## **Supplementary Materials**

Overland flow fabric and structures generated in laboratory experiments – fluids composed of low concentrations (≈ 3 vol %) of soil aggregates



**Figure A.1.** Steep-planar hillslopes. These are very common in the transition between steep hillslopes and alluvial terraces (a) and hollows of the valley head (b) within the Paraná Basin Volcanic Plateau.

 Table A.1. Description of Laminae.

		External C	Organization <sup>a</sup>	Intern	on	
Laminae	Avg. thicknes	Bedding surface	Lateral extents	Composition and texture <sup>a</sup>	Selection <sup>b</sup>	Fabric
	s (mm)					
			Proximal	sector		
			Parallel-	flow		
			thin section	n 15/55		
V	0.43	Discontinuous	Abutting against	Mix – soil aggregates	Poorly	Inverse
		, wavy,	an unconformity	very fine to very	sorted	discontinuous
		nonparallel		coarse sand >		gradation to
				quartz/arcosian fine		massive
				to medium sand		
IV	1.52	Wavy,	Convergence	Mix -	Well	Diffuse- folded
		nonparallel	and intersection	quartz/arcosian fine	sorted	microlaminated
			of bedding	to medium sand >		
			surface	soil aggregates very		
				fine to medium sand		
III	0.69	Discontinuous	Convergence	Mix -	Well	Diffuse- folded
		, even, parallel	and intersection	quartz/arcosian fine	sorted	microlaminated
			of bedding	to medium sand >		
			surface	soil aggregates fine		
				to medium sand		
II	1.88	Even, parallel	Convergence	Mix -	Well	Diffuse- folded
			and intersection	quartz/arcosian fine	sorted	microlaminated
			of bedding	to medium sand >		
			surface	soil aggregates very		
				fine to medium sand		
I	0.69	Discontinuous	Abutting against	Mix -	Poorly	Diffuse- folded
		, wavy,	an unconformity	quartz/arcosian fine	sorted	microlaminated
		parallel		to medium sand >		to massive
				soil aggregates very		
				fine to coarse sand		
	l .		thin section	n 25/45		
III	0.65	Wavy, parallel	Convergence	Mix -soil aggregates	Poorly	Inverse
			and intersection	fine sand to granule	sorted	discontinuous
			of bedding	> quartz/arcosian		gradation
			surface	fine to coarse sand		
II	1.91	Wavy, parallel	Convergence	Mix -	Moderatel	Diffuse- folded
			and intersection	quartz/arcosian fine	y well	microlaminated
			of bedding	to coarse sand > soil	sorted	
			surface	aggregates fine to		
				coarse sand		

I	1.10	Discontinuous	Abutting against	Mix -	Moderatel	Diffuse- folded
		, wavy,	an unconformity	quartz/arcosian	y well	microlaminated
		nonparallel		medium to coarse	sorted	
				sand > soil		
				aggregates fine to		
				medium sand		
			Oblique-	·flow		
			thin section	n 10/45		
VI	0.60	Discontinuous	Abutting against	Mix -	Very	Inverse
		, wavy,	an unconformity	quartz/arcosian fine	poorly	discontinuous
		nonparallel		to medium sand >	sorted	gradation
				soil aggregates		
				medium to very		
				coarse sand and		
				granule		
V	0.80	Discontinuous	Abutting against	Mix -	Very	Inverse
		, wavy,	an unconformity	quartz/arcosian fine	poorly	discontinuous
		nonparallel		to medium sand >	sorted	gradation
				soil aggregates fine		
				to very coarse sand		
IV	0.40	Discontinuous	Abutting against	Mix -	Very well	Massive
		, wavy,	an unconformity	quartz/arcosian fine	sorted	
		nonparallel		to medium sand >		
				soil aggregates fine		
				sand		
III	0.70	Discontinuous	Abutting against	Mix – soil aggregates	Poorly	Inverse
		, wavy,	an unconformity	fine to coarse sand >	sorted	discontinuous
		nonparallel		quartz/arcosian fine		gradation to
				to medium sand		massive
II	2.00	Wavy, parallel	convergence and	Mix -	Well	Diffuse-
			intersection of	quartz/arcosian fine	sorted	microlaminated
			bedding surface	to medium sand >		to massive
				soil aggregates fine		
				to medium sand		
Ι	1.75	Discontinuous	Convergence	Mix -	Moderatel	Diffuse-folded
		, wavy,	and intersection	quartz/arcosian fine	y well	microlaminated
		parallel	of bedding	to medium sand >	sorted	
			surface	soil aggregates fine		
				to coarse sand		
***	0.10		thin section			_
VI	0.60	Discontinuous	Abutting against	Mix -	Very	Inverse
		, wavy,	an unconformity	quartz/arcosian fine	poorly	discontinuous
		nonparallel		to medium sand >	sorted	gradation
				soil aggregates fine		

			I	<u> </u>	Ī	<u> </u>
				to very coarse sand		
				and granule		
V	0.75	Discontinuous	Abutting against	Mix – soil aggregates	Poorly	Inverse
		, wavy,	an unconformity	fine to very coarse	sorted	discontinuous
		nonparallel		sand >		gradation
				quartz/arcosian fine		
				to medium sand		
IV	0.80	Discontinuous	Abutting against	Mix -	Well	Massive
		, wavy,	an unconformity	quartz/arcosian fine	sorted	
		nonparallel		to medium sand >		
				soil aggregates fine		
				to medium sand		
III	0.70	Wavy, parallel	Convergence	Mix – soil aggregates	Poorly	Diffuse- folded
			and intersection	fine to coarse sand >	sorted	microlaminated
			of bedding	quartz/arcosian fine		to massive
			surface	to medium sand		
II	1.30	Wavy, parallel	Convergence	Mix -	Moderatel	Diffuse- folded
		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	and intersection	quartz/arcosian fine	y well	microlaminated
			of bedding	to coarse sand > soil	sorted	to massive
			surface	aggregates very fine	sortea	to massive
			surface	to fine sand		
т	1.40	TA7 11 1			XA7 11	D:(( (11.1
Ι	1.40	Wavy, parallel	Convergence	Mix –	Well	Diffuse- folded
			and intersection	quartz/arcosian fine	sorted	microlaminated
			of bedding	to medium sand >		
			surface	soil aggregates fine		
				to medium sand		
	1	1	thin section	n 20/45 I	I	_
VI	1.20	Discontinuous	Abutting against	Mix – soil aggregates	Very	Inverse
		, wavy,	an unconformity	fine to coarse sand	poorly	discontinuous
		nonparallel		and granule >	sorted	gradation
				quartz/arcosian fine		
				to medium sand		
V	1.25	Discontinuous	Abutting against	Mix -	Moderatel	Diffuse-cross-
		, wavy,	an unconformity	quartz/arcosian	y well	microlaminated
		nonparallel		medium to coarse	sorted	(increscent angle
				sand > soil		25-45°)
				aggregates fine to		
				medium sand		
IV	0.70	Discontinuous	Lateral	Mix -	Well	Diffuse-cross-
		, wavy,	gradation-	quartz/arcosian	sorted	microlaminated
		nonparallel	bedding surfaces	medium to coarse		(increscent angle
		1	become	sand sand > soil		30-40°)
			indistinguishabl	aggregates very fine		,
			maisunguisnabi	aggregates very line	<u> </u>	

			e	to fine sand		
III	1.26	Discontinuous	Lateral	Mix -	Well	Diffuse-cross-
		, wavy,	gradation-	quartz/arcosian fine	sorted	microlaminated
		nonparallel	bedding surfaces	to medium sand		(increscent angle
			become	sand > soil		10-25°)
			indistinguishabl	aggregates very fine		
			e	to fine sand		
II	1.10	Discontinuous	Lateral	Mix -	Well	Diffuse-cross-
		, wavy,	gradation-	quartz/arcosian fine	sorted	microlaminated
		nonparallel	bedding surfaces	to medium sand		(increscent angle
			become	sand > soil		25-35°)
			indistinguishabl	aggregates very fine		
			e	to fine sand		
I	0.50	Discontinuous	Convergence	Mix -soil aggregates	Well	Massive
		, wavy,	and intersection	fine to medium sand	sorted	
		parallel	of bedding	> quartz/arcosian		
			surface	fine to medium sand		
	•		thin section	n 25/45	•	
VI	1.00	Discontinuous	Abutting against	Mix – soil aggregates	Moderatel	Inverse
		, wavy,	an unconformity	medium to very	y well	discontinuous
		nonparallel		coarse sand >	sorted	gradation
				quartz/arcosian		
				medium to coarse		
				sand		
V	1.10	Discontinuous	Abutting against	Mix -	Moderatel	Diffuse-cross-
		, wavy,	an unconformity	quartz/arcosian	y well	microlaminated
		nonparallel		medium to coarse	sorted	(increscent angle
				sand > soil		25-52°)
				aggregates medium		
				to coarse sand		
IV	1.40	Discontinuous	Abutting against	Mix -	Moderatel	Diffuse-cross-
		, wavy,	an unconformity	quartz/arcosian fine	y well	microlaminated
		nonparallel		to coarse sand > soil	sorted	(increscent angle
				aggregates fine to		20-40°)
				medium sand		
III	1.60	Discontinuous	Abutting against	Mix – soil aggregates	Poorly	Normal
		, wavy,	an unconformity	fine sand to granule	sorted	discontinuous
		nonparallel		> quartz/arcosian		gradation
				medium to coarse		
				sand		
II	2.30	Discontinuous	Abutting against	Mix -	Moderatel	Diffuse-cross-
		, wavy,	an unconformity	quartz/arcosian fine	y well	microlaminated
		nonparallel		to medium sand >	sorted	(increscent angle

				soil aggregates fine		20-40°)
				to medium sand		20 40 )
I	0.35	Discontinuous	Convergent and	Mix -soil aggregates	Well	Massive
1	0.55	, wavy,	intersection of	mud and fine sand >	sorted	WIUSSIVC
		nonparallel	bedding surface	quartz/arcosian fine	sorted	
		nonparaner	bedding surface	to medium sand		
			l Median s			
			Parallel-			
			thin section			
III	1.40	Discontinuous	Abutting against	Mix - soil aggregates	Poorly	Diffuse-cross-
111	1.40		an unconformity	fine to granule sand	sorted	microlaminated
		, wavy, nonparallel	an uncomorning	> quartz/arcosian	sorted	(increscent angle
		попраганег		fine to medium sand		5-45°)
II	0.80	Discontinuous	Abutting against	Mix -	Moderatel	Diffuse-cross-
11	0.80					microlaminated
		, wavy, nonparallel	an unconformity	quartz/arcosian fine to coarse sand > soil	y well sorted	(increscent angle
		попраганег			sorted	
				aggregates fine to very coarse sand		5 to 25°)
I	0.72	Diagontino	A l	Mix -	Moderatel	Normal
1	0.72	Discontinuous	Abutting against			
		, wavy,	an unconformity	quartz/arcosian fine	y well	discontinuous
		nonparallel		to coarse sand > soil	sorted	gradation
				aggregates fine to		
				very coarse sand		
			thin section			
II	2.04	Even, parallel	Convergence	Mix -	Moderatel	Diffuse- folded
			and intersection	quartz/arcosian fine	y well	microlaminated
			of bedding	to coarse sand > soil	sorted	
			surface	aggregates fine to		
-	0.54			coarse sand	TAT 11	76 .
Ι	0.54	Even, parallel	Convergence	Mix -	Well	Massive
			and intersection	quartz/arcosian fine	sorted	
			of bedding	to medium sand >		
			surface	soil aggregates very		
				fine to medium sand		
			Oblique-			
	1		thin section			_
II	1.16	Discontinuous	Abutting against	Mix – soil aggregates	Poorly	Inverse
		, wavy,	an unconformity	fine to very coarse	sorted	discontinuous
		nonparallel		sand >		gradation
				quartz/arcosian fine		
				to medium		
Ι	0.77	Discontinuous	Abutting against	Mix -	Moderatel	Diffuse-
		, wavy,	an unconformity	quartz/arcosian fine	y well	microlaminated
		nonparallel		to medium > soil	sorted	to massive

				aggregates fine to			
			.1	coarse sand			
thin section 40/55							
IV	0.33	Discontinuous	Abutting against	Mix -	Poorly	Inverse	
		, wavy,	an unconformity	quartz/arcosian fine	sorted	discontinuous	
		parallel		to medium sand >		gradation to	
				soil aggregates fine		massive	
				to coarse sand			
III	0.94	Wavy, parallel	Convergence	Mix -	Moderatel	Diffuse-	
			and intersection	quartz/arcosian fine	y well	microlaminated	
			of bedding	to medium sand >	sorted	to massive	
			surface	soil aggregates fine			
				to medium sand			
II	0.25	Discontinuous	Abutting against	Mix -	Well	Massive	
		, wavy,	an unconformity	quartz/arcosian very	sorted		
		parallel		fine to fine sand >			
				soil aggregates very			
				fine to fine sand			
I	0.26	Discontinuous	Abutting against	Mix -	Well	Massive	
		, wavy,	an unconformity	quartz/arcosian very	sorted		
		parallel		fine to fine sand >			
				soil aggregates very			
				fine to fine sand			
			Distal se	ector			
			Parallel-	flow			
			thin section	n 65/55			
II	0.40	Discontinuous	Abutting against	Mix -	Well	Massive	
		, even, parallel	an unconformity	quartz/arcosian fine	sorted		
				to medium sand >			
				soil aggregates fine			
				to medium sand			
I	0.86	Even, parallel	Convergence	Mix -	Well	Massive	
			and intersection	quartz/arcosian fine	sorted		
			of bedding	to medium sand >			
			surface	soil aggregates very			
				fine to medium sand			
	•		thin section	n 80/45			
II	0.91	Discontinuous	Convergence	Mix – soil aggregates	Poorly	Inverse	
		, wavy,	and intersection	coarse sand to	sorted	discontinuous	
		nonparallel	of bedding	granule >		gradation	
			surface	quartz/arcosian			
				medium to coarse			
				sand			
I	0.37	Discontinuous	Convergence	Mix -	Moderatel	Massive	
-	0.07	Discontinuous	Convergence		Moderater	1,14001 ( C	

		, wavy,	and intersection	quartz/arcosian	y well	
		parallel	of bedding	medium to coarse	sorted	
			surface	sand > soil		
				aggregates fine to		
				medium sand		
			Oblique-	flow		
			thin section			
III	0.32	Discontinuous	Abutting against	Mix – soil aggregates	Poorly	Inverse
		, wavy,	an unconformity	medium to coarse	sorted	discontinuous
		parallel		sand >		gradation
				quartz/arcosian fine		
				to medium sand		
II	0.50	Discontinuous	Convergence	Mix -	Well	Massive
		, wavy,	and intersection	quartz/arcosian fine	sorted	
		parallel	of bedding	to medium sand >		
			surface	soil aggregates very		
				fine to medium sand		
I	0.80	Discontinuous	Abutting against	Mix -	Well	Diffuse-
		, wavy,	an unconformity	quartz/arcosian fine	sorted	microlaminated
		nonparallel		to medium sand >		to massive
				soil aggregates very		
				fine to medium sand		
	ı	1	thin section	n 80/45	T	
II	0.78	Wavy, parallel	Abutting against	Mix – soil aggregates	Poorly	Inverse
			an unconformity	medium sand to	sorted	discontinuous
				granule >		gradation
				quartz/arcosian		
				medium sand		
I	0.38	Discontinuous	Abutting against	Mix -	Well	Massive
		, wavy,	an unconformity	quartz/arcosian fine	sorted	
		parallel		to medium sand >		
				soil aggregates fine		
				to medium sand		

 $<sup>^{\</sup>text{\tiny{b}}}\text{based}$  on Campbell (1967) $^{\text{\tiny{a}}}$  and Harrel (1983) $^{\text{\tiny{b}}}\text{.}$ 

Campbell, C.V. (1967). Lamina, laminaset, bed and bedset. Sedimentol. 8, 7-36. Harrell, J. 1983. A visual comparator for degree of sorting in thin and plane sections. J. Sedimentol. Research. 54, 646-650. https://doi.org/10.2110/jsr.54.646