

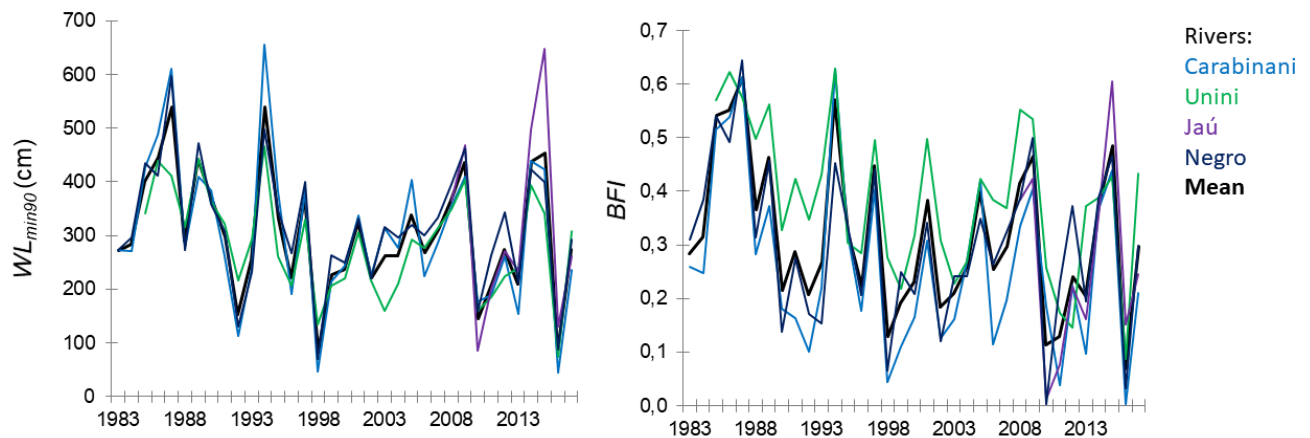
Supplementary Material

Supplementary Table 1. Obtained climatic and hydrographic data for analyses obtained from the Brazilian National Institute of Meteorology (INMET) and the Hidroweb platform operated by the Brazilian National Water Agency (ANA) and the Geological Survey of Brazil (CPRM).

Parameter	Region	Station	Station code	Coordinates	Period	Data gaps	Source
Temperature	Negro River	Manaus	82331	3.10°S/60.01°W	07/1982-06/2017	11/1982; 07-12/1990	INMET
Temperature	Negro River	Barcelos	82113	0.97°S/62.92°W	07/1982-06/2017	06-07/1982; 09-12/1986; 08/1989-01/1993; 06-09/1993; 06/2009; 09/2014; 08/2015; 10/2016	
Precipitation	Negro River	Moura	161002	1.46°S/61.63°W	07/1982-06/2017	02-04/1991; 03/2008	HidroWeb (SNIRH-ANA/CPRM)
Precipitation	Negro River	Novo Airão	260006	2.62°S/60.95°W	07/1982-06/2017	-	
Precipitation	Unini River	Umanapana	162002	1.89°S/62.44°W	05/1984-06/2017	-	
Precipitation	Jaú River	Seringalzinho	161004	1.83°S/61.60°W	09/2005-06/2017	06-10/2007; 12/2009-02/2010; 08/2013; 12/2013; 07/2016	
Precipitation	Carabinani River	Baruri	261000	2.03°S/61.54°W	07/1982-06/2017	10/1993-06/1994; 05/1996; 09/2003-02/2004; 05/2006; 02/2007; 05/2008; 07/2008; 05/2009; 07/2010; 12/2013; 03/2014; 05/2014; 08/2014; 10/2016	
Water level	Negro River	Moura	14840000	1.46°S/61.63°W	07/1982-06/2017	-	
Water level	Unini River	Umanapana	14855000	1.89°S/62.46°W	05/1984-06/2017	-	
Water level	Jaú River	Seringalzinho	14876000	1.83°S/61.60°W	09/2005-06/2017	10-11/2006; 11/2009-02/2010	
Water level	Carabinani River	Baruri	14880000	2.03°S/61.54°W	07/1982-06/2017	12/1982-01/1983; 10/1993-06/1994; 10-11/1995; 09-11/1997; 09-10/2003; 05-06/2006; 01-03/2007; 07-08/2007; 05/2008; 10-12/2009	
Ocean Niño Index	Equatorial Pacific			5°N-5°S/ 120°-170°W	07/1982-06/2017	-	NOAA



Supplementary Figure 2. Burned blackwater *igapó* forests in January 2016 at the location ‘Seringalzinho’ in the Jaú National Park. The arrow indicates the flood height from 2017 (credits: Jochen Schöngart).



Supplementary Figure 2. Average (black curve) of 90-day minimum water level (WL_{min90}) and baseflow index (BFI) based on available data for the Negro, Unini, Carabinani and Jaú rivers for the period 1982-2016 (data: SNIRH/ANA).

Supplementary Video. Release of flammable methane from the trunk hollow of *Macrolobium acaciifolium* (Fabaceae), an abundant and frequent tree species in Amazonian floodplains. Video from the clearwater igapó of the Tapajós River during the dry season in September 2017. (<https://drive.google.com/file/d/1o2C98WrxRGj-l3Dx1a9dLpIgkTdJzwu9/view?usp=sharing>; credits: Jochen Schöngart).

Historical Background Information of the Study Region

Archeological studies and hundreds of petroglyphs at the Jaú National Park (JNP) and Extractive Reserve Rio Unini indicate human occupation in the study region from the late Holocene, probably by multiethnic groups from the linguistic families Maku and Arawak (Valle, 2012). While the Maku ethnic groups were mainly nomads, hunters, and collectors inhabiting the large forested Japurá-Negro interfluvial region, the Arawak were considered ‘riverine people’ performing agriculture at fixed settlements (Nimuendaju, 1950).

During the 17th century the Portuguese colonization of the Amazon basin started towards the West construction forts at strategic locations. Several religious orders established missions along the major rivers under the administration of the Portuguese regime (Tavares, 2011). Santo Elias do Jaú was founded by Carmelite missionaries in 1694 as the first settlement at the Negro River, located close to the mouth of the Jaú River (Figure 1). Ethnic groups at the JNP at this period were Aroaqui, Manao, Tarumã, Baré, and Tucum indigenous people (Leonardi, 1999). Carmelites and merchants transformed the livelihood of the indigenous people creating settlements to explore their labor for extraction of natural resources (‘Drogas do Sertão’) (Sampaio, 2003). This transformation, together with conflicts (such as the ‘Guerra Justa’ declared against the Manao Indians in 1728) and disease outbreaks resulted in the exodus of the Tarumã and Bare groups and decimation of the Manao populations along the lower Negro River. The remaining Aroaqui, Tucum and some Baré and Manao people who continued living in the region formed the so-called ‘tapuia’ population (indigenous descendants) (Leonardi, 1999).

After the Treaty of Madrid in 1750 defining the limits between the Spanish and Portuguese colonies in South America, the Portuguese Crown expanded towards the Amazon basin to delimitate their territory establishing in 1755 the Captaincy of São José do Rio Negro with Barcelos (former Mariuá established in 1728 by Carmelite missionaries) as capital. During this period, the reformist policy of Marquis of Pombal reduced the power of the Church, transforming the former Carmelite settlements along the Negro River to villages at strategic locations and Santo Elias do Jaú was named Airão in 1759 (Leonardi, 1999). The Pombalian reforms allowed the Portuguese invaders to procreate with the local native population. The Portuguese colonization of the Negro River basin was characterized by the military reinforcement and the consolidation of agriculture and extraction of natural resources by indigenous and ‘tapuia’ populations to guarantee the borders and the necessary labor to sustain the colonial economy (Sampaio, 2003). Meanwhile, Juma and Mura indigenous groups settled along the Unini and Jaú rivers, respectively, probably refuging from conflicts in their original territories (Leonardi, 1999). At the end of the 18th century, indigenous and ‘tapuia’ populations were forced by law (‘Carta Régia’ from 1798) to work for civil and military services (‘agarrações’), further decimating the native populations (Leonardi, 1999). In 1808, the capital was finally transferred from Barcelos to Vila da Barra do Rio Negro (later Manaus). This political movement during the last decades of the Portuguese regiment interrupted trade, navigation, extractive activities, agriculture, and supply along the Negro River leading to economic and demographic decline of many villages along the Negro River, including Airão and Barcelos (Sampaio, 2003).

After attaining independence from the Portuguese Crown (1821-1822), the Amazon region did not achieve integration by the new Brazilian Empire. A suppressed rebellion in 1832, demanding the autonomy of the Amazonas region, resulted in the creation of the District of the Upper Amazon (‘Comarca do Alto Amazonas’). Extreme poverty and diseases of the population finally resulted in the ‘Cabanagem’ (1835-1840), a popular revolution, which was defeated by interventions of the Brazilian Empire and allies which caused a further strong decimation of indigenous and descendant populations,

abandonment of many villages, and socioeconomic decay. Highly likely, the Mura and Juma groups were extinct during this period in the region of the JNP and ‘tapuias’ were heavily decimated or refuted to remote areas in headwater regions (Leonardi, 1999).

The District of the Upper Amazon defeated the rebellion against the imperial government and as a sort of reward for loyalty, the Province of Amazonas was officially created in 1850 and received its autonomy with Manaus as capital in 1856. This period was the beginning of a strong economic increase in the study region. Steamboats started to navigate in 1854 along the Negro River (until Santa Isabel do Rio Negro) (Leonardi, 1999), resulting in intensifying activities of resource extraction in the region (eggs of freshwater turtles, resins, oils). Airão had a strategic location to support steamboats with firewood (‘Porto de Lenha’) for navigation along the Negro River. According to Leonardi (1999), many tree species from the *igapó* forests were harvested mainly along the lower Jaú River. Thousands of immigrants from the Brazilian Northeast, who abandoned the semiarid region after the El Niño-induced Great Drought (1877-1879), settled in the study region at the end of the 1870s. Airão turned into an important economic reference for the commerce of rubber (*Hevea* spp.), extracted from the nearby river basins and from the upper Negro and Branco rivers. During the rubber boom (1880-1920), over a hundred settlements were established along the Jaú, Carabinani and Unini rivers along the lower sections and expanding to remote areas upstream of the rapids (Leonardi, 1990). The increasing extraction and commerce of rubber in the region, intensified the steamboat navigation even more. Firewood, needed for steamboats and vulcanization of rubber, probably resulted in large harvests of *igapó* forests. With the immigration of populations from mainly the Brazilian Northeast, also a deep social and cultural transformation occurred. Despite some remaining ‘tapuia’ people, who survived the suppressions of the past, most people settled in the region were immigrants without an intrinsic relationship to the Amazonian ecosystems.

After the collapse of the rubber boom in the 1920s, a progressive population decline occurred in the region of Airão which was finally abandoned in the 1950s. Estimates indicate about 3,000 residents in the 1970s living in the region of the JNP which reduced to more or less 1,000 in 1980 (Leonardi, 1999) with the establishment of the protected area. Since then, a further progressive population decrease occurred during the 1990s and 2000s, since people are not allowed to reside in this category of protected area (SNUC Law 9.985/2000). However, still some residents live within the JNP (FVA, 1998) practicing resource extraction of lianas (*Heteropsis* spp.), Brazil nut (*Bertholletia excelsa*), oil (*Copaifera* spp.) and rubber (*Hevea* spp.), small-scale agriculture (mainly *Manihot esculenta*), hunting and fishing (Borges et al., 2004).

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