

Use of GFM Data to Support The Update of The Flood Vulnerability Atlas

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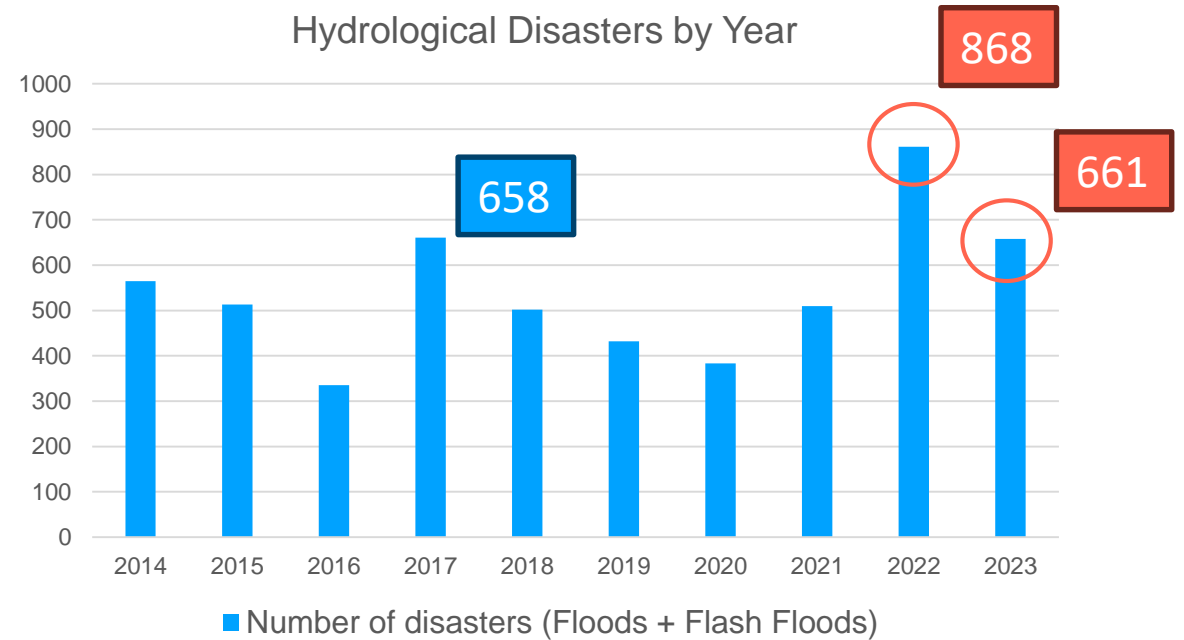
Water Specialist

National Water and Sanitation Agency

03/06/2024



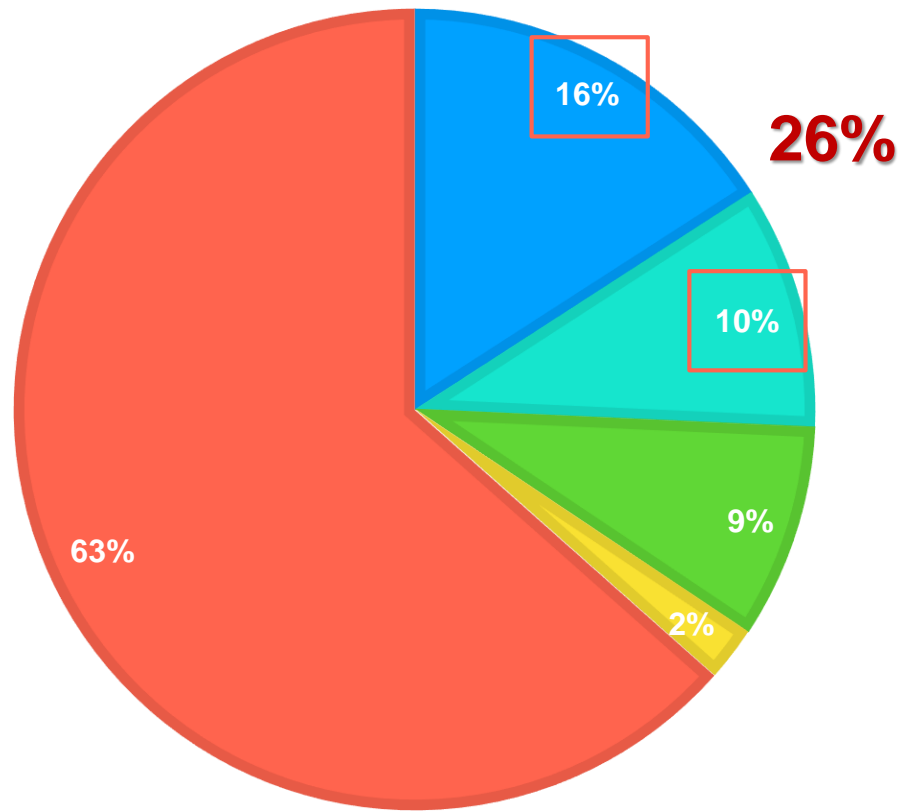
Number of Hydrological Disasters in Brazil



Natural Distasters in Brazil - 1991 a 2023

NUMBER OF DISASTERS

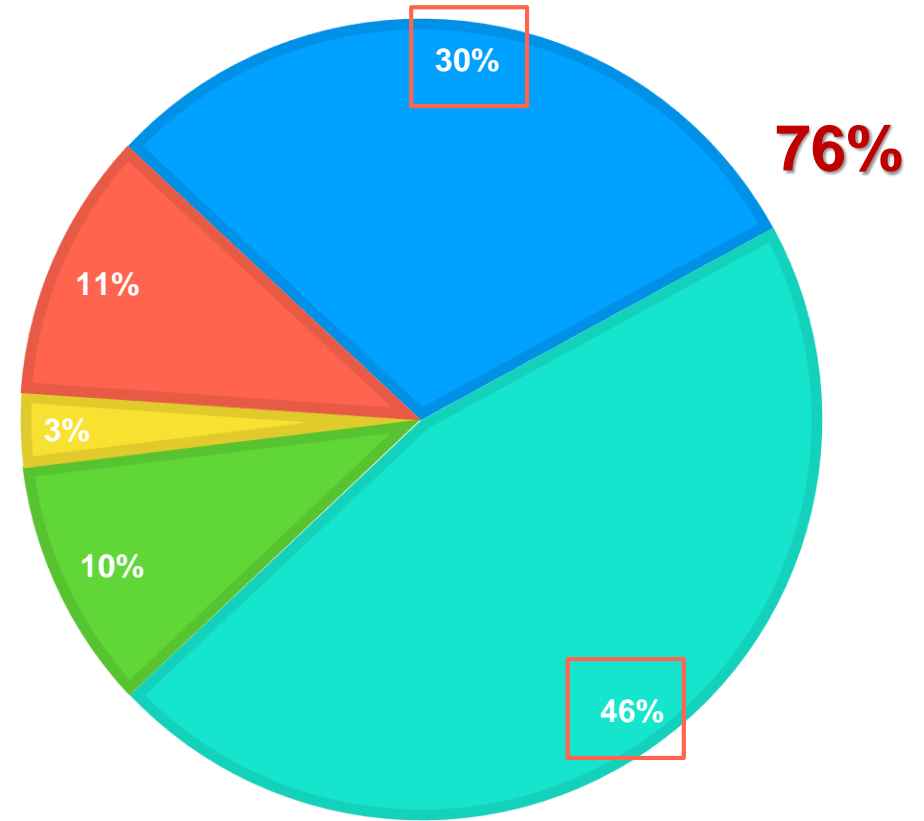
■ Flash Floods ■ Floods ■ Heavy Rain ■ Landslides ■ Others



Total disasters: 57,581

AFFECTED POPULATION

■ Flash Floods ■ Floods ■ Heavy Rain ■ Landslides ■ Others



Fonte: Sistema S2iD – Cenad/MIDR

Flood Vulnerability Atlas

ANA duties (art. 4º, Federal Law nº 9.984/2000):

" ...

X – to plan and promote actions to prevent or minimize the effects of droughts and floods, within the National Water Resources Management System, in articulation with the central agency of the National Civil Defense System, in support to States and Municipalities;

" ...

2014's Vulnerability Atlas

- Qualitative approach
- Interviews with state and municipal stakeholders

Risk Matrix

Impact	Frequency		
	RT > 10 years	5 < RT < 10 years	RT < 5 years
Localized damage	Low	Low	Medium
Reasonable damage to essential services, public facilities and homes	Medium	Medium	High
Damage to human life, significant damage to essential services, public facilities and homes	High	High	High



Objectives

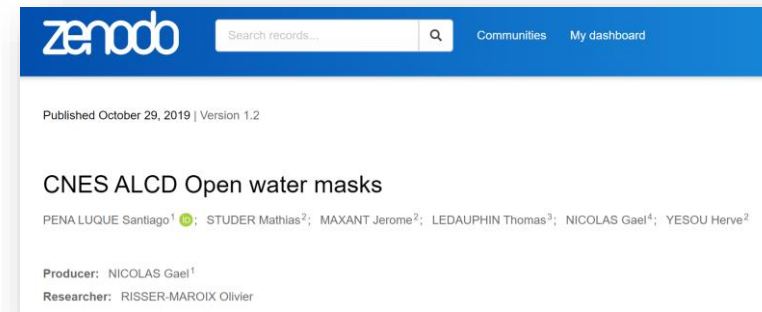
- Update the Flood Vulnerability Atlas moving from qualitative to quantitative approach
- New Technologies – Remote Sensing
 - Confirm events registered by authorities (and possibly adjust dates or categories)
 - Find non-registered disasters
 - Map flood-prone areas in Brazilian municipalities (>5,500)
- Global Flood Monitoring (GFM) database can be used to identify/map past events

S1 – Water detection

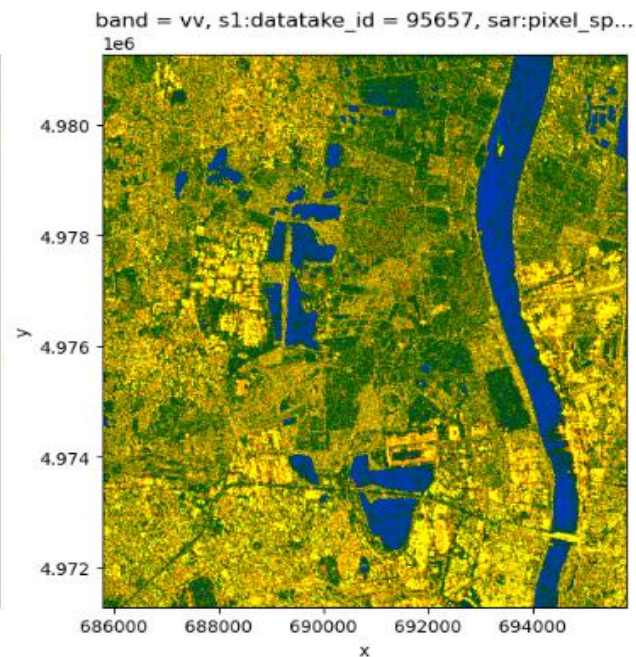
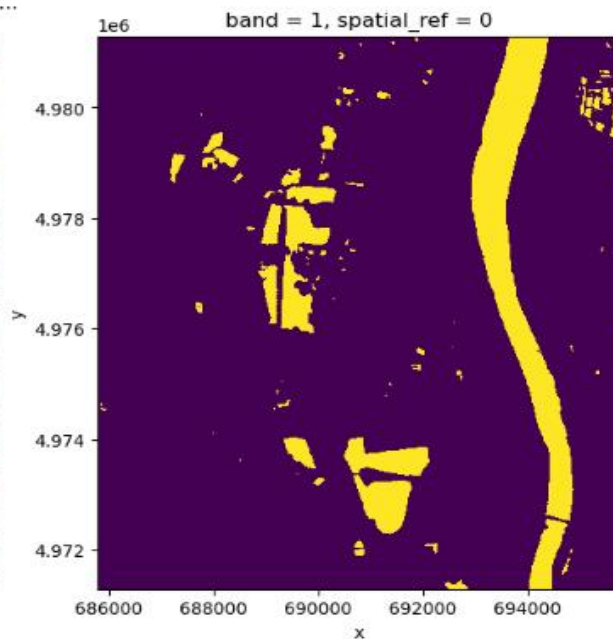
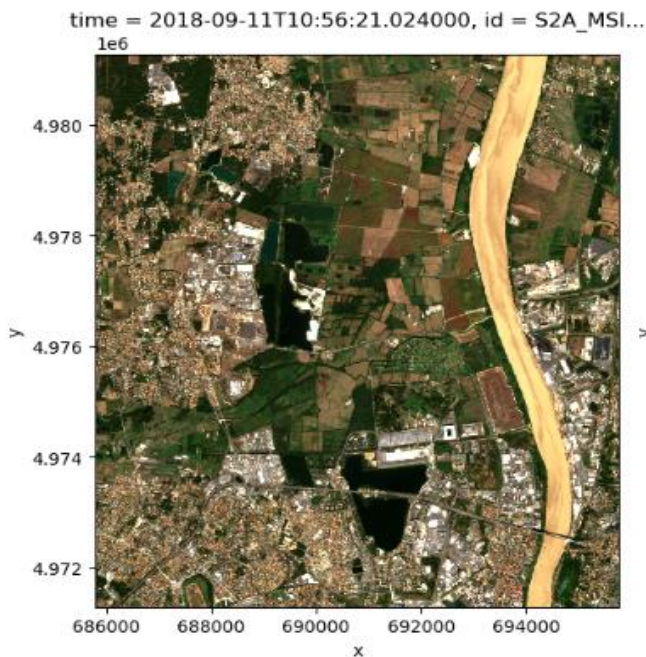
- Sentinel 1 – Radiometrically Terrain Corrected (RTC)

 Microsoft |  Planetary Computer

- Paired to 26 Sentinel-2 images with high quality masks (CNES ALCD Open Water Masks)
- Random Forests Classifier using both polarizations VV and VH
(5k pixels for each image – 50/50 balance)

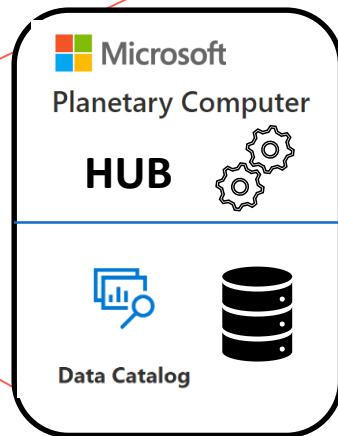
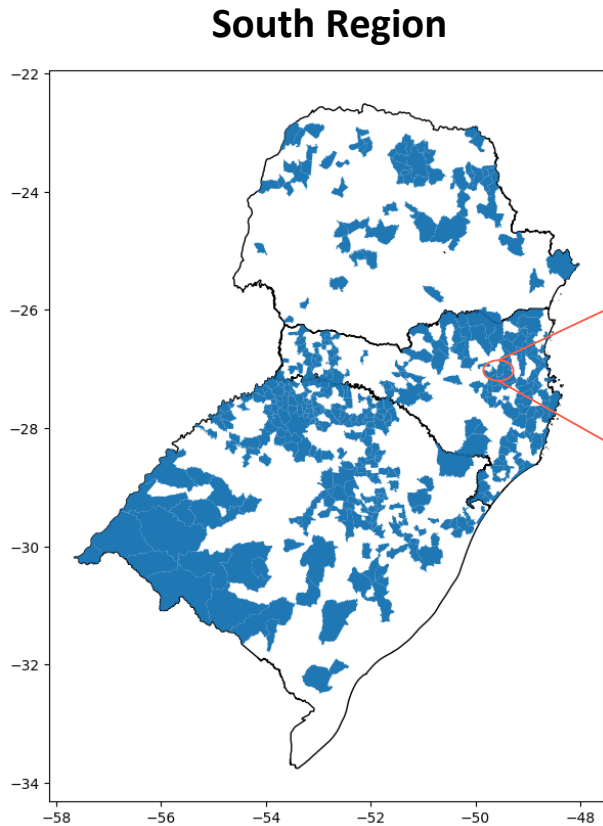


<https://zenodo.org/records/3522069>

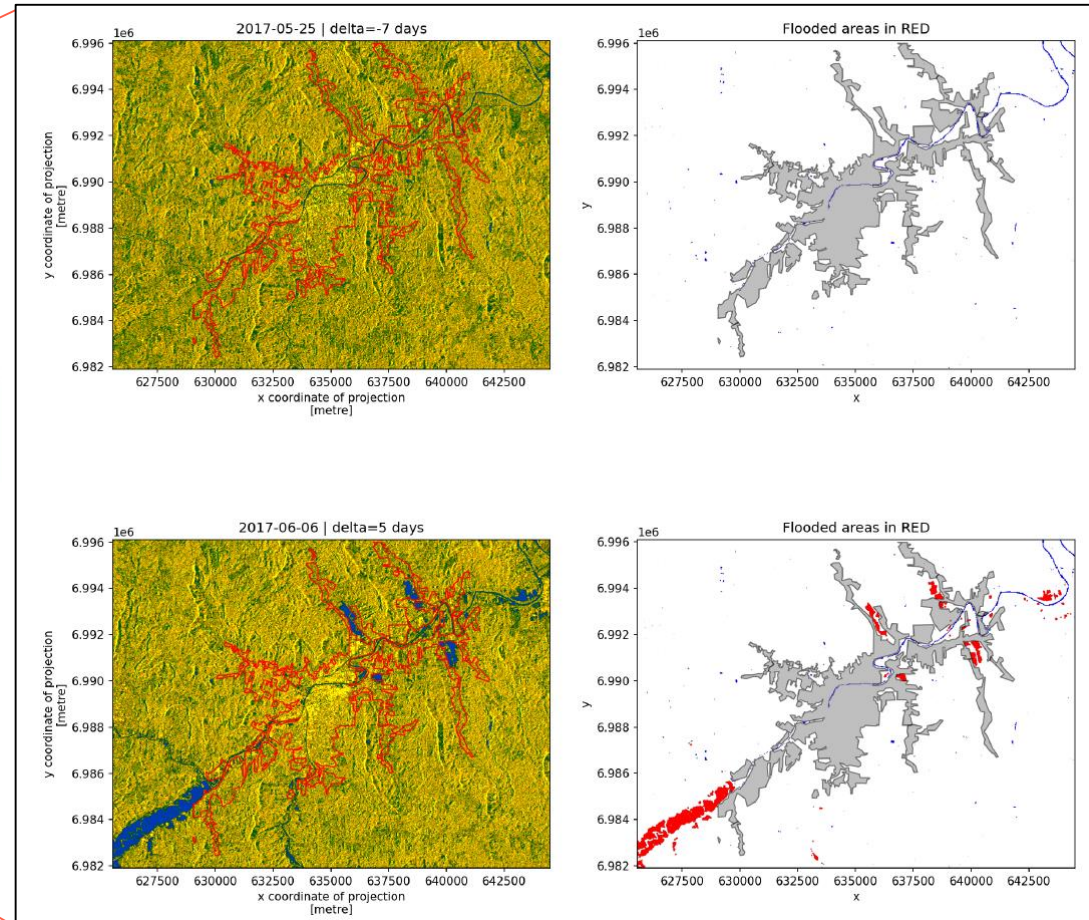


1st Processing

- Keep track of disasters occurred between **2016 and 2020** in South of Brazil
- **700** disasters registered as **floods** and **flash floods** - **430** distinct municipalities (only tabular data)
- **Zoom-in** on the main urban areas

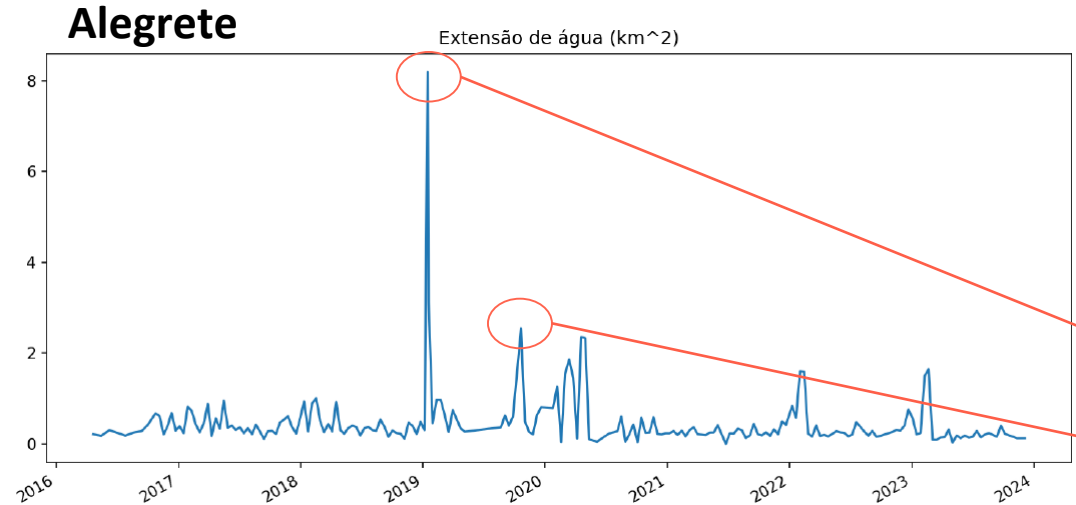


PDF Report – Rio do Sul / SC



Results and Next Steps

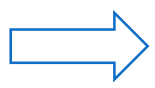
- Identification of undocumented or misclassified flood events seem promising



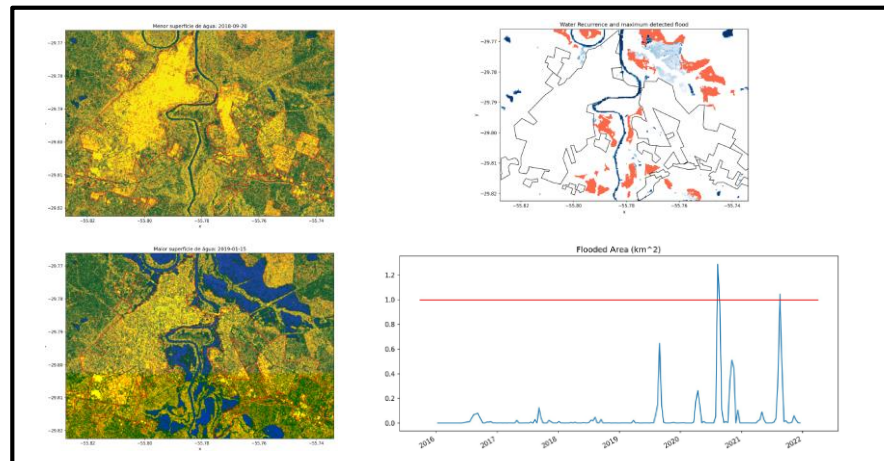
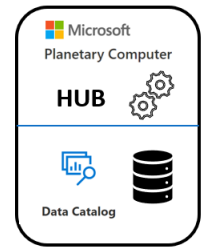
Disasters Sheet (Alegrete)

RS-F-4300406-12100-20170411	Alegrete	RS	4/11/2017	River Flood
RS-F-4300406-12100-20161017	Alegrete	RS	1/8/2019	Heavy Rain
RS-F-4300505-12200-20190511	Alegrete	RS	10/27/2019	Storm

- Implement automated GFM retrieval of historical data



LAYERS
[Observed flood extent]
[Observed water extent]



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MINISTÉRIO DA
INTEGRAÇÃO E DO
DESENVOLVIMENTO
REGIONAL



Obrigado!

até a próxima.