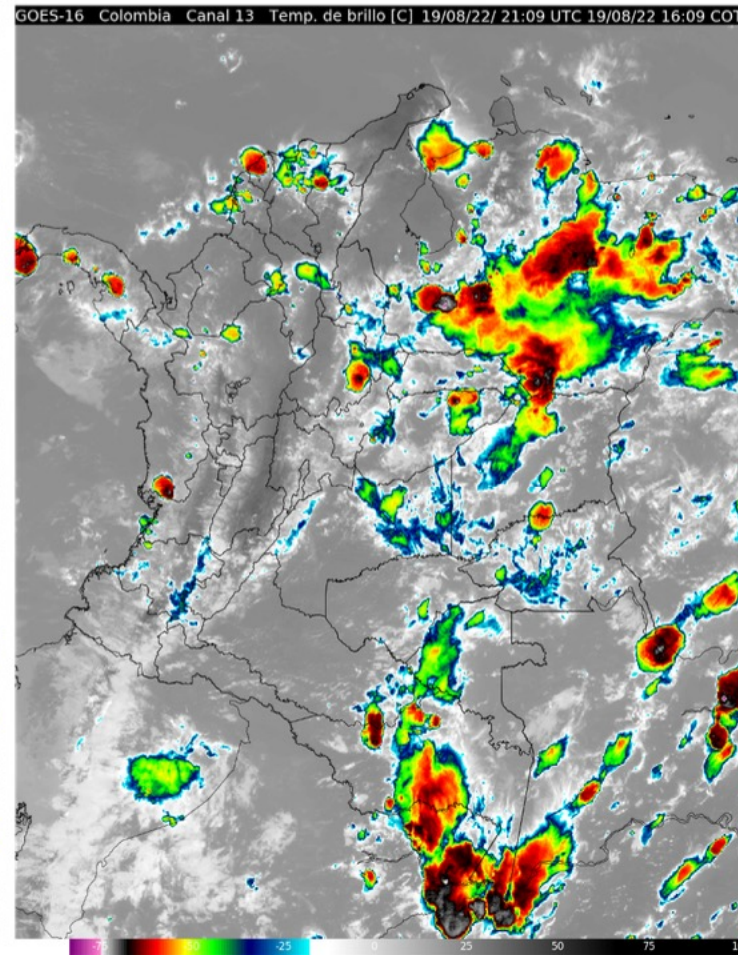
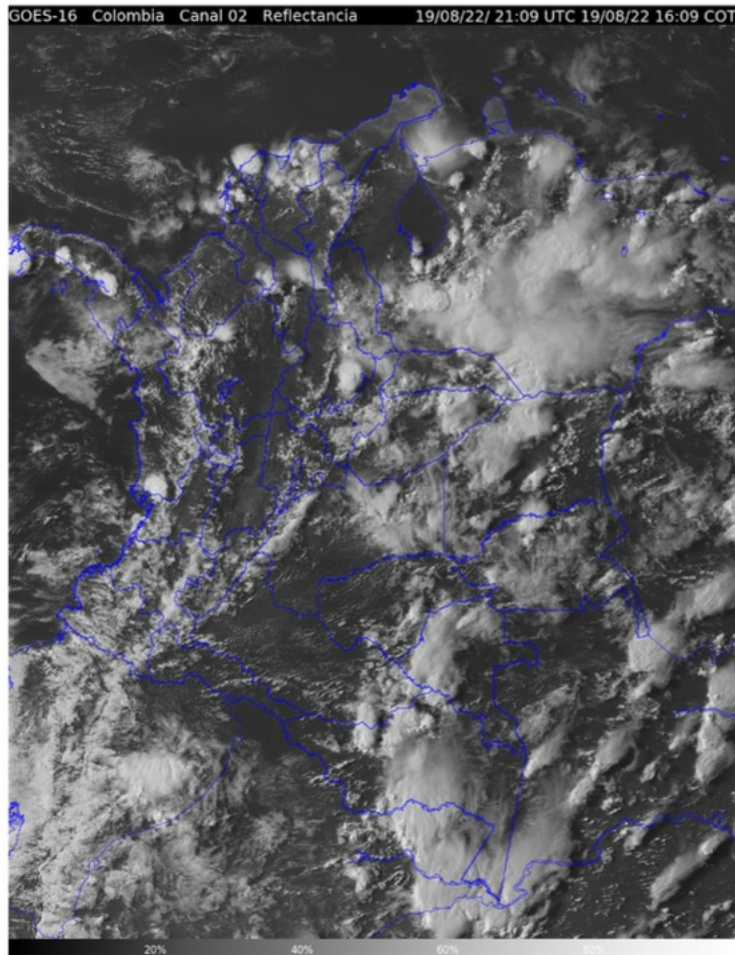


<https://iri.columbia.edu/our-expertise/climate/forecasts/seasonal-climate-forecasts/>

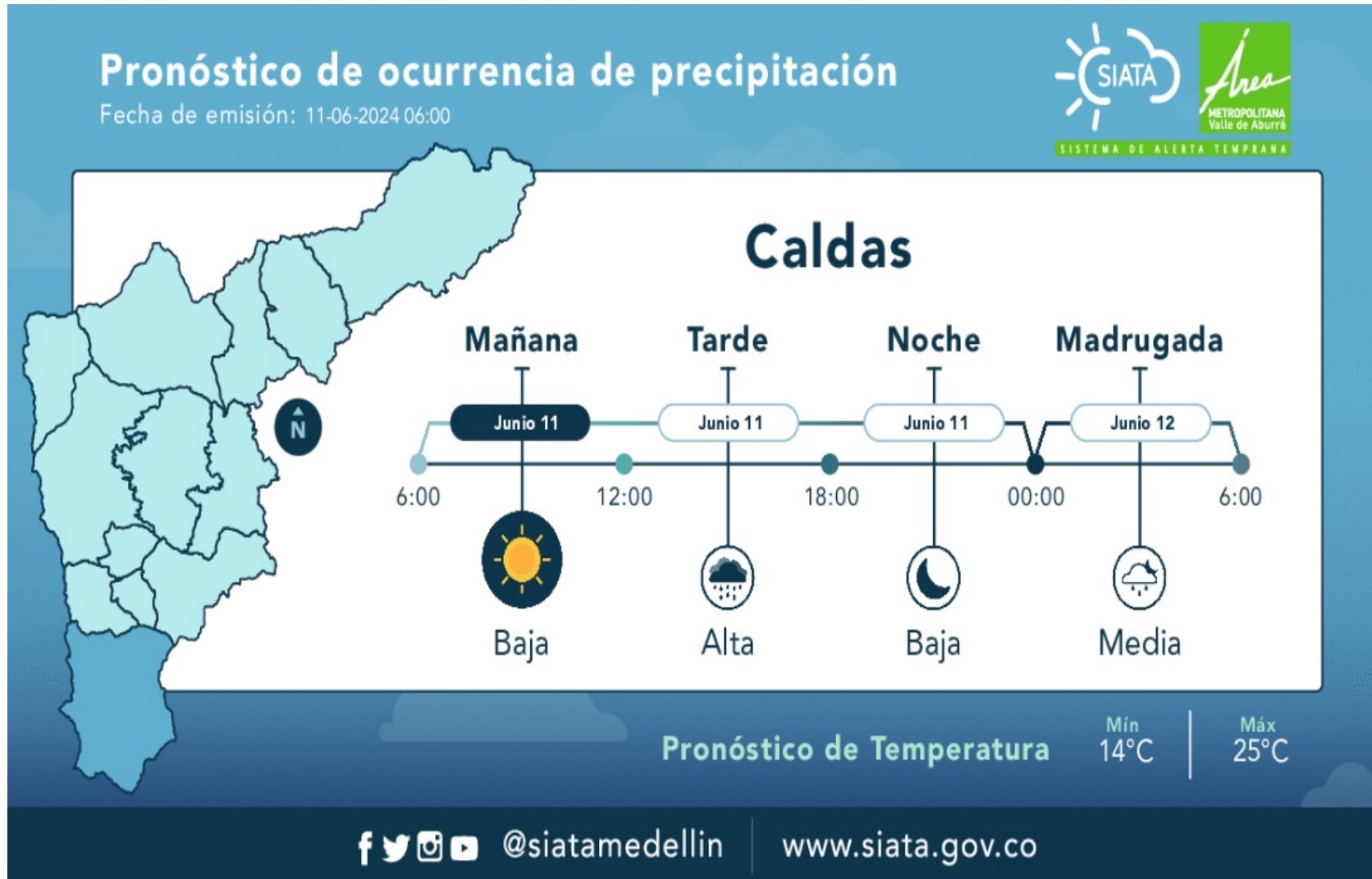
# Assessment during the first air quality episode



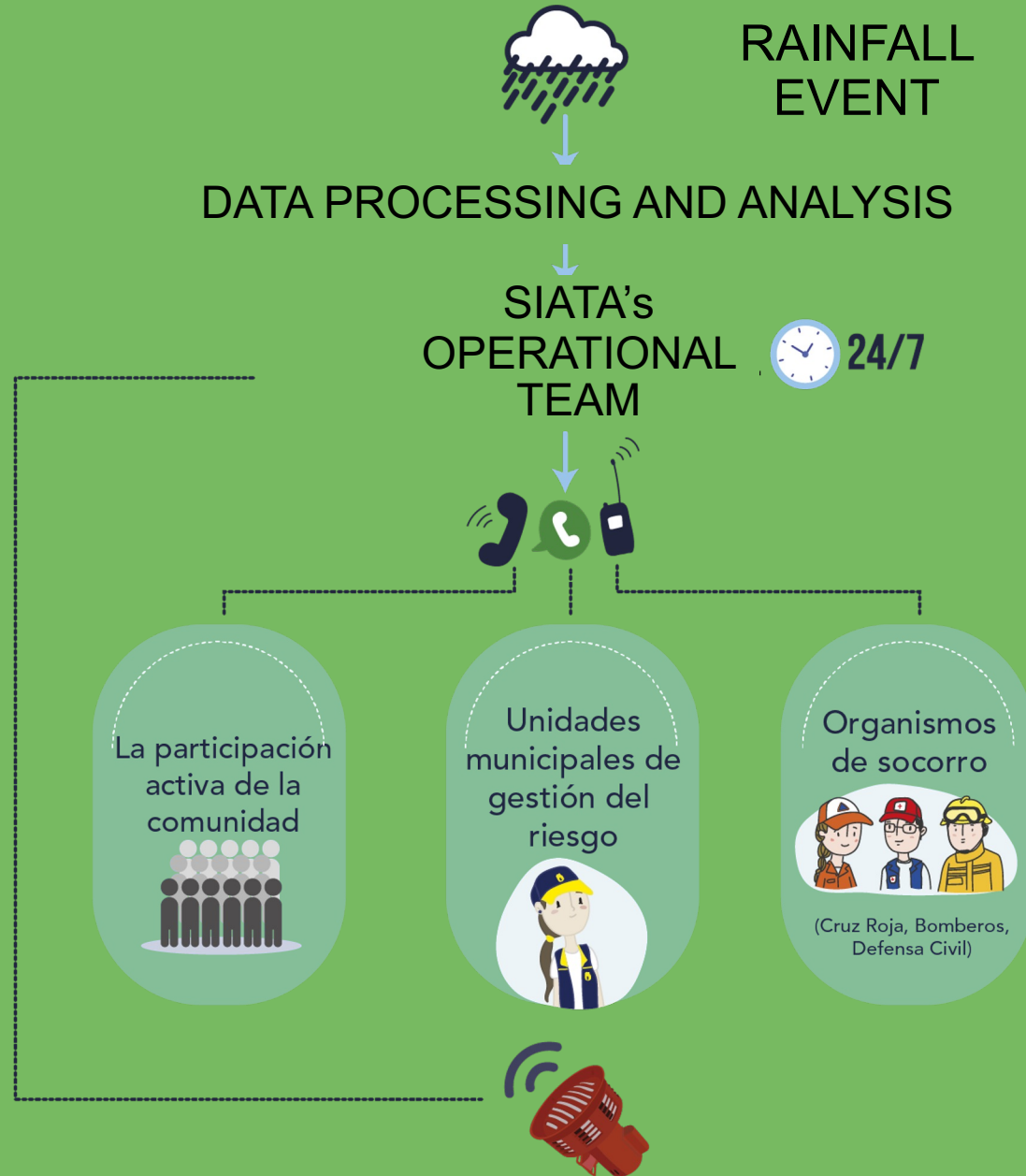
# Analysis of satellite info



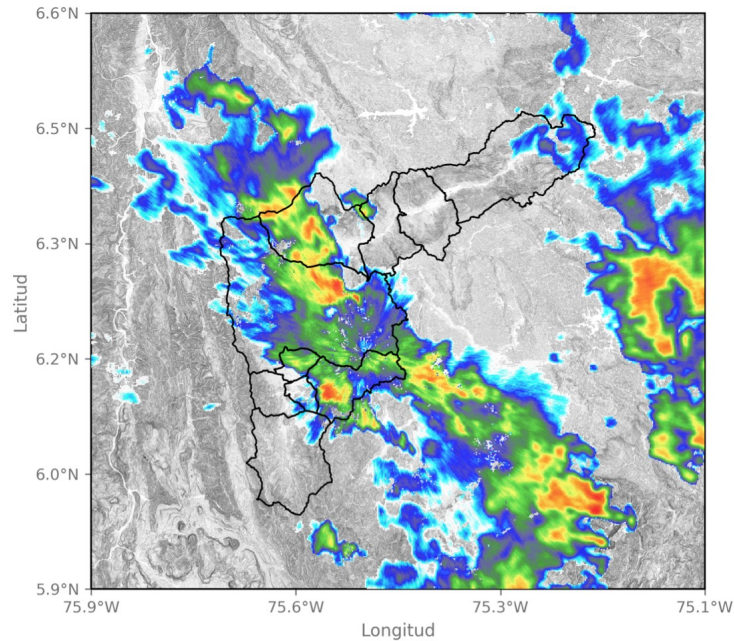
# Weather forecasts



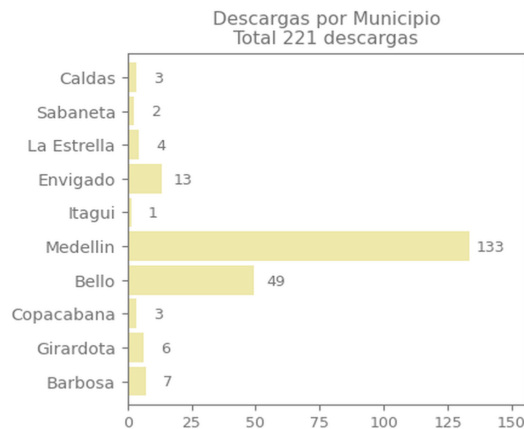
**In action**



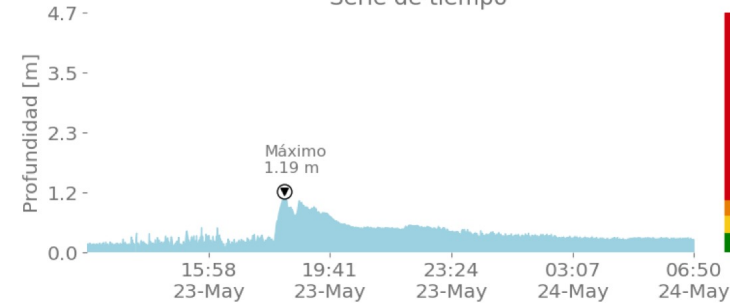
# (May 23<sup>rd</sup>, 2024 event)



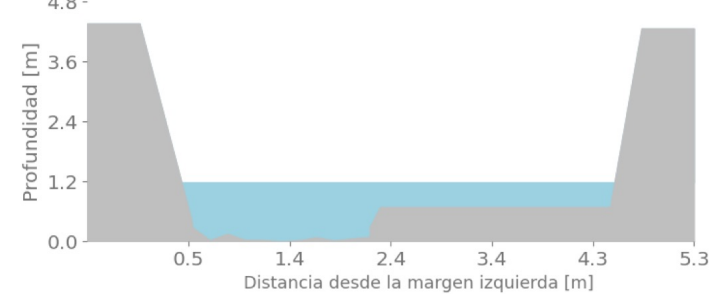
2024-05-23 18:45



134 | Q. La Madera - Barrio Nuevo  
Serie de tiempo



Sección transversal 2024-05-23 18:16:00

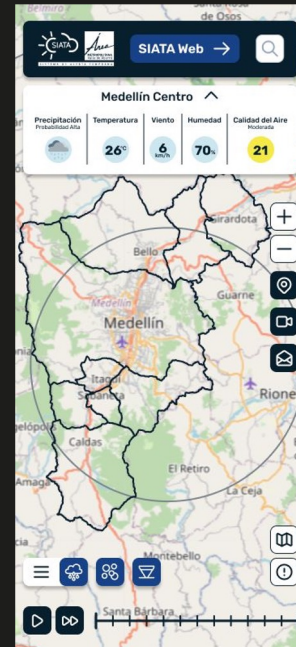
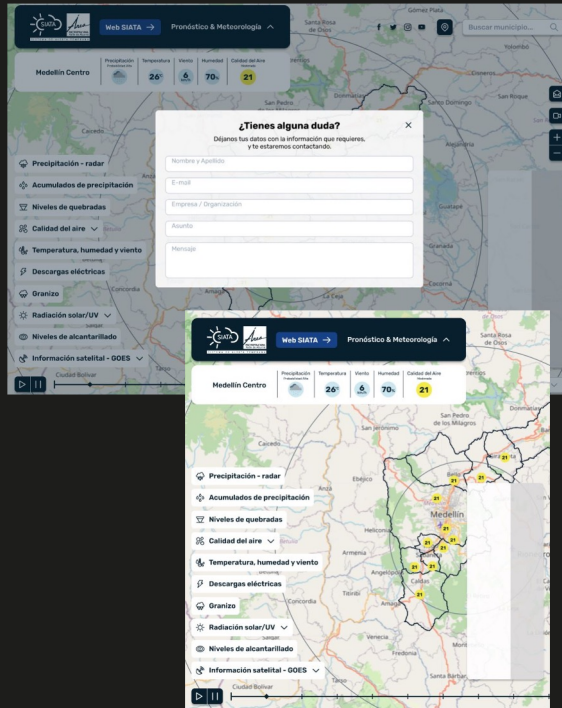


## Resumen de Registro de nivel

Estación	Pico de la hidrografa (m)	Riesgo	Fecha y hora
606. Q. La Presidenta - Exito Poblado Lidar	1.77	Rojo	2024-05-23 18:54
634. Q. Malpaso - El Paraiso 1	0.8	Rojo	2024-05-23 19:11
265. Q. La Loca - El Cafetal	2.415	Rojo	2024-05-23 19:05
624. Q. Malpaso - El Volador	2.457	Rojo	2024-05-23 18:59
150. Q. Canada Negra - Santa Rita	1.389	Rojo	2024-05-23 18:16
145. Q. La Sabanetica - Prados de Sabaneta	0.805	Rojo	2024-05-23 13:49
140. R. Medellin - Puente Fundadores	4.131	Rojo	2024-05-23 20:00
134. Q. La Madera - Barrio Nuevo	1.192	Rojo	2024-05-23 18:16



# Appropriation of scientific knowledge



**Coming up soon**

Updating our  
geoportal and  
responsive version  
(for smartphones)

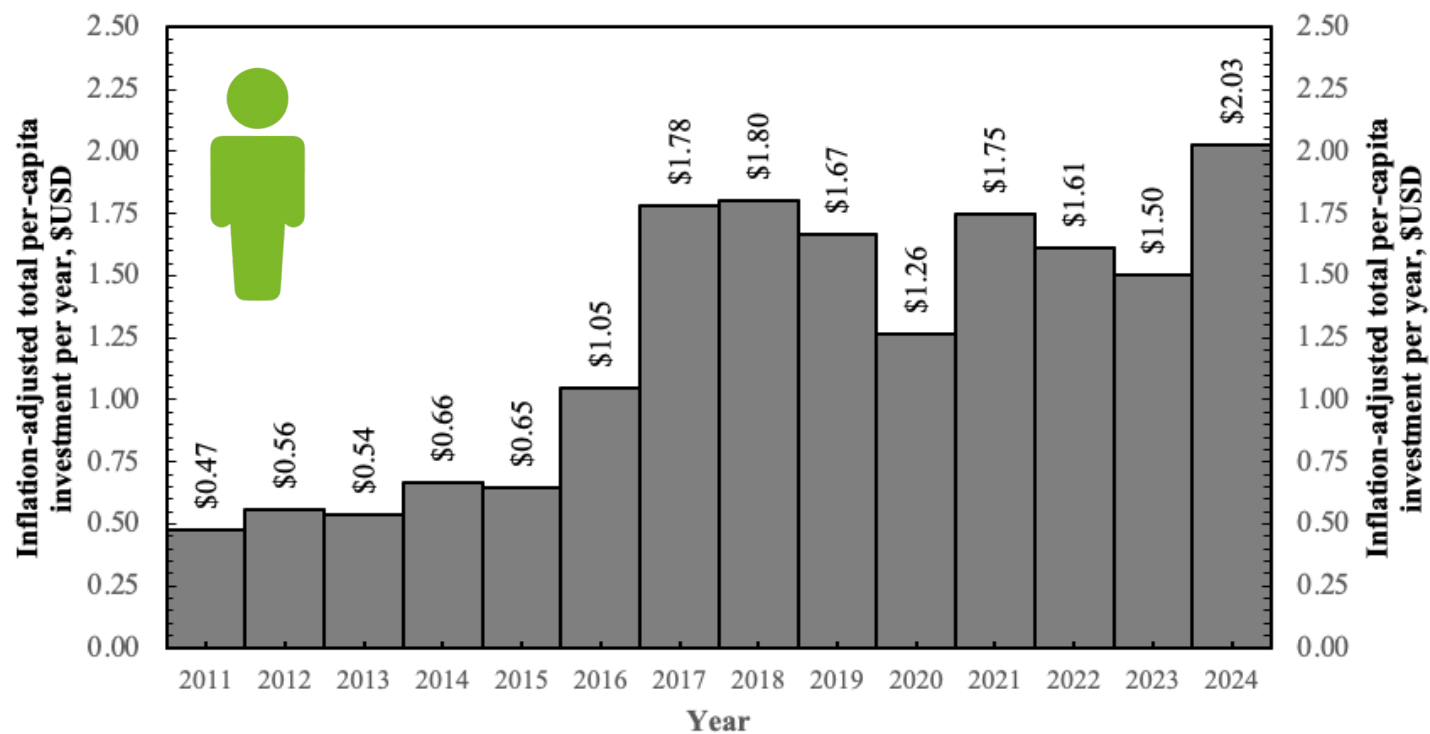


<https://www.youtube.com/watch?v=Qk5TOb0cer4>

# Investment



Total per-capita investment per year, \$USD



# Conclusions and contributions

Inter- and trans-disciplinary (and inter-institutional) effort

Tools, platforms, information channels, institutional frameworks, dissemination tools: better prepared

ENSO - El Nino and La Nina events: an opportunity

**ACT NOW!**

# Concluding remarks

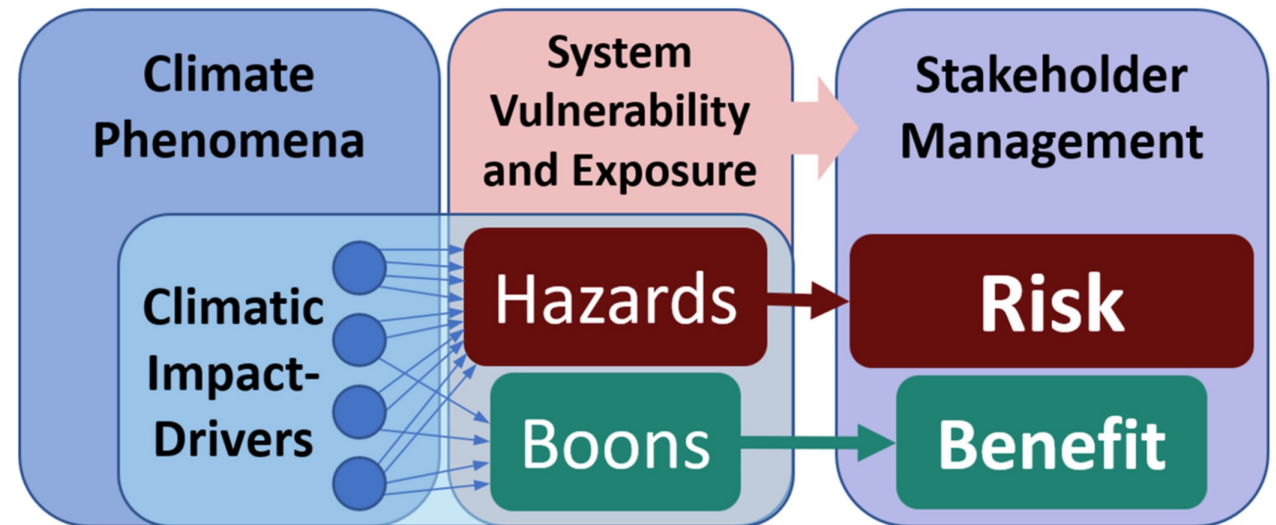
We are assessing the changing climate conditions that are relevant for societal and sectoral impacts, risk assessments and urban planning, not only from the point of view of detrimental conditions (i.e., hazards in the risk framing) but also from beneficial and neutral perspectives.

Research Article | [Open Access](#) |    

## The Climatic Impact-Driver Framework for Assessment of Risk-Relevant Climate Information

Alex C. Ruane ✉, Robert Vautard, Roshanka Ranasinghe, Jana Sillmann, Erika Coppola, Nigel Arnell, Faye Abigail Cruz, Suraje Dessai, Carley E. Iles, A. K. M. Saiful Islam, Richard G. Jones, Mohammad Rahimi, Daniel Ruiz Carrascal, Sonia I. Seneviratne, Jérôme Servonnat, Anna A. Sörensson, Mouhamadou Bamba Sylla, Claudia Tebaldi, Wen Wang, Rashyd Zaaboul ... [See fewer authors](#) ^

First published: 04 November 2022 | <https://doi.org/10.1029/2022EF002803>



# Concluding remarks

Incorporating SIATA's knowledge and information into the integrated, unifying **One Health approach**, which is based on the integration of biotic monitoring within the framework of urban planning and health.

SIATA provides elements for the achievement of at least five of the 17 SDGs of the 2030 Agenda for Sustainable Development:

**4** QUALITY EDUCATION



Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

**5** GENDER EQUALITY



Achieve gender equality and empower all women and girls.

**11** SUSTAINABLE CITIES AND COMMUNITIES



Make cities and human settlements inclusive, safe, resilient and sustainable.

**13** CLIMATE ACTION



Take urgent action to combat climate change and its impacts.

**15** LIFE ON LAND



Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

**UNIVERSIDAD**  
**EAFIT**

**Inspira Crea Transforma**