Water Resources Research

Supporting Information for

Expressive riverine fluxes over Amazon floodplain units revealed by high resolution 2D modelling

Alice César Fassoni-Andrade[1,2]*, Rodrigo Cauduro Dias de Paiva[1], Sly Wongchuig[3], Claudio Barbosa[4], Fabien Durand[2,5]

[1] Institute of Hydraulic Research, Federal University of Rio Grande do Sul (UFRGS), Porto Alegre, Brazil.

[2] Institute of Geosciences, University of Brasília (UnB), Campus Universitário Darcy Ribeiro, Brasília, Brazil.

[3] Univ. Grenoble Alpes, IRD, CNRS, Grenoble INP, Institut des Géosciences de l'Environnement (IGE, UMR 5001), 38000, Grenoble, France.

[4] Instrumentation Lab for Aquatic Systems (LabISA), Earth Observation Coordination of National Institute for Space Research (INPE), São José dos Campos, SP, Brazil.

[5] Laboratoire d'Etudes en Géophysique et Océanographie Spatiales (LEGOS), Université Toulouse, IRD, CNRS, CNES, UPS, Toulouse, France.

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Introduction

In this supporting information, we provide detailed information on in situ and virtual stations used in the modeling (Table S1), area proportion of Manning's roughness coefficients class to the computational domain (Table S2), and water surface elevation metrics evaluated at Amazon River stations (Table S3).

Table S1 Name, code, and location of in situ stations operated by Agência Nacional de Águas e Saneamento Básico (ANA) and virtual stations available in Hydroweb

Name	Code	Source	Latitude	Longitude
Manacapuru	14100000	ANA	-3.308	-60.609
Porto de Moz	18950003	ANA	-1.753	-52.241
Moura	14840000	ANA	-1.456	-61.634
Jatuarana	15030000	ANA	-3.052	-59.678
Parintins	16350002	ANA	-2.630	-56.752
Santarém	17900000	ANA	-2.416	-54.716
Curuai	17060000	ANA	-2.268	-55.481
Óbidos	17050001	ANA	-1.947	-55.511
amz_amz_env_	0020_01	Hydroweb	-3.161	-59.465
amz_amz_env_	0063_01	Hydroweb	-3.338	-58.774
amz_amz_env_	0220_01	Hydroweb	-2.391	-54.266
amz_amz_env_	0263_01	Hydroweb	-2.083	-54.020
amz_amz_env_	0306_01	Hydroweb	-1.907	-55.596
amz_amz_env_	0349_01	Hydroweb	-1.946	-55.487
amz_amz_env_	0392_01	Hydroweb	-2.533	-57.171
amz_amz_env_	0435_01	Hydroweb	-2.611	-56.778
amz_amz_env_	0478_02	Hydroweb	-3.331	-58.784
amz_amz_env_	0521_01	Hydroweb	-2.953	-58.14
amz_amz_env_	0607_01	Hydroweb	-3.125	-59.539
amz_amz_env_	0764_01	Hydroweb	-2.146	-54.930
amz_amz_env_	0807_01	Hydroweb	-2.405	-54.668
amz_amz_env_	0850_01	Hydroweb	-2.368	-56.416
amz_amz_env_	0893_01	Hydroweb	-2.123	-56.167
amz_amz_env_	0936_01	Hydroweb	-2.798	-57.948
amz_amz_env_	0979_01	Hydroweb	-2.407	-57.542
R_amz_amz_jas_	0139_01	Hydroweb	-2.571	-56.897
R_amz_amz_jas_	0152_01	Hydroweb	-3.254	-59.068
R_amz_amz_jas_	0228_01	Hydroweb	-2.488	-56.508
R_amz_amz_jas_	0063_01	Hydroweb	-3.281	-59.985

Table S2 Manning's roughness coefficients adopted in each class of the mapping of Hess et al. (2015) and proportion of the area occupied in the computational domain

Class	Description (Hess et al., 2003)	Mapping code (Hess et al., 2015)	Manning's roughness coefficients	Spatial proportion in the domain*
Open water	Lago, paraná, igarapé, furo	11 13	0.022 (Same as the river)	17%
Bare soil or herbaceous	Terreno aberto, campo, macrófitas aquáticas	21 23 33	0.03	18%
Shrub	Vegetação arbustiva, campina	41 44 45 51 55	0.04	11%
Woodland	Chavascal, pântano, savanas inundadas	66 67 77	0.14	27.3%
Forest	Floresta, mata	88 89 99	0.14	4.4%
Terra firme	Fora da planície de inundação	-	0.18	9.1%

*13.2% of the area represents the Amazon River.

Other studies have based on Hess' mapping assigning similar Manning's coefficient values. Rudorff et al. (2014a) used 0.14 and 0.10 for the forest and shrub vegetation classes. Pinel et al. (2019) assigned 0.032 for permanent water, 0.042 for shrub vegetation, 0.14 for flooded forest, and 0.18 for forested areas.

References:

Hess, L.L., Melack, J.M., Affonso, A.G., Barbosa, C., Gastil-Buhl, M., Novo, E.M.L.M., 2015. Wetlands of the Lowland Amazon Basin: Extent, Vegetative Cover, and Dual-season Inundated Area as Mapped with JERS-1 Synthetic Aperture Radar. Wetlands 35, 745–756. https://doi.org/10.1007/s13157-015-0666-y

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Rudorff, C.M., Melack, J.M., Bates, P.D., 2014. Flooding dynamics on the lower Amazon floodplain: 1. Hydraulic controls on water elevation, inundation extent, and river-floodplain discharge. Water Resour. Res. 50, 619–634. https://doi.org/10.1002/2013WR014091

Table S3 Water surface elevation metrics evaluated at Amazon River stations

Station	Number of data	Bias	RMSE	NSE	*r*
0020_01	28	-0.86	1.38	0.82	0.94
0063_01	29	-0.43	0.58	0.97	1.00
0220_01	29	-0.42	0.48	0.93	0.99
0263_01	30	-0.40	0.48	0.92	0.99
0306_01	31	-0.60	1.01	0.83	0.95
0349_01	29	-0.47	0.62	0.93	0.99
0392_01	31	-1.28	1.54	0.61	0.95
0435_01	30	-0.47	0.62	0.95	0.99
0478_02	31	-0.36	0.51	0.98	1.00
0521_01	30	-0.48	0.61	0.96	0.99
0607_01	29	-0.13	0.45	0.99	0.99
0764_01	29	-0.59	0.70	0.85	0.98
0807_01	29	-0.82	1.02	0.64	0.96
0850_01	31	-0.59	0.67	0.94	1.00
0893_01	31	-0.83	0.99	0.84	0.98
0936_01	29	-0.75	0.80	0.93	1.00
0979_01	31	-0.47	0.68	0.95	0.99
0139_01	81	-0.68	1.38	0.45	0.95
0152_01	75	0.00	0.61	0.96	0.98
0228_01	82	-0.50	0.94	0.81	0.97
0063_01	74	-0.15	0.64	0.98	0.99
Curuai	1005	0.65	0.67	0.92	1.00
Óbidos	1066	0.30	0.37	0.98	1.00