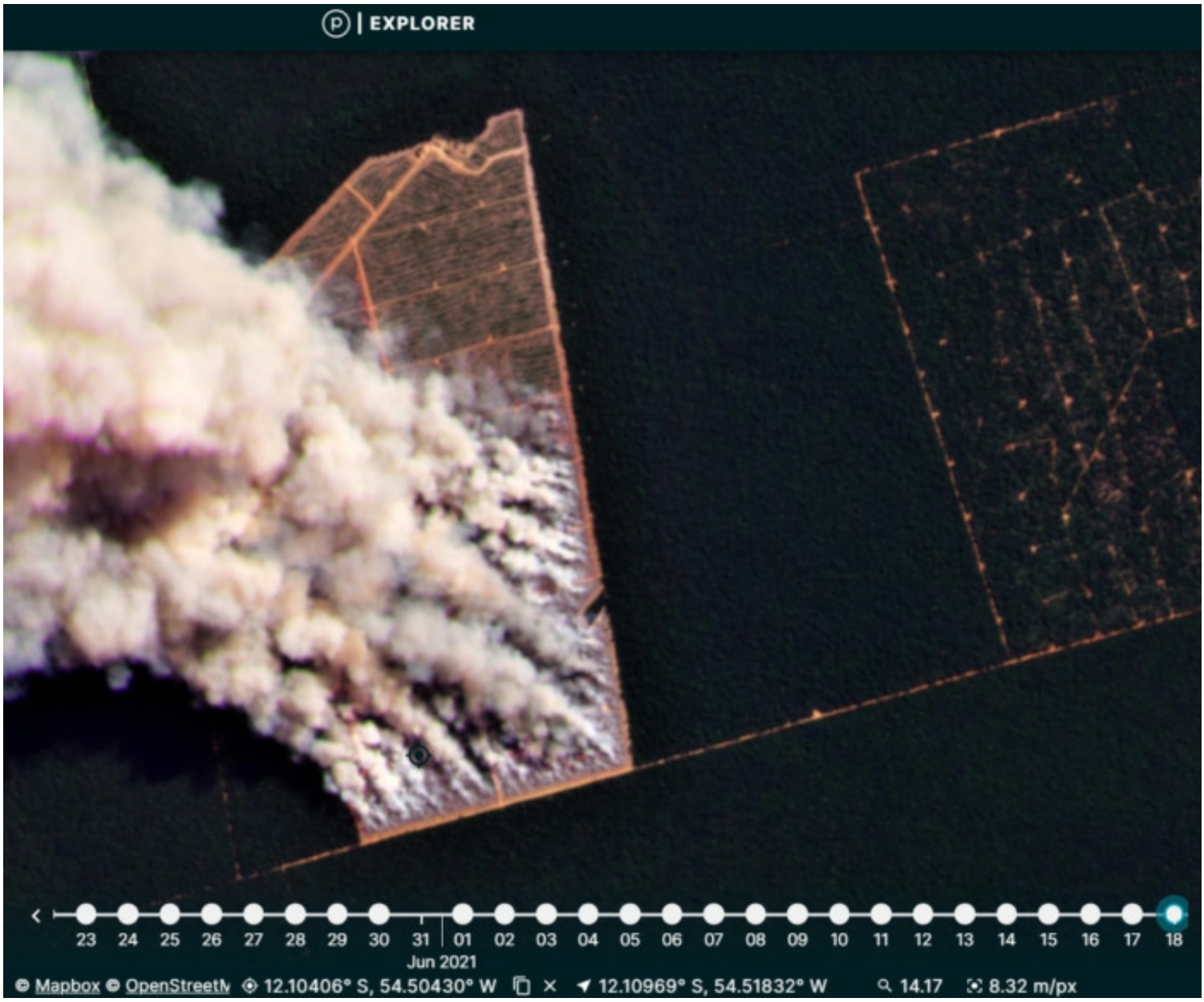
Amazon Fire Tracker 2021: Brazilian Amazon Fire Season Intensifies



2021 Brazilian Amazon Fire #17 (June 18, Mato Grosso). Data: MAAP, Planet.

We have documented **24 major fires** in the Brazilian Amazon thus far in 2021 (as of June 29), based on our unique **real-time Amazon fire monitoring app**,

In 2020, we demonstrated the power of the app, documenting over 2,500 major fires across the Bolivian, Brazilian, and Peruvian Amazon (MAAP #129).

In a **new and unique** approach, the app combines data from both the atmosphere (aerosol emissions in smoke) and the ground (heat anomaly alerts) to quickly and precisely detect **major Amazon fires** (MAAP #118).*

We recently reported that the 2021 Brazilian Amazon fire season started on May 19-20, with a pair of major fires on the southern edge of the Amazon in the state of Mato Grosso. For comparison, the intense 2020 fire season started on May 28.

Here, we provide an update through the end of June: we have documented 24 major fires in the Brazilian Amazon, all of which have occurred in the state of Mato Grosso. See the **Base Map** below for major fire locations (**orange dots** indicate major 2021 Amazon fires).

Importantly, by analyzing an archive of satellite imagery from the company Planet, we have confirmed that all 24 major fires **burned recently deforested areas**. That is, all of the fires were burning the abundant remaining biomass in areas freshly

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deforested in 2020 and even 2021 (over **7,000 hectares**, or 17,000 acres, in total).

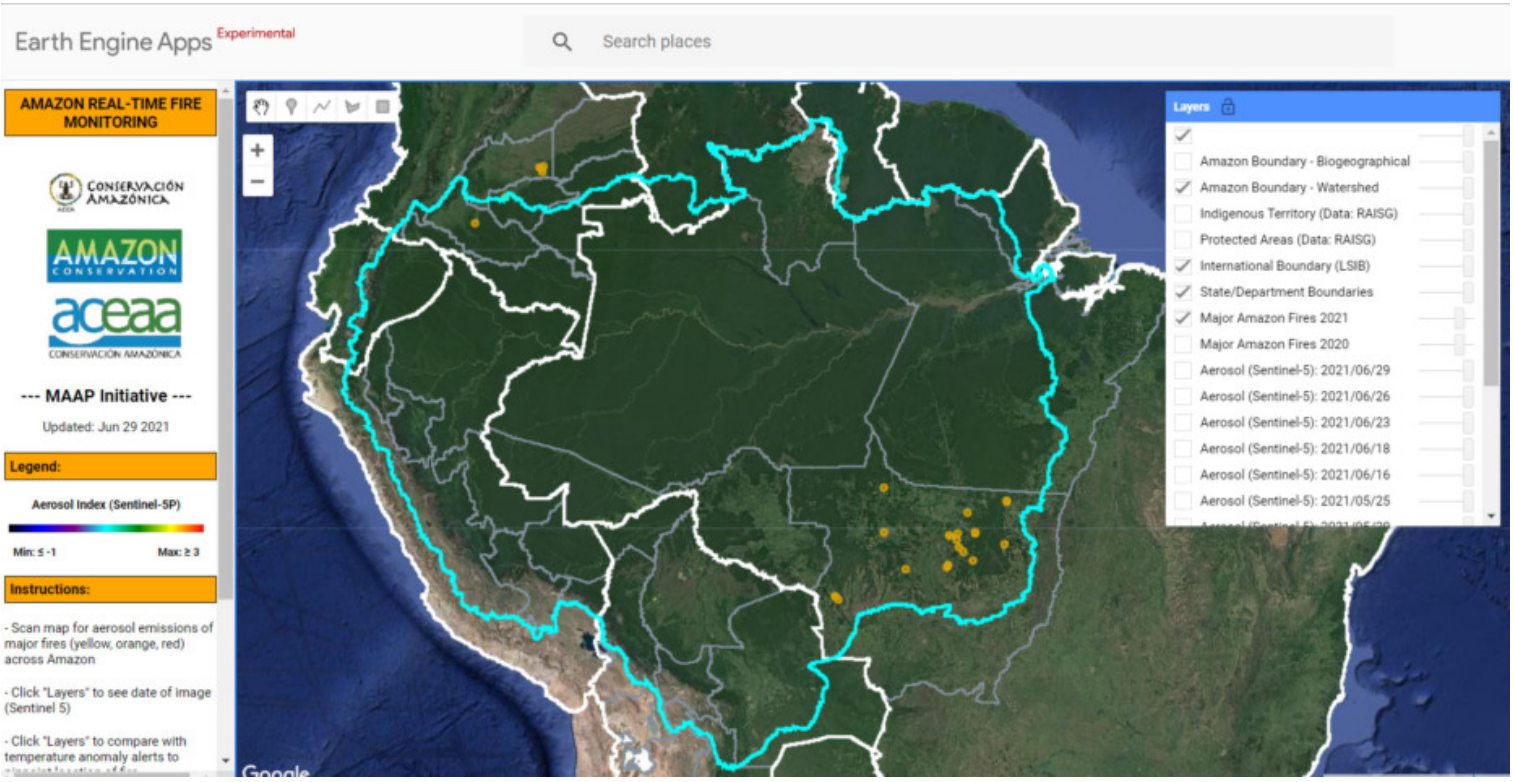
Thus, the **critical pattern is Deforestation followed by Fire**.

To clarify this important point, we have not yet documented “forest fires” impacting intact Amazon forest, but these types of fires are expected later in the fire season, as was the pattern documented in 2020 (see MAAP #129). Also, nearly all fires in the Amazon are assumed to be human-caused and not natural wildfire events.

Below, we present the Base Map along with a striking series of **satellite imagery videos** showing this critical process of Amazon deforestation followed by major fires. Note that for fire #22, the burning occurred in areas deforested as recently as May 2021.

Base Map: Major Amazon Fires 2021

The Base Map shows the location of the 2021 major Amazon fires (**orange dots**), as visualized in the app. Note the concentration of fires in the southeastern Brazilian state of **Mato Grosso**. Keep in mind all those dots also indicate major recent deforestation events. None of these fires directly impacted a protected area or indigenous territory (see Annex). Also note several major fires in the **Colombian Amazon** that we detected earlier in the year, during that region's peak season of February -March.



Satellite Imagery Videos

Brazilian Amazon Fires #5 and #23

We detected this series of major fires on May 28 and June 27, in the state of Mato Grosso. As the satellite video shows, this area was deforested in 2020 prior to being burned in June 2021.

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https://www.maaproject.org/wp-content/uploads/2021/06/maaproject.org-amazon-fire-tracker-2021-brazilian-amazon-fire-season-intensifies-Fires-5-23.mp4

https://www.planet.com/stories/brazilian-amazon-fire-23-9yAJFJznR

Brazilian Amazon Fire #22

We detected this major fire on June 27, in the state of Mato Grosso. As the satellite video shows, this area was deforested quite recently (March-May 2021) immediately prior to being burned in June.

https://www.maaproject.org/wp-content/uploads/2021/06/maaproject.org-amazon-fire-tracker-2021-brazilian-amazon-fire-season-intensifies-fire22.mp4

Brazilian Amazon Fire #17

We detected this major fire on June 18, in the state of Mato Grosso. As the satellite video shows, this area was deforested in late 2020 and early 2021 prior to being burned in June 2021.

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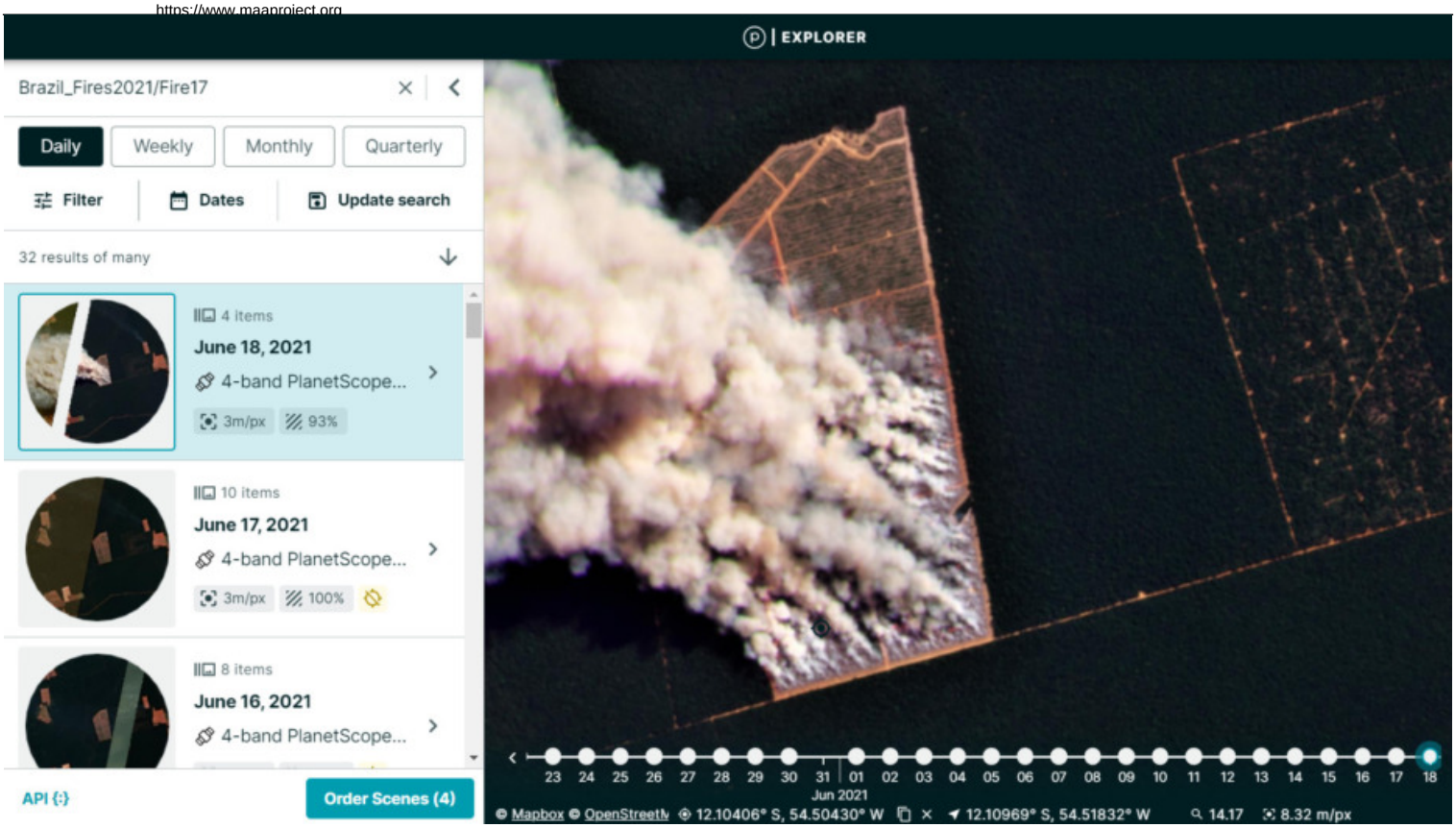

https://www.maaproject.org/wp-content/uploads/2021/06/maaproject.org-amazon-fire-tracker-2021-brazilian-amazon-fire-season-intensifies-17.mp4

Brazilian Amazon Fire #2

We detected the second major fire of the year in the Brazilian Amazon on May 20, also on the southern edge of the Amazon in the state of Mato Grosso. As the satellite video shows, this area was also first cleared in 2020 and then later burned in 2021.

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2021 Brazilian Amazon Fire #2. Mato Grosso. Data: MAAP, Planet.

https://www.maaproject.org/wp-content/uploads/2021/05/maaproject.org-amazon-fire-tracker-2021-brazilian-amazon-fire-season-begins-Brazil2021-2.mp4

Annex

The Annex map shows a zoom of the southeastern Brazilian Amazon, as visualized in the app with the protected areas and indigenous territories layers activated. Note that none of the 24 major fires directly impacted a protected area or indigenous territory.

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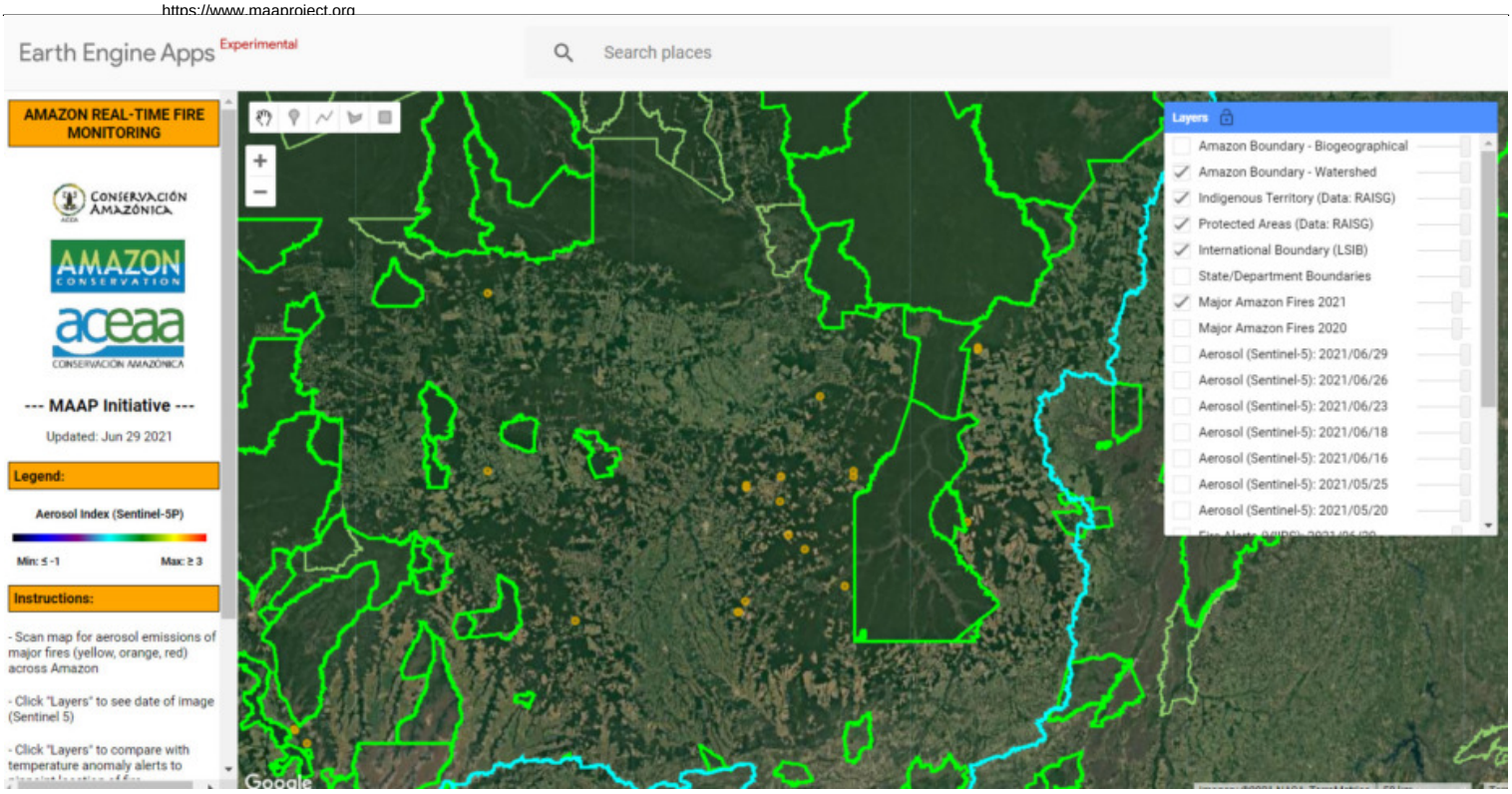

*App Background

We launched a new and improved version of the **Amazon real-time fire monitoring app** in May 2021. The app is hosted by Google Earth Engine and updated every day by the organization Conservación Amazónica, based in Peru.

The app displays aerosol emissions as detected by the European Space Agency's Sentinel-5 satellite. Elevated aerosol levels indicate the burning of large amounts of biomass, defined here as a "major fire". In a novel approach, the app combines data from the atmosphere (aerosol emissions in smoke) and the ground (heat anomaly alerts) to effectively detect and visualize major Amazon fires.

When fires burn, they emit gases and aerosols. A new satellite (Sentinel-5P from the European Space Agency) detects these **aerosol emissions** (aerosol definition: Suspension of fine solid particles or liquid droplets in air or another gas). Thus, the major feature of the app is detecting elevated aerosol emissions which in turn indicate the burning of large amounts of biomass. For example, the app distinguishes small fires clearing old fields (and burning little biomass) from larger fires burning recently deforested areas or standing forest (and burning lots of biomass). The spatial resolution of the aerosol data is 7.5 sq km. The high values in the aerosol indices (AI) may also be due to other reasons such as emissions of volcanic ash or desert dust so it is important to cross reference elevated emissions with heat data and optical imagery.

We define "**major fire**" as one showing elevated aerosol emission levels on the app, thus indicating the burning of elevated levels of biomass. This typically translates to an aerosol index of >1 (or cyan-green to red on the app). To identify the exact source of the elevated emissions, we reduce the intensity of aerosol data in order to see the underlying terrestrial heat-based fire alerts. Typically for major fires, there is a large cluster of alerts. The major fires are then confirmed, and burn areas estimated, using high-resolution satellite imagery from Planet Explorer.

Since the data updates daily and is not impacted by clouds, **real-time monitoring** really is possible. Our goal is to upload each day's new image in the late afternoon/early evening.

Acknowledgements

The app was developed and updated daily by Conservación Amazónica (ACCA). The data analysis is led by Amazon Conservation in collaboration with SERVIR Amazonia.

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The Amazon Fire Tracker series is supported by NORAD (Norwegian Agency for Development Cooperation) and ICFC (International Conservation Fund of Canada).

Citation

Finer M, Villa L (2021) Amazon Fire Tracker 2021: Brazilian Amazon Fire Season Intensifies. MAAP.

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