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Información suplementaria

Upper Pleistocene deposits from the Cauca Valley

Depósitos del Pleistoceno Superior en el Valle del Rio Cauca

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Contenido

Figure S1. A. Small fragment of the original vegetation that once covered the Cauca valley before the sugar-cane plantations. B. The meandering Cauca river and its flat valley. Several dredges can be seen in the center of the river. Notice how most of the original vegetation has been replaced by sugar cane plantations. C. Dredge facilities at Paso La Torre. D. Bucket-style dredge in Platanares. E-F. Convey-style dredge in Paso La Torre (Photos by C. Ziegler).

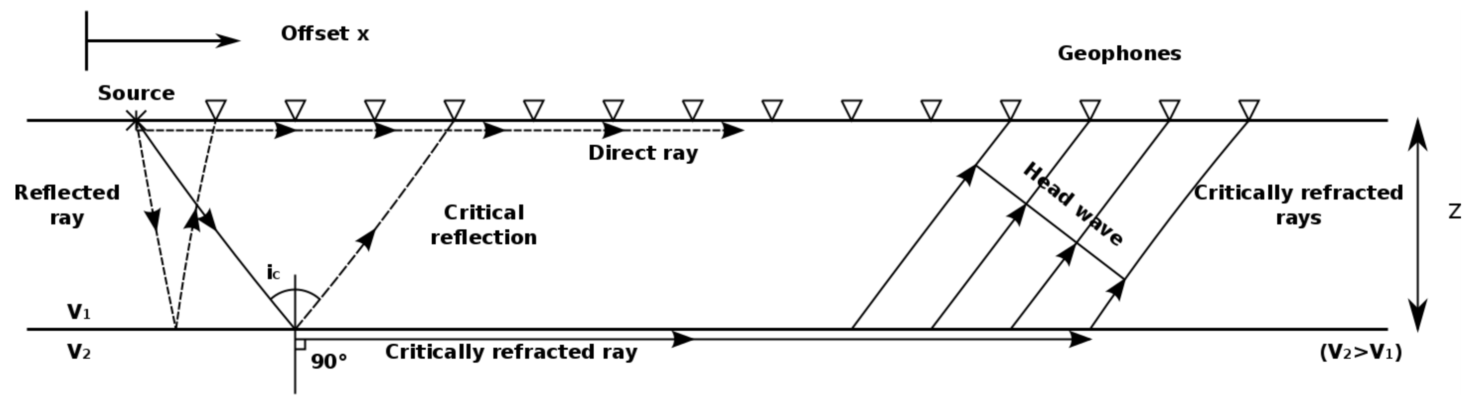

Figure S2. Simplified model of Seismic Refraction Method (Modified from Reynolds, 1997).

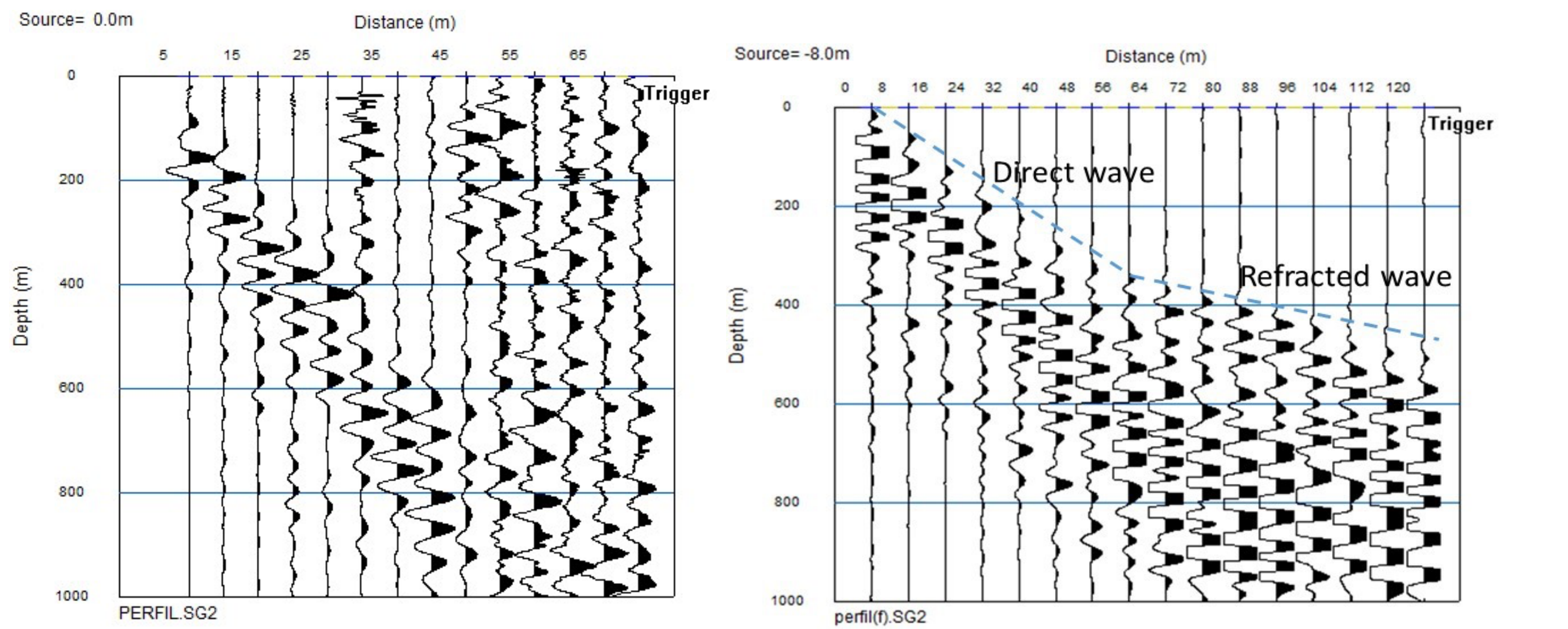

Figure S3. Left: Raw marine seismic refraction record from the Platanares area. Note poor signal to noise ratio, making interpretation difficult beyond the first 5 channels. Right: Raw land seismic refraction record from the Platanares area. Note the excellent signal to noise ratio and sharpness of first arrivals.

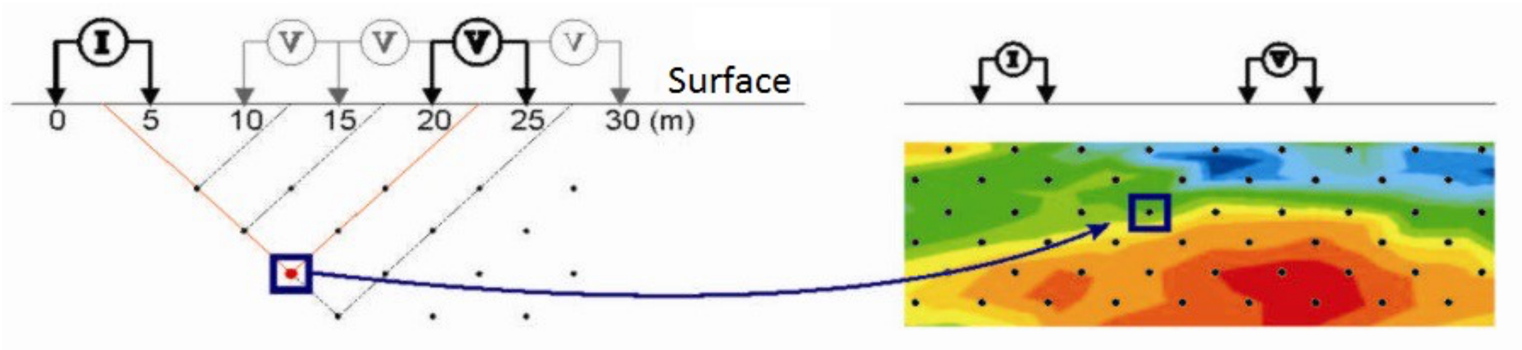

Figure S4. Simplified model of ERT Method (Modified from Everett, 2013).

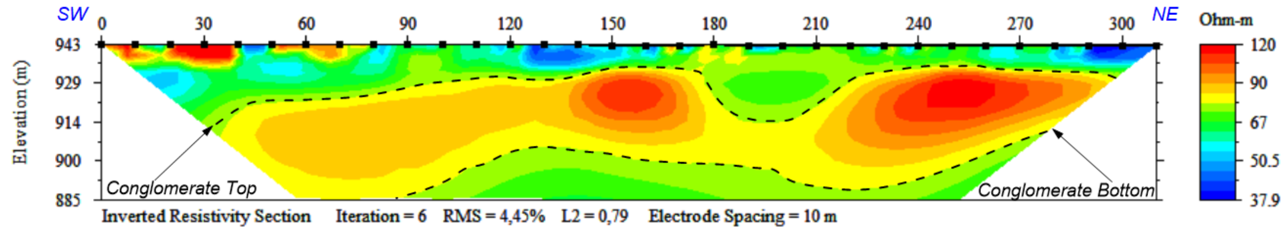

Figure S5. Inverted Resistivity Section of the L1-ERT (See location in Figure 7)

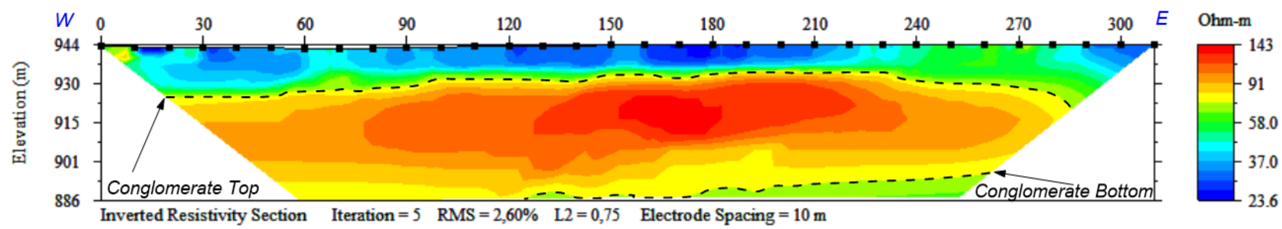

Figure S6. Inverted Resistivity Section of the L2-ERT (See location in Figure 7).

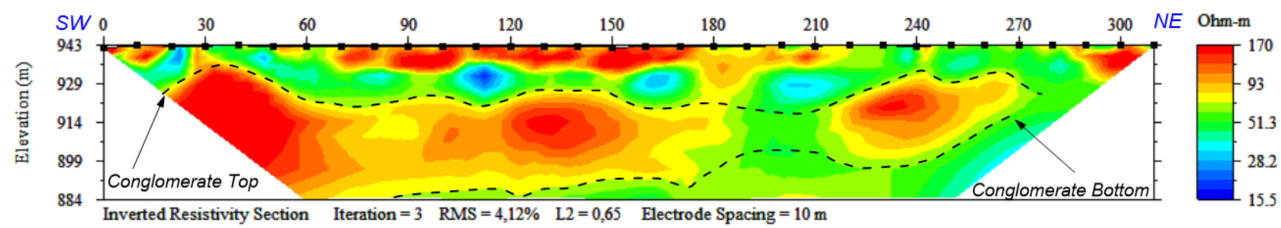

Figure S7. Inverted Resistivity Section of the L3-ERT (See location in Figure 7).

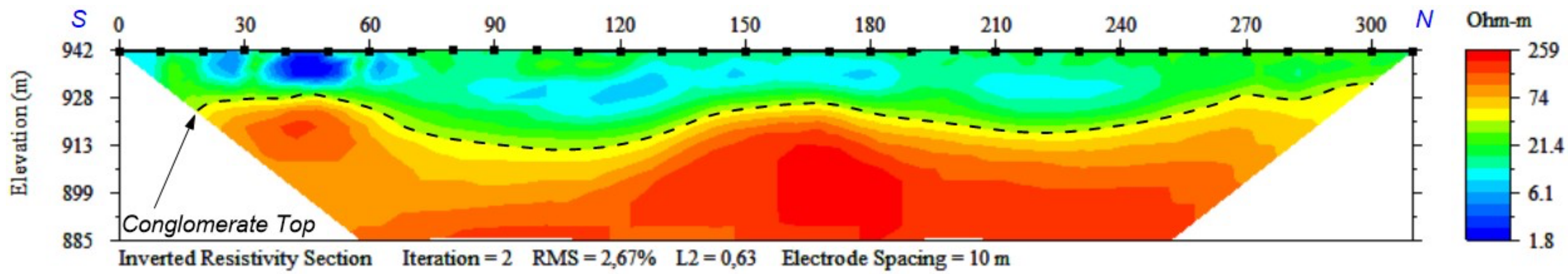

Figure S8. Inverted Resistivity Section of the L5-ERT (See location in Figure S9).

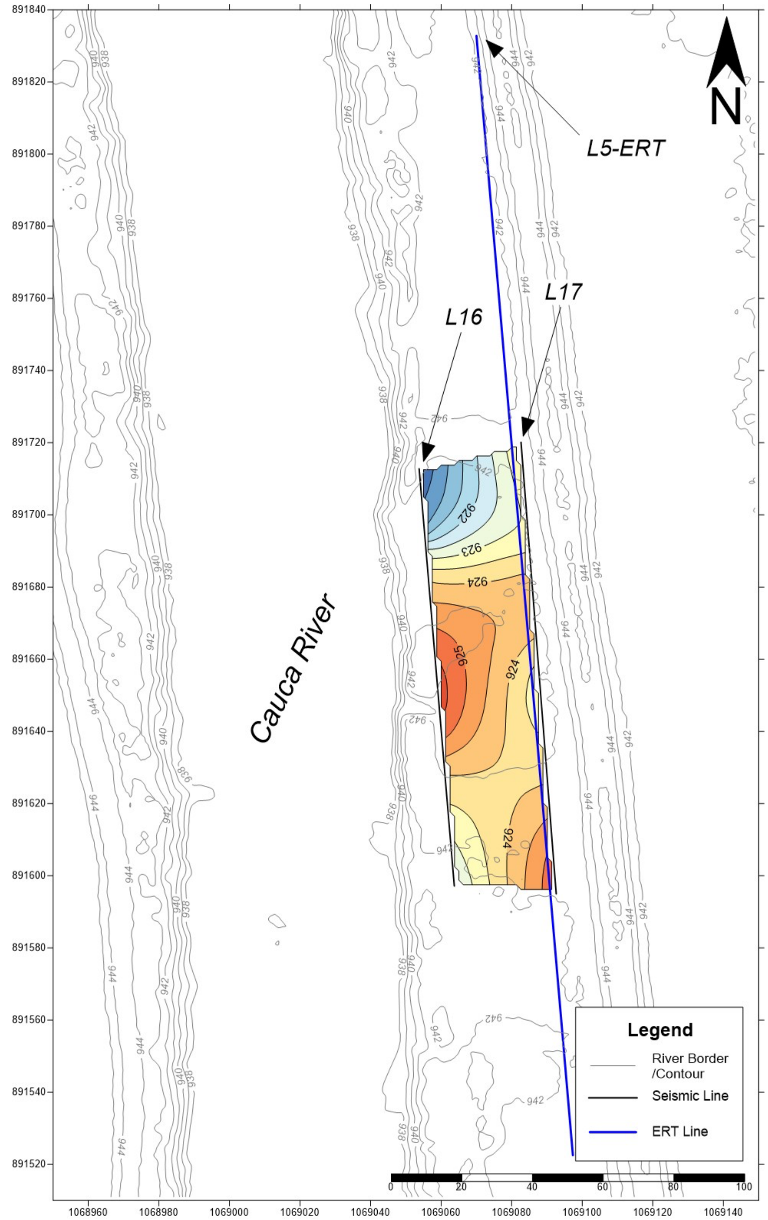

Figure S9. Subsurface model of the fossil-rich layer top at Intermediate Area 1. Coordinates in Magna Sirgas Colombia West Zone

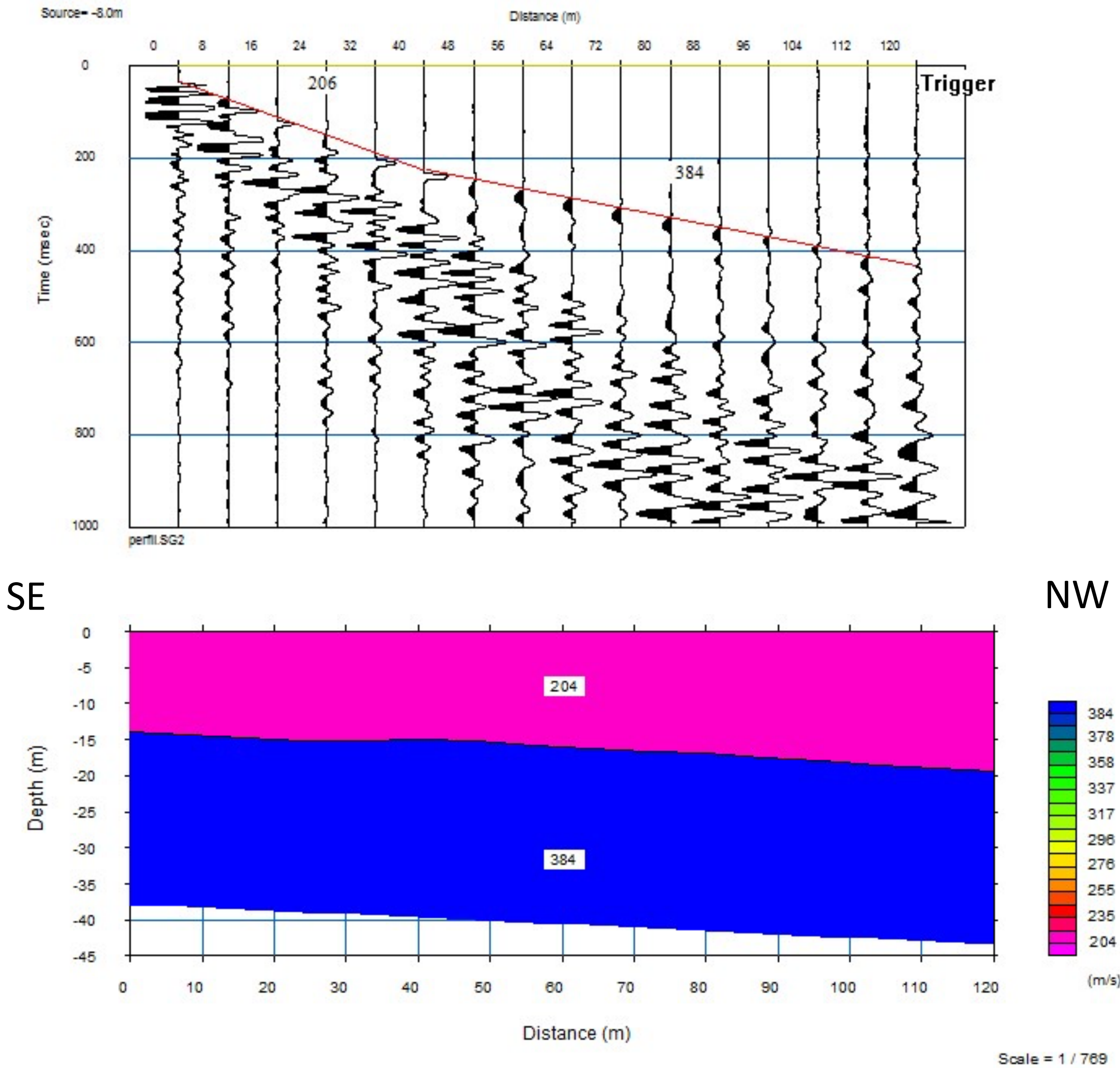

Figure S10. Top: Field seismic record from Line 14 acquired at Intermediate Area 2, showing interpreted first break. Bottom: layer model for Line 14. See Figure S11 for location.

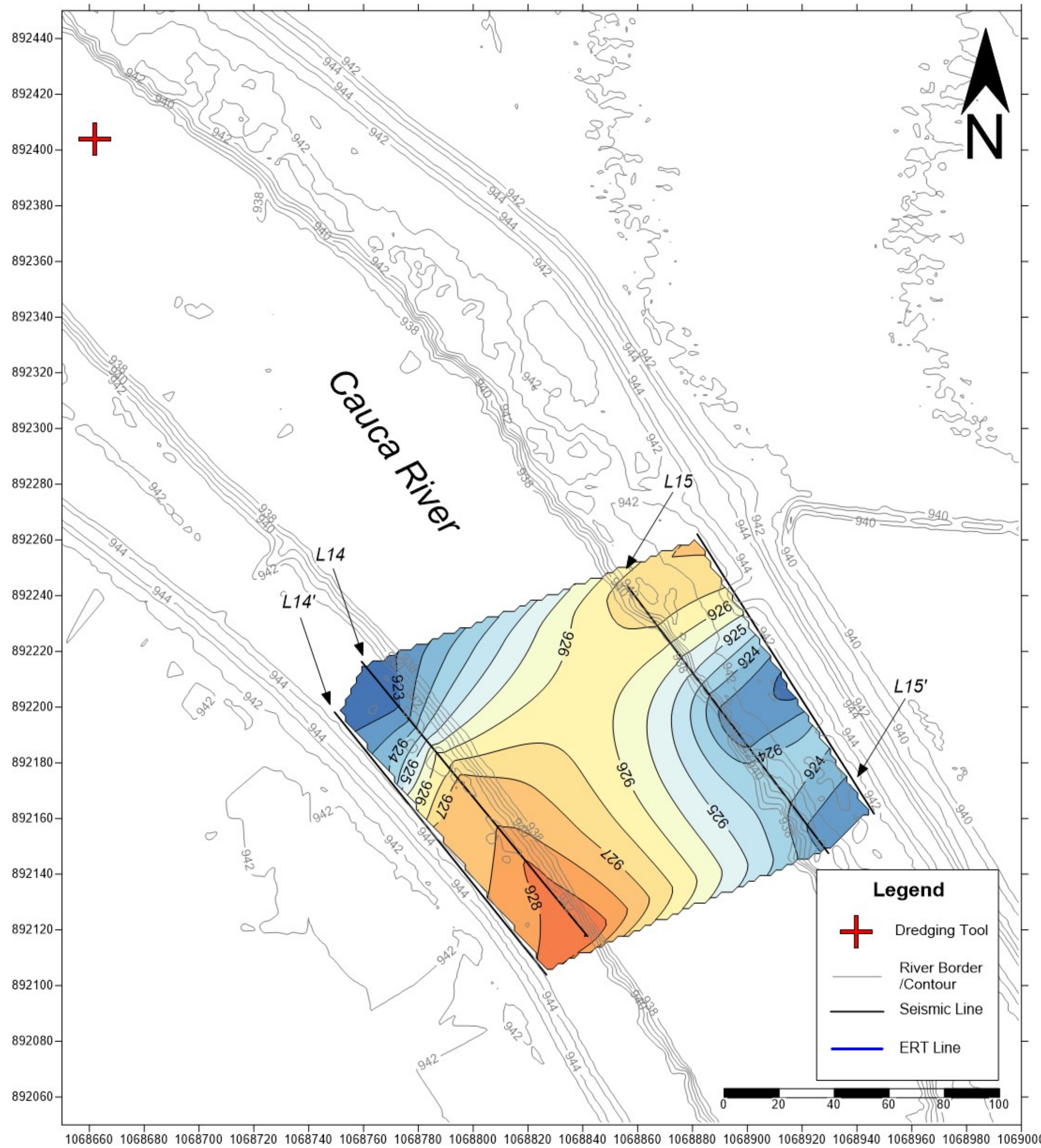

Figure S11. Subsurface model of the fossil-rich layer top at Intermediate Area 2. The cross symbol indicates the point where a dredging tool confirmed the presence, depth, and fossil content of the conglomerate layer. Coordinates in Magna Sirgas Colombia West Zone.

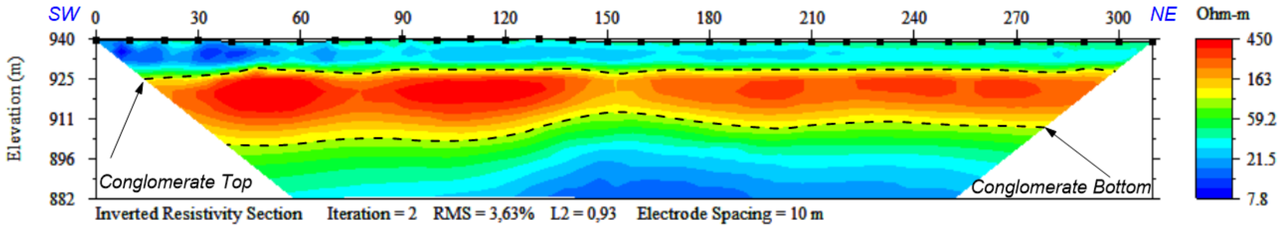

Figure S12. Inverted Resistivity Section of the L6-ERT (See location in Figure 9).

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Summary of Ages

Submitter Name: Carlos Jaramillo
Company Name: Smithsonian Tropical Research Institute
Address: 9100 Panami City PL, Washington DC 20521

ICA ID	Submitter ID	Material Type	Pretreatment	Conventional Age	Calibrated Age
17W/1049	STRI 44179	Wood	AAA	>40.000 BP	————————
17W/1050	STRI 44177	Wood	AAA	37010 +/- 400 BP	Cal 40250 - 38890 BC
17W/1051	STRI 44176	Wood	AAA	11890 +/- 40 BP	Cal 11830 - 11630 BC

- Calibrated ages are attained using INTCAL13: **IntCal13 and Marine13 Radiocarbon Age Calibration Curves 0–50,000 Years cal BP.** *Paula J Reimer, Edouard Bard, Alex Bayliss, J Warren Beck, Paul G Blackwell, Christopher Bronk Ramsey, Caitlin E Buck, Hai Cheng, R Lawrence Edwards, Michael Friedrich, Pieter M Grootes, Thomas P Guilderson, Haflidi Haflidason, Irka Hajdas, Christine Hatté, Timothy J Heaton, Dirk L Hoffmann, Alan G Hogg, Konrad A Hughen, K Felix Kaiser, Bernd Kromer, Sturt W Manning, Mu Niu, Ron W Reimer, David A Richards, E Marian Scott, John R Southon, Richard A Staff, Christian S M Turney, Johannes van der Plich*t. **Radiocarbon 55(4), Pages 1869-1887**.
- Unless otherwise stated, 2 sigma calibration (95% probability) is used.
- Conventional ages are given in BP (BP=Before Present, 1950 AD), and have been corrected for fractionation using the delta C13.

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Sample Report

Submitter Name: Carlos Jaramillo
Company Name: Smithsonian Tropical Research Institute
Address: 9100 Panami City PL, Washington DC 20521

Date Received	October 04, 2017	**Material Type**	Wood
Date Reported	November 13, 2017	**Pre-treatment**	AAA
ICA ID	17W/1049	**Conventional Age**	**>40.000 BP**
Submitter ID	STRI 44179	**Calibrated Age**	—————-

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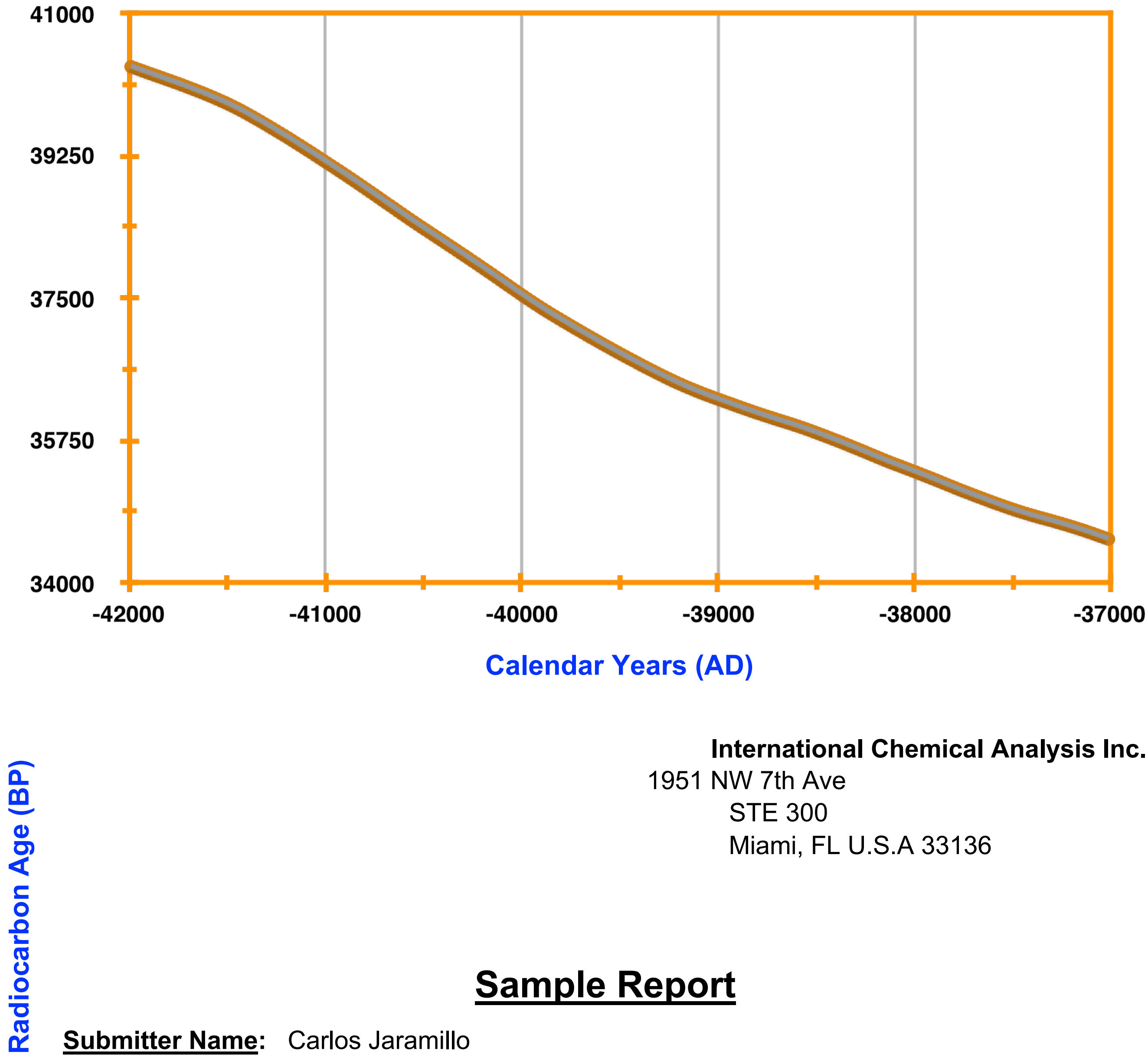
Sample Report

Submitter Name: Carlos Jaramillo
Company Name: Smithsonian Tropical Research Institute
Address: 9100 Panami City PL, Washington DC 20521

Date Received	October 04, 2017	Material Type	Wood
Date Reported	November 13, 2017	Pre-treatment	AAA
ICA ID	17W/1050	Conventional Age	**37010 +/- 400 BP**
Submitter ID	STRI 44177	Calibrated Age	**Cal 40250 - 38890 BC**

Radiocarbon Age (BP)



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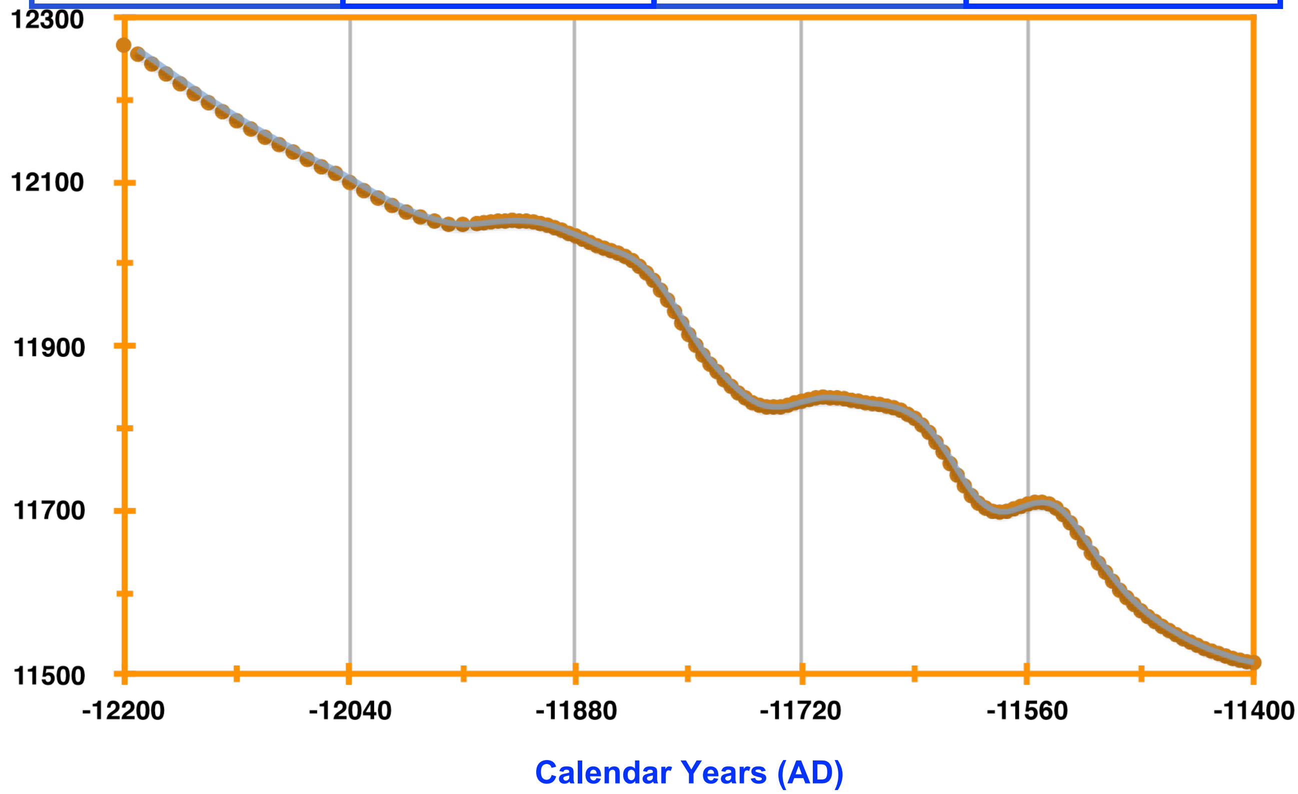
Sample Report

Submitter Name: Carlos Jaramillo
Company Name: Smithsonian Tropical Research Institute
Address: 9100 Panami City PL, Washington DC 20521

Date Received	October 04, 2017	**Material Type**	Wood

Date Reported	October 31, 2017	**Pre-treatment**	AAA
ICA ID	17W/1051	**Conventional Age**	**11890 +/- 40 BP**
Submitter ID	STRI 44176	**Calibrated Age**	**Cal 11830 - 11630 BC**



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QC Report

Submitter Name: Carlos Jaramillo
Company Name: Smithsonian Tropical Research Institute
Address: 9100 Panami City PL, Washington DC 20521

Date Submitted	October 04, 2017	Date Reported	October 31, 2017
QC 1 Sample ID	**IAEA C7**	QC 2 Sample ID	**NIST OXII**
QC Expected Value	49.53 +/- 0.50 pMC	QC Expected Value	134.09 +/- 0.70 pMC
QC Measured Value	50.04 +/- 0.20 pMC	QC Measured Value	134.76 +/- 0.40 pMC
Pass?	**YES**	Pass?	**YES**

- pMC = Percent Modern Carbon.
- IAEA = International Atomic Energy Agency.

	Seismic Refraction		Electrical Resistivity Tomography (ERT)	
	Land	Marine	Land	Marine
Recording equipment	SeismeX16[1] Seismograph		GeoAmp[1] 303 console and ASM001[1] tomography switch	
Sensor type	10 Hz Gs-One[2] geophones	10 Hz Gs-One[2] geophones	land electrodes	marine electrode cable
Number of sensors	16	2	32	16
Survey line length (m)	120	70	310	160

Sensor spacing (m)	8	5	10	10
Processing workflow	•Sorting and converting field data from SEG-Y to SEG-2 •Filtering, denoising and gain application when necessary •Interpretation and picking of first arrivals to identify direct and first refracted wave for a basic twolayer model. •Inversion of first break picks to generate final layer- and 2D velocity- models. •x-y-z coordinate extraction from profiles, including LIDAR topography correction •Gridding using a 'Natural Neighbor' interpolation algorithm •Contouring and final mapping		•Loading of field data in ASCII format onto commercial Earth Imager[3] processing software •Data denoising and smoothing; eliminating bad points. •Iterative, least squares-based robust inversion •x-y-z coordinate extraction from profiles, including LIDAR topography correction •Gridding using a 'Natural Neighbor' interpolation algorithm •Contouring and final mapping	
[1]: Commercial equipment by Andes Earth Imaging, Miami, USA [2]: Commercial sensor by Geospace Technologies, Houston, USA [3]: Commercial software by Advanced Geosciences Inc, Dallas, USA				

Table S1. Summary of acquisition instrumentation and processing workflow.

	Land seismic refraction	Marine seismic refraction	Land ERT	Marine ERT
Platanares area	10	1	4	0
Paso La Torre area	4	0	1	
			1 (land to river)	
Intermediate area 1	2	0	1	0
Intermediate area 2 (near dredging tool)	4	0	0	0

Table S2. Summary of field survey lines acquired.

		Weathered Layer (top soil)		Bedrock (fossiliferous conglomerate)		
		Vmin (m/s)	Vmax (m/s)	Vmin (m/s)	Vmax (m/s)	Rho-max (ohm m)
North	Paso La Torre	234	251	477	483	450
	Intermediate Area 2	204	254	384	414	n/a
	Intermediate Area 1	206	250	382	384	260
South	Platanares	197	255	354	399	170

Table S3. Seismic P-wave minima and maxima velocities and maxima electric resistivities found for top layers (in meters per second and ohm-meters respectively). Note south to north gradual increase.

Supplementary Information S1. Palynological comparison

This is the R-code need to perform the cluster and DCA analyses comparing the muddy sample to the Quilchao-1 core of Berrio et al (2012)

```
###################################
library(neotoma)

quilchao <- get_download(get_dataset(21915)) # Site Id from Quilchao1 quil
<- quilchao[[1]][[4]] # Extract counts
cron <- as.data.frame(quilchao[[1]][[6]])[ ,2] # Extract chronology

# load muddy counts
muddy <- read.csv("Supplementary Informatio 3 MuddySample_pollen.csv",check.names = FALSE)

# Merge counts a <- merge(t(quil),t(muddy),
by=0, all=TRUE) a[is.na(a)]<-0 ;
rownames(a)<-a[,1]; a <- a[,-1] cauca <- t(a)

# clean taxa (take out aquatics fungi and RW)

out <-c("Fungi undiff.", "Gelasinospora", "Hydrocotyle", "Isoetes", "Sagittaria", "Typha", "Cyperaceae undiff.",
"Asteraceae (aff.  Ambrosia) RW")
cauca.clean <- cauca[ ,-match(out, colnames(cauca))]

# relative abundance
suma <- apply(cauca.clean, 1, sum)
abrel <- (cauca.clean / suma) * 100

library(vegan)

dca <- decorana(abrel,iweigh=0) sc <-
scores(dca, display="sites") eucdca <-
vegdist(sc, method="euclidean")

library(rioja)
chclust(eucdca)->c2

###################################
pdf("Figure.pdf",width=8, height=5)

par(mfrow=c(3,1),mar=c(4, 4, 0, 2))
plot(as.matrix(eucdca)[113,-113], t="n",xaxt="n",yaxt="n",bty="n",xlab="",ylab="")
rect(c(1.1,3,18,66,81,102),rep(1,6),c(3,18,66,81,102,112),rep(1.5,6))
text(c(2,10.5,42,73.5,91.5,107),rep(1.25,6),c("QIO-4b","QIO-4a","QIO-3","QIO-2","QIO-1b","QIO-1a"))
text(56.5,2,"Quilichao - 1 Zones (Berrio et al. 2002)" )
plot(c2,hang=-0.1,cex=0.7)
abline(h=18,col="gray",lty=2)

plot(as.matrix(eucdca)[113,-113], t="l", main="",xaxt="n",las=1,cex.axis=0.7,
xlab=" Quilichao's samples (Age BP)",ylab= "Distance (SD)")
axis(side=1,at=1:112,labels=cron, las=2,cex.axis=0.7)
 dev.off()
```

Supplementary Information S2¬

Sample,Taxa_ID,Count,in_sum

Muddy_ID_44171,Asteraceae (aff. Ambrosia) RW,486,0

Muddy_ID_44171,Cyperaceae,970,0

Muddy_ID_44171,Arecaceae,72,1

Muddy_ID_44171,Moraceae-Urticaceae,57,1

Muddy_ID_44171,Apocynaceae,23,1

Muddy_ID_44171,Amaranthaceae,18,1

Muddy_ID_44171,Celtis,11,1

Muddy_ID_44171,Solanaceae,6,1

Muddy_ID_44171,Asteraceae (Asteroidea),6,1

Muddy_ID_44171,Bromeliaceae,5,1

Muddy_ID_44171,Loranthaceae,5,1

Muddy_ID_44171,Onagraceae (aff. Ludwiga),5,1

Muddy_ID_44171,Bignoniaceae,4,1

Muddy_ID_44171,Fabaceae (C) ,4,1

Muddy_ID_44171,Fabaceae (M),4,1

Muddy_ID_44171,Piper,4,1

Muddy_ID_44171,Poaceae,4,1

Muddy_ID_44171,Anacardiaceae,3,1

Muddy_ID_44171,Apiaceae,3,1

Muddy_ID_44171,Plantago,3,1

Muddy_ID_44171,Sapium,3,1

Muddy_ID_44171,aff. Saurauia,2,1

Muddy_ID_44171,Annonaceae,2,1

Muddy_ID_44171,Louteridium (Acanthaceae),2,1

Muddy_ID_44171,Malpighiaceae,2,1

Muddy_ID_44171,Myrica,2,1

Muddy_ID_44171,Myriophylum,2,1

Muddy_ID_44171,Petiveria,2,1

Muddy_ID_44171,Asteraceae (Liguliflorae),1,1

Muddy_ID_44171,Combretaceae-Melastomataceae,1,1

Muddy_ID_44171,Euphorbiaceae,1,1

Muddy_ID_44171,Euphorbiaceae (undif),1,1

Muddy_ID_44171,Justicia,1,1

Muddy_ID_44171,Randia,1,1

Muddy_ID_44171,Tournefortia,1,1

Muddy_ID_44171,Typha,26,0

Muddy_ID_44171,Sagittaria,14,0

Muddy_ID_44171,IsoÎtes,1,0

Muddy_ID_44171,Espora trilete equinas largas,14,0

Muddy_ID_44171,Polypodyaceae gemada,3,0

Muddy_ID_44171,Lycopodium,2,0

Muddy_ID_44171,Espora monolete equinas cortas,1,0

Muddy_ID_44171,Espora trilete gemada,1,0

Muddy_ID_44171,Selaginella,1,0

Muddy_ID_44171,Fungi espora (Tilletia),16,0

Intraclast_ID_44168,Polypodiisporites aff. Specious RW,240,0

Intraclast_ID_44168,Maurittidiites franciscoi var. Minutus RW,89,0

Intraclast_ID_44168,Arecaceae,13,1

Intraclast_ID_44168,Moraceae-Uricaceae,5,1

Intraclast_ID_44168,Bignoniaceae,4,1

Intraclast_ID_44168,Apocynaceae,2,1

Intraclast_ID_44168,Louteridium (Acanthaceae),2,1

Intraclast_ID_44168,Polygonaceae,2,1

Intraclast_ID_44168,Annonaceae,1,1

Intraclast_ID_44168,Asteraceae,1,1

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Intraclast_ID_44168,Euphorbiaceae,1,1

Intraclast_ID_44168,Piper,1,1

Intraclast_ID_44168,Desc tricolpado,1,1

Intraclast_ID_44168,Cyperaceae,51,1

Intraclast_ID_44168,Lycopodium,2,0

Intraclast_ID_44168,Selaginella,11,0