

Case study:

South Africa (11-13 April 2022)



Cite: [CNN](#)

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2. CNR - ISAC
3. ECMWF
4. TUWIEN
5. CNR - IRPI

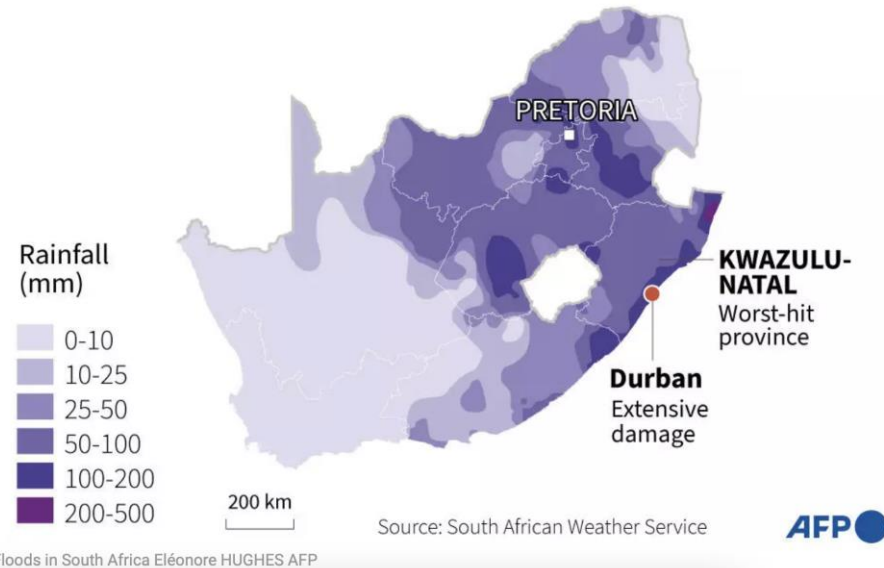
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Introduction

Rainfall for April 1-10, based on preliminary data



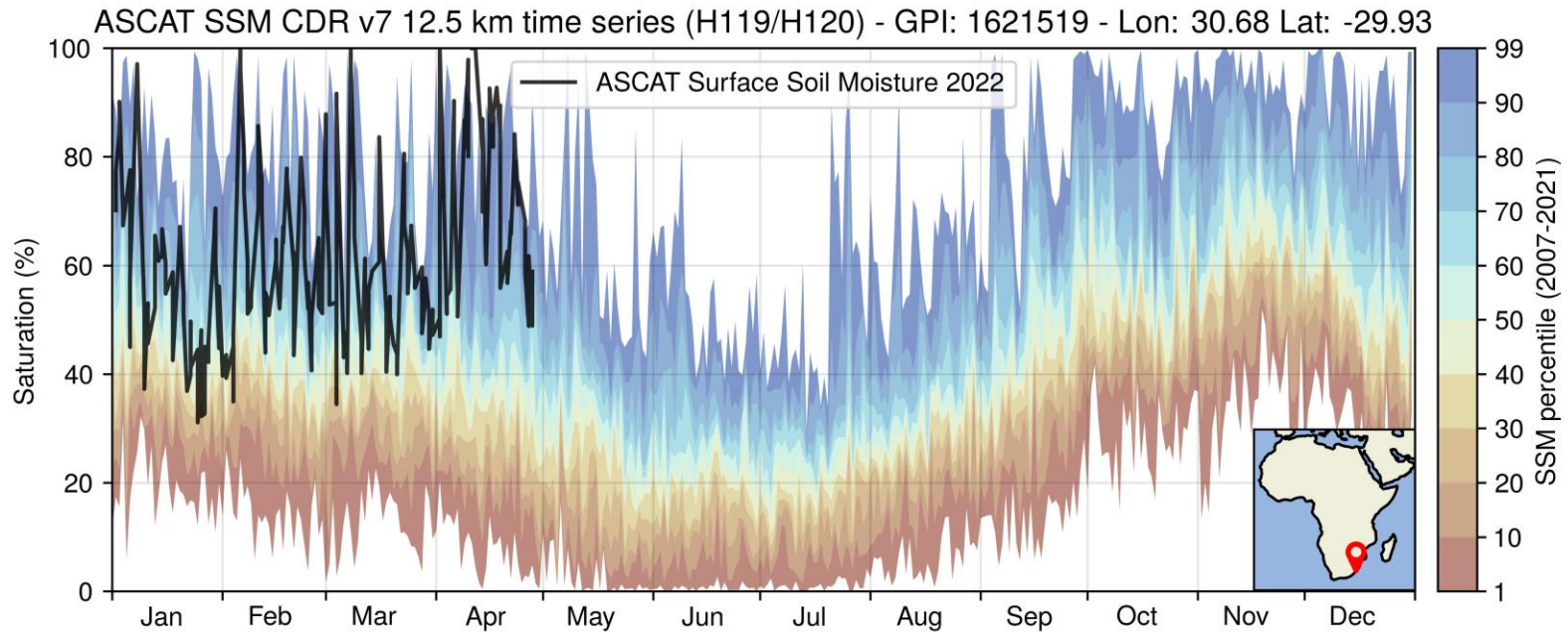
“Durban experiences floods every year, but not as severe as these.”

Cite: <https://www.france24.com/en/live-news/20220418-what-s-behind-south-africa-s-flood-disaster>

The city of Durban, in South Africa, is particularly vulnerable to heavy rainfall; in the costal area, in the **first 13 days of April 2022**, almost **200 mm of cumulative rainfall** were reached (i.e. P-AC-SEVIRI-PMW [H61] product).

An **intense flooding** has been registered in the period **11-13th April 2022**.

Satellite Soil moisture analysis



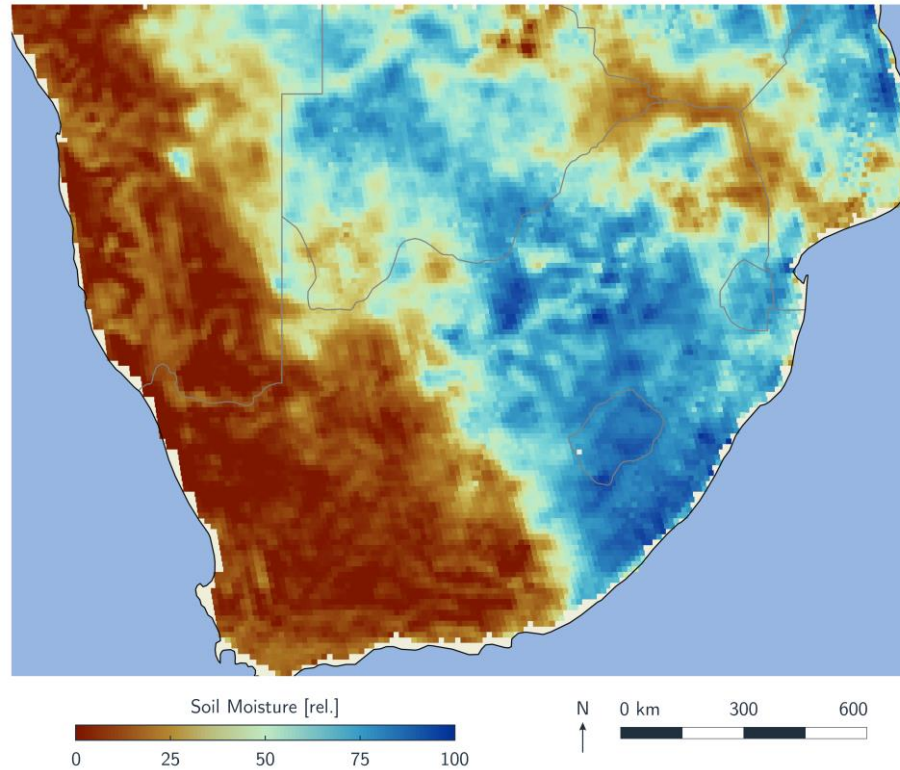
ASCAT SSM DR product (SSM-ASCAT-DR2019-TS12.5 [[H119](#)]/H120)

Surface soil moisture time series (based on the H SAF ASCAT Surface Soil Moisture (SSM) Data Record (DR) v7 product - H119/H120) for an area close to Durban.

Highly saturated soil surface conditions can be seen in the **beginning of April 2022** compared to surface soil moisture percentiles derived from previous years 2007-2021.

Satellite Soil moisture analysis

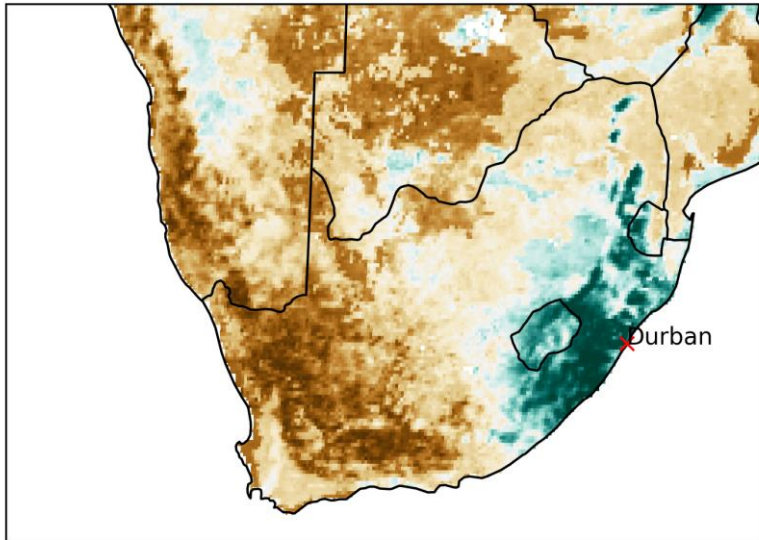
ASCAT NRT Surface Soil Moisture | South Africa | 2022/04/12 - 2022/04/14



Composite of the H SAF ASCAT Surface Soil Moisture (SSM) near real-time (NRT) products (SSM-ASCAT-A-NRT-O12.5 [H101], SSM-ASCAT-B-NRT-O25 [H103]) for the period 12-14 April 2022. **Surface soil moisture saturation levels are very high** in south-eastern South Africa due to heavy rainfall.

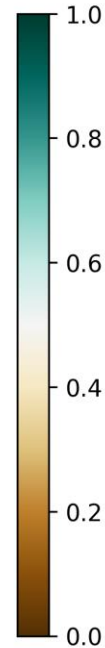
Satellite Soil moisture analysis

h26 layer 3 SWI (-), 2022041300

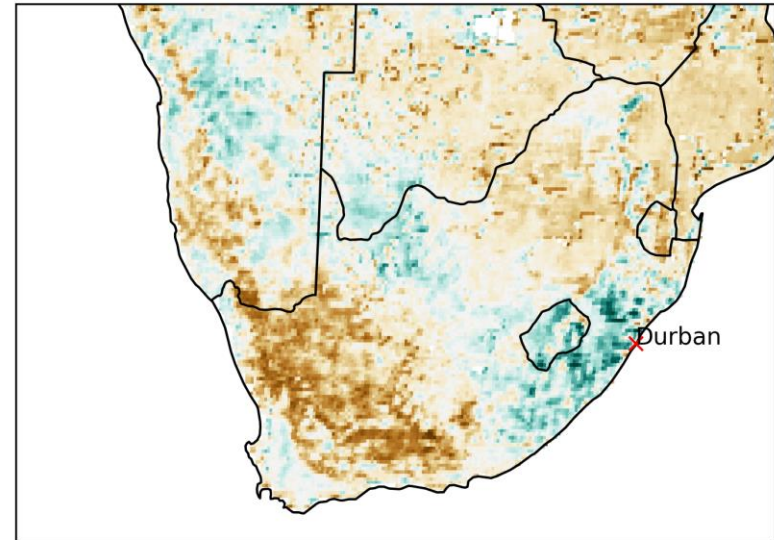


Liquid root-zone soil wetness index (RZSM-ASCAT-NRT-10 [H26])

RZSM-ASCAT-NRT-10km (H26), 13th April 2022 at 00UTC, for variable var42 (layer 3, 28-100 cm depth). **Saturated soil moisture conditions** are present around Durban during the flooding events.

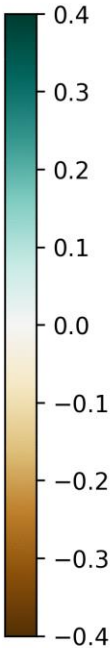


h26 layer 3 SWI anomaly (-), 2022040100

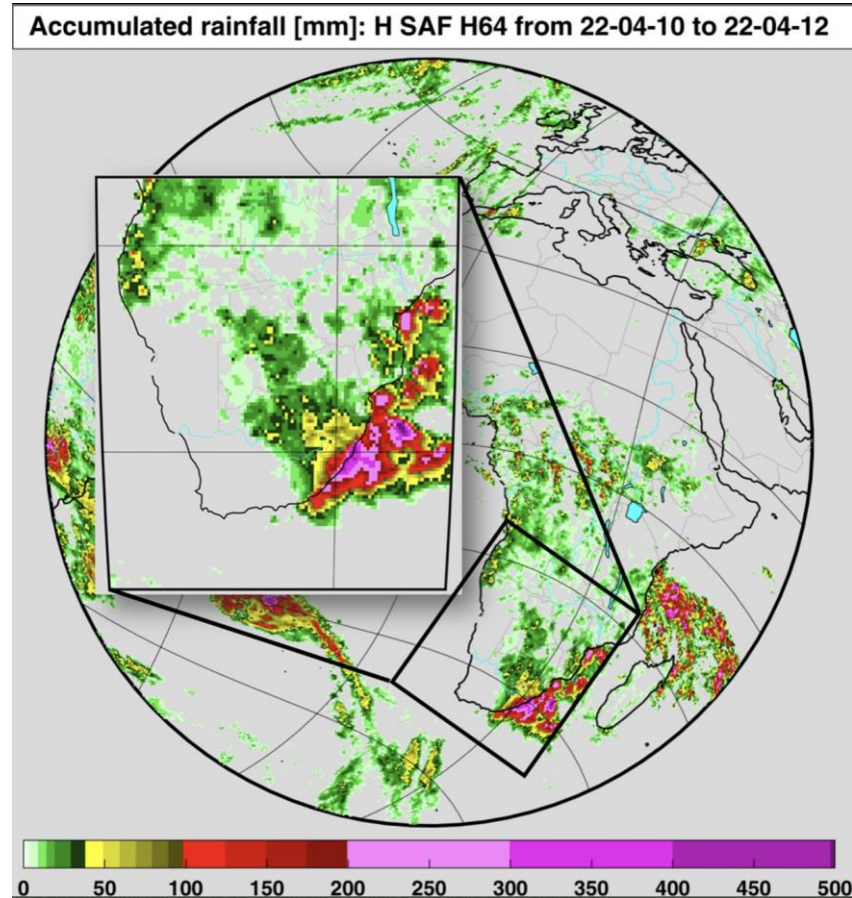


Liquid root-zone soil wetness index anomaly (RZSM-ASCAT-NRT-10 [H26])

RZSM-ASCAT-NRT-10km (H26) anomaly animation (20220401-20220416) for variable var42 (layer 3, 28-100 cm depth) with respect to 1992-2021 RZSM-DR2019-10km April mean. **Anomalously wet soil moisture conditions** are present around Durban **from the start of April**, with a **rapid increase during the flooding events** from 11th to 13th April.

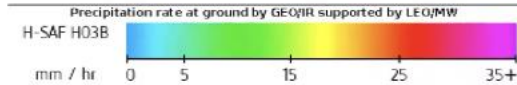


Satellite Precipitation analysis

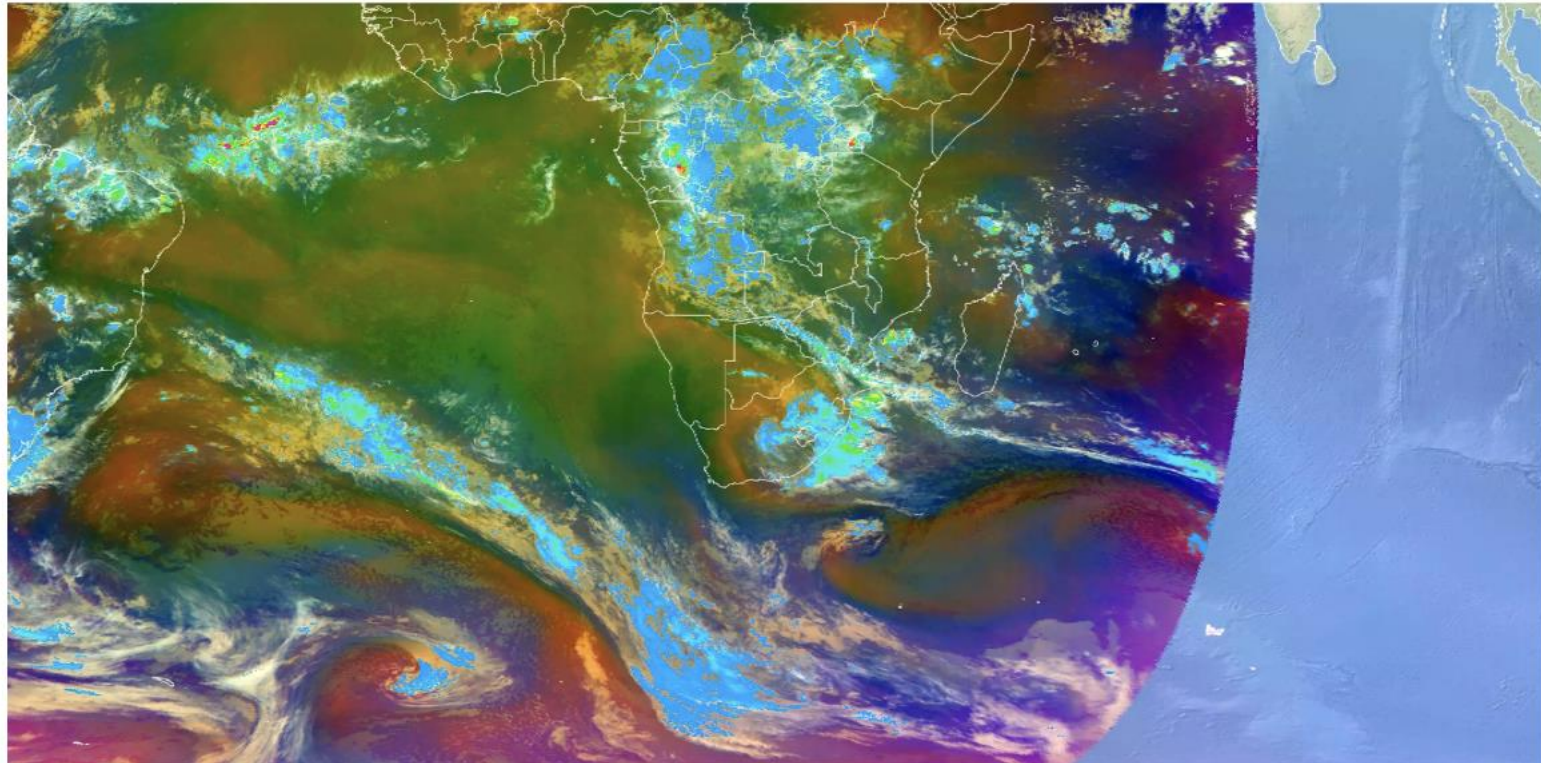


P-AC-SM2RAIN [H64] product highlighted 300 mm of accumulated precipitation in 3 days, in the South Africa (11-12 April 2022).

Satellite Precipitation analysis



Click on the image to see the animation

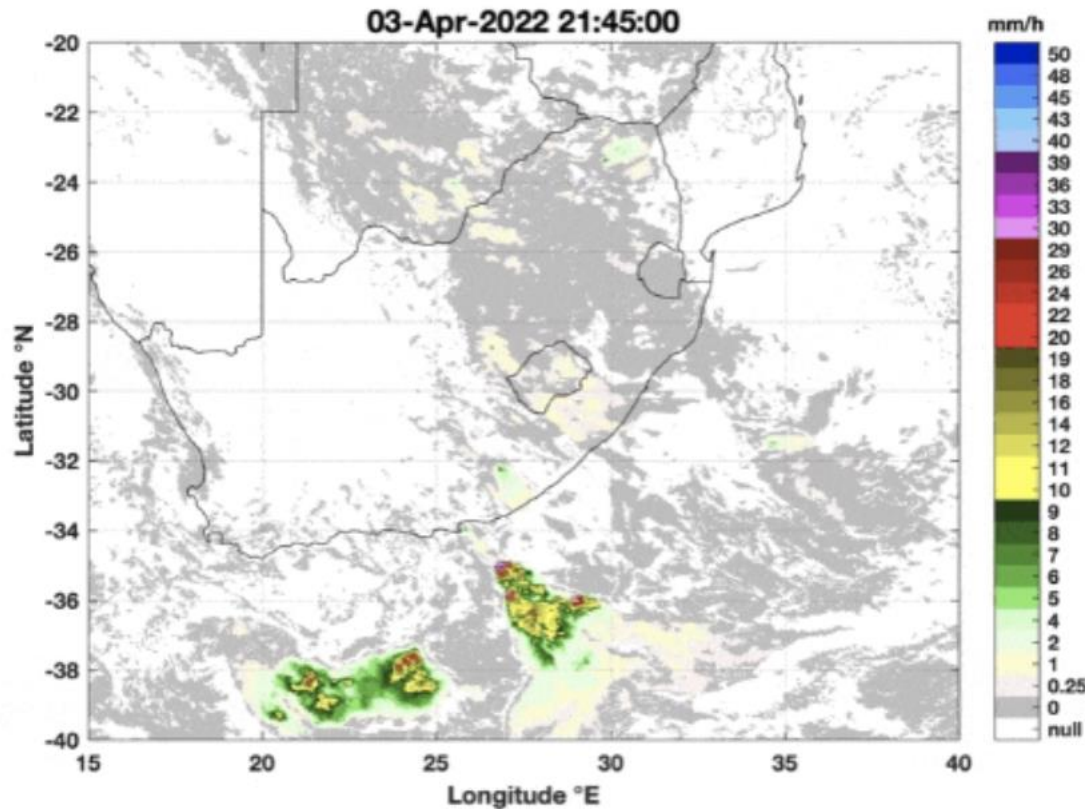


2022-04-11 00:00:00 UTC

P-IN-SEVIRI [H03] (Precipitation rate at ground by blended MW and IR) animation from EUMETview shows persistent, over nearly 3 days, precipitation in the South Africa (11-12 April 2022).

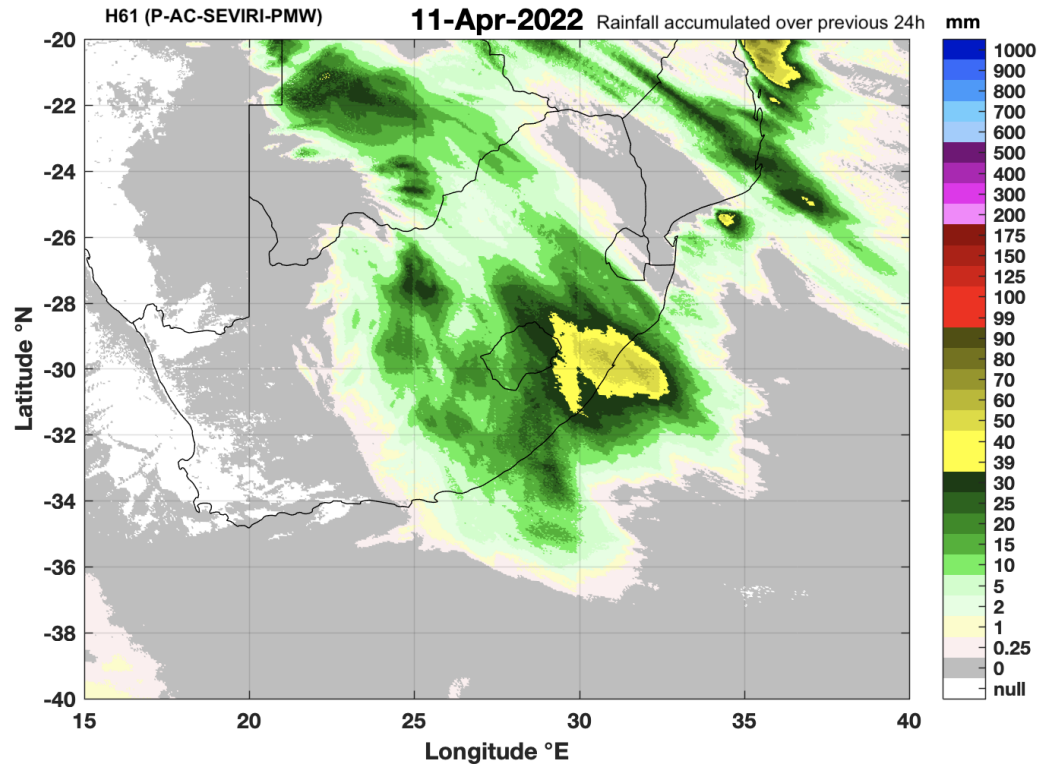
Satellite Precipitation analysis

Click on the image to see the animation



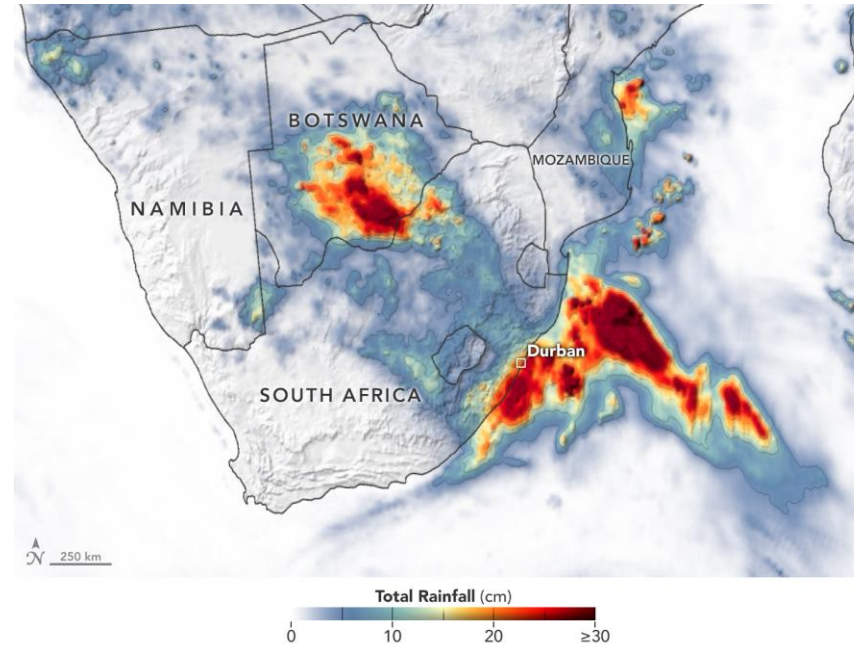
Instantaneous precipitation (time frequency of 15 minutes) estimated by the product H SAF P-IN-SEVIRI-PMW (H60) from **1st to 15th April 2022** over South Africa. Even if the maximum instantaneous precipitation values never exceed 50 mm/h, the **persistence** of the event brings to a **notable accumulation**.

Satellite Precipitation analysis



The image shows the **24 hours precipitation accumulated on 11 April, 00:00** (P-AC-SEVIRI-PMW [H61]), which mainly involved the city of Durban, in the south east of South Africa, with values **over 50 mm over 24h**.

Satellite Precipitation analysis



«The map above depicts a satellite-based estimate of rainfall over a seven-day period ending on April 13, 2022. The darkest reds reflect the highest rainfall amounts, with some places in Botswana and South Africa receiving as much as 30 centimeters (12 inches) or more. The data are remotely sensed estimates that come from the Integrated Multi-Satellite Retrievals for GPM (IMERG), a product of the Global Precipitation Measurement (GPM) satellite mission. Local rainfall amounts can be significantly higher when measured from the ground.»

Cite: <https://earthobservatory.nasa.gov/images/149720/deluge-in-south-africa>

Summary and conclusion

- The area of **Durban** is particularly sensitive to severe precipitation.
- In the costal area, in the **first 13 days of April 2022**, almost **200 mm of cumulative rainfall** were registered (i.e. P-AC-SEVIRI-PMW [H61] product).
- An **intense flooding** hit the area in the period **11-13th April 2022**.
- **Anomalously wet soil moisture conditions** are present around Durban from the start of April, with a **rapid increase during the flooding events** from 11th to 13th April.

Satellite products have **identified and described** the case study **phenomenon**, showing the persistency of the event and identifying the amount of accumulated precipitation.



Cite: <https://www.france24.com/en/live-news/20220418-what-s-behind-southafrica-s-flood-disaster>