Data description for the DANS project: Disclosure of paleoecological datasets of IBED, FNWI, UvA

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Data description for the DANS project:

Disclosure of paleoecological datasets of IBED, FNWI, UvA

(NL titel: Ontsluiting van paleoecologische datasets van IBED, FNWI, UvA)

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Abstract:

The Paleoecology group of IBED has collected sediment cores in lakes and analyzed the samples for pollen during many decades, but the resulting data have not been digitized in a systematic way. Therefore a project was funded by DANS with the aim to archive data and at making them public domain. The focus of this project is on the large amounts of pollen data from South America, mainly Colombia. Metadata were collected from the publications, where necessary taxon names were adapted to modern nomenclature, all age models were fitted using the same methodology and data were entered in spreadsheets, together with the raw pollen counts. From these spreadsheets ASCII files were created (CSV-format) and archived on the DANS server (EASY, https://easy.dans.knaw.nl/). The data from 62 sediment cores were uploaded: 3 cores from Bolivia, 53 from Colombia, 1 from Ecuador, 1 from Guatemala, 1 from Mexico, and 3 from Peru. All these data are now in EASY and can be downloaded from there.

If you use the data from this database please reference this report as:

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1. Introduction

Paleoecological datasets can be used to reconstruct the vegetation in the deep past, i.e. thousands of years back in time and in some cases even millions of years in the past (e.g. Torres et al., 2013). The vegetation composition provides information on the environment and climatic conditions in which the plants were growing can be inferred. Therefore these datasets can also be used for the reconstruction of past climates.

The paleoecology group of the Institute for Biodiversity and Ecosystem Dynamics (IBED) of the University of Amsterdam has collected sediment cores for six decades, mostly in Europe and in South America. From these cores samples were taken and analyzed for one or more proxies, like pollen grains, spores and lithology. Dating was often done by measuring radioactive carbon (^{14}C dating) (Flantua et al., 2016). The long records, however, reach ages far beyond the maximum age that the radiocarbon method can accommodate (ca. 50 kyr before present). For these records orbital tuning was used to fit the observed peaks to the orbital record of climate change (e.g. Groot et al., 2011; Torres et al., 2013).

Large amounts of data were collected, but the data often remained in the archives of the researchers that had produced them. This practice produces a big risk of losing the data and moreover the data are not available to other researchers. To fuel new projects and research questions the data should be archived in a professional manner and they should be available to others. DANS gave us the opportunity to archive the data at their server and also provided funding for a project on which we could hire a junior researcher to do much of the work. The aim of this project was to collect and check the relevant data of 50 cores and to publish the data in the DANS archive (https://dans.knaw.nl/nl) in an orderly manner.

2. Methods

At the Department of Ecosystem and Landscape Dynamics (ELD) many paleoecological data were available, often already in digital form.

We designed a template in Excel to make sure that the data of all sediment cores considered were presented in the same way. The data of each core were copied in a separate spreadsheet. Since taxonomy has changed over the past 60 years, taxon names were adapted to the current (2017) taxonomy with the help of Eric Grimm of the University of Minnesota (US). He also recalculated the age models using the modern IntCal13 calibration curve (Reimer et al., 2013). However the age model, determined by the original data producers, was also maintained in the data files. For all cores the coordinates of the location where the core was collected were checked and when needed corrected. We also collected the original publications in which the sediment cores were described and the records presented. The references to these articles and to additional publications were also included in the spreadsheets as metadata (Table 1).

Table 1: *Most important metadata, chronology and other information.*

Site description	**Persons & Publications**	**Other information**
Site Name	Collectors	^{14}C dates (geochronology)
Latitude [°]	Researchers	Age models (chronologies)
Longitude [°]	Data processors	
Elevation [m]	Contact person	
Country		
Department	Publication(s)	*Only if available:*
Description		*Lithology*

The data were also copied into TILIA for a consistency check, especially to check whether taxon names were according to the current (2017) taxonomy. Entering the data in TILIA also made it possible to upload the data to the international Neotoma database (https://www.neotomadb.org/; Grim et al., 2013).

The Excel spreadsheets were converted to ASCII files in CSV format. For each record we produced at least three ASCII files: Metadata, Chronology, Pollen record. Most records also have a separate file describing the lithology. Table 2 describes how we named the data files.

Table 2: *System for naming the data files*

Document name COUNTRY_HANDLE-YEAR_TYPE.csv For example: COL_AGUABLA1-1982_META.csv			(The Excel file has the extension .xlsx)
Codes:	COUNTRY	3-letter abbreviation of the country were the core was taken	BOL = Bolivia COL = Colombia ECU = Ecuador GUA = Guatemala MEX = México PER = Perú
	HANDLE	8 letter abbreviation for the core	Zie tabel 3
	YEAR	Year the core was collected	
	TYPE	Indication for the type of document	META = Metadata RAW = Pollen counts CHRON = Dating and chronologies LITH = Lithology (if available) Excel = The complete spreadsheet
NOTE: CSV stands for Commas Separated Values. However, the values in these files are not separated by commas, as the name suggests, but by semicolons because a comma can appear as part of a number.			

The ASCII data files will hopefully last forever. That is why all data have been stored in CSV format. These CSV files can be loaded into any spreadsheet program.

Many users of these data will indeed load these data into a spreadsheet in order to analyze them. Therefore we have also stored the Excel spreadsheets from which the CSV files were produced. These are already formatted in such a way that they are easily readable.

Table 3: *Overview of the most important metadata for each core (Age: BP is before 1950).*

Country	HANDLE	Coring year	Location	Coordinates		Elevation [m]	Age range [cal yr BP]	Nr. of samples	References
BOL	**CHALALAN**	2003	Lake Chalalán	14,43 S	67,92 W	330	-53 - 16511	39	45
BOL	**SANTAROS**	2003	Lake Santa Rosa	14,48 S	67,87 W	350	5 - 16108	34	45
BOL	**TITICACA**	2001	Lake Titicaca	16,20 S	69,00 W	3810	0 - 210898	184	26 27 29 30 43
COL	**AGUABLA1**	1982	Páramo de Agua Blanca 1	4,99 N	74,16 W	3250	-32 - 383731	104	1 31 32 34 52
COL	**AGUABLA2**	1982	Páramo de Agua Blanca 2	4,99 N	74,16 W	3250	70 - 9197	20	35
COL	**AGUABLA3**	1982	Páramo de Agua Blanca 3	4,99 N	74,16 W	3250	26 - 8883	24	35
COL	**ANDABOBO**	1972	Andabobos	4,10 N	74,25 W	3750	1275 - 17852	74	18 38 39
COL	**BOCLOPEZ**	1977	Boca de López	10,85 N	74,33 W	0	-13 - 7786	101	55
COL	**BOQUILLA**	1998	Boquillas	9,12 N	74,56 W	20	1696 - 11413	49	11 12
COL	**CABOSQUE**	1996	Laguna Carimagua-Bosque	4,59 N	71,33 W	180	-46 - 1032	27	11 13
COL	**CAIMITO1**	1997	Laguna El Caimito	2,45 N	77,69 W	50	-3 - 3806	119	46 60 62
COL	**CARIMAGU**	1996	Laguna Carimagua	4,59 N	71,33 W	180	1281 - 9218	41	7 13
COL	**CHENEVO1**	2000	Laguna Chenevo	4,59 N	71,44 W	150	-50 - 8172	37	11 14
COL	**EL_PINAL**	1996	Laguna El Piñal	4,66 N	71,45 W	180	969 - 21536	36	7
COL	**ELPATIA1**	2000	El Patía-1	2,01 N	77,12 W	580	-50 - 9513	84	58 59
COL	**ELPATIA2**	2000	El Patía-2	2,01 N	77,12 W	580	-50 - 8450	53	58 59
COL	**FUQUENE2**	1967	Laguna de Fúquene	5,46 N	73,75 W	2540	107 - 44474	102	17 28 56 57
COL	**GENAGRA1**	1996	Pantano de Genagra	2,47 N	76,60 W	1730	58 - 52000	47	5 64
COL	**GOBERNAD**	1973	Laguna Gobernador	3,95 N	74,30 W	3815	57 - 11488	86	18 38 39
COL	**GUITARRA**	1972	Laguna La Guitarra	3,95 N	74,16 W	3450	544 - 18363	120	18 38 39
COL	**HERRERA1**	1957	Laguna de la Herrera	4,69 N	74,27 W	2550	69 - 5820	46	51 61
COL	**LACOCHA3**	2006	Laguna De La Cocha	1,12 N	77,15 W	2780	-51 - 3134	115	21
COL	**LAGUNIL5**	1959	Valle de Lagunillas V	6,38 N	72,34 W	3931	-1 - 14759	71	24
COL	**LAGUNIL7**	1959	Valle de Lagunillas VII	6,39 N	72,35 W	3922	No dates	11	24
COL	**LAGUNIL8**	1959	Valle de Lagunillas VIII	6,39 N	72,34 W	3923	609 - 10485	16	24
COL	**LATETA-2**	1997	La Teta-2	3,08 N	76,53 W	1020	-47 - 9936	39	11 15
COL	**LG-ALSAC**	1981	Laguna Negra de Alsacia	3,97 N	74,09 W	3100	3150 - 28378	79	38 39
COL	**LG-ANGEL**	1996	Laguna Angel	4,45 N	70,54 W	200	-46 - 11580	27	6
COL	**LGCIEGA1**	1967	Laguna Ciega I	6,47 N	72,39 W	3510	389 - 33827	78	54
COL	**LGCIEGA3**	1967	Laguna Ciega III	6,47 N	72,39 W	3510	496 - 33234	64	48
COL	**LOMALIND**	1996	Laguna Loma Linda	3,30 N	73,36 W	233	103 - 9856	67	8
COL	**LOSBOBOS**	1959	Laguna de los Bobos	6,22 N	72,76 W	3815	49 - 6583	22	47
COL	**MARGARIT**	1996	Laguna Las Margaritas	3,37 N	73,42 W	240	646 - 11186	190	63
COL	**MONICA-1**	1995	Pantano de Mónica 1	0,70 S	72,05 W	160	4804 - 14075	17	10
COL	**MONICA-2**	1995	Pantano de Mónica 2	0,71 S	72,06 W	112	-45 - 4499	21	10 11
COL	**MONICA-3**	1995	Pantano de Mónica 3	0,70 S	72,06 W	160	-45 - 3542	19	10 11
COL	**MOZAMBIQ**	2000	Laguna Mozambique	3,95 N	73,05 W	175	17 - 3685	51	11 14
COL	**PENANEG1**	1982	Páramo de Peña Negra 1	5,07 N	74,10 W	3625	-27 - 16609	71	35
COL	**PIAGUA-1**	1997	Piagua	2,43 N	76,78 W	1700	-47 - 20370	121	62 64
COL	**PIUSBI-1**	1996	Laguna Piusbi	1,88 N	77,93 W	100	69 - 5625	57	9 46
COL	**PLVERDE1**	1982	Páramo de Laguna Verde 1	5,22 N	74,00 W	3647	21 - 6248	45	35
COL	**POTRERI2**	2000	Potrerillo-2	2,10 N	77,05 W	750	0 - 9273	47	25
COL	**PRIMAVE1**	1973	Laguna La Primavera 1	3,98 N	74,16 W	3547	19 - 8175	130	18 36 37
COL	**PRIMAVE2**	1981	Laguna La Primavera 2	3,98 N	74,16 W	3547	10521 - 13399	91	36 37 53
COL	**PVARGAS1**	1996	Pantano de Vargas 1	5,77 N	73,06 W	2488	2054 - 10177	119	23
COL	**QUEBAMOR**	?	Quebrada del Amor	0,60 S	72,40 W	381	-49 - 100	26	16
COL	**QUILIC-1**	1997	Quilichao-1	3,10 N	76,52 W	970	-43 - 14375	112	11 15
COL	**RABONA-1**	1972	Cuchilla La Rabona	4,00 N	74,25 W	4000	14-7283	29	18 38 39
COL	**ROSAGRND**	?	Rosarito Grande	4,89 N	75,21 W	3320	29907 - 43860	25	41 42 49
COL	**ROSARITO**	?	Rosarito	4,90 N	75,23 W	3400	2908 - 28438	30	41 42 49
COL	**SARDINAS**	1996	Laguna Sardinas	4,95 N	69,53 W	80	-46 - 13536	46	6
COL	**TIMBIO-1**	1997	Rio Timbio	2,36 N	76,70 W	1750	498 - 31289	71	62 64 65
COL	**VBOCAT09**	1959	Valle de la Bocatoma IX	6,37 N	72,33 W	4117	830 - 7548	18	24
COL	**VBOCAT10**	1959	Valle de la Bocatoma X	6,37 N	72,32 W	4288	No dates	4	24
COL	**VBOCAT11**	1959	Valle de la Bocatoma X	6,37 N	72,33 W	3998	No dates	9	24
COL	**VISITADO**	1958	Ciénaga del Visitador	6,18 N	72,80 W	3300	185 - 16532	46	50 61
ECU	**MAXUS-S5**	1994	Maxus Site 5	0,69 S	76,44 W	246	-44 - 71222	16	3 4
GUA	**PETENITZ**	2006	Lake Petén-Itzá	17,01 N	89,69 W	110	40 - 85408	445	19 20 22 33 40
MEX	**LAGARTO2**	2011	Ría Lagartos-2	21,58 N	88,07 W	2	8 - 3812	64	2
PER	**REFUGIO1**	2006	Lake Refugio 1	13,09 S	71,70 W	3401	-56 - 18894	31	44
PER	**REFUGIO2**	2006	Lake Refugio 2	13,10 S	71,71 W	3406	-56 - 18847	18	44
PER	**REFUGIO3**	2006	Lake Refugio 3	13,10 S	71,71 W	3404	-56 - 10572	6	44

3. Pollen records in the database

The database contains the data of 62 records from Central America and South America, collected between 1957 and 2011. Most records (53) are from Colombia, where research of the Paleoecology group of IBED was focused. Additionally there were also three cores from Bolivia, one from Ecuador, one from Guatemala, one from Mexico and three from Peru (Table 3).

The number of samples taken along the sediment cores varies from 4 to 445 (Table 3). On average 64 samples were taken per core, and the total number of analyzed pollen samples amounts 3991. In total 1.8 million pollen grains and 2.4 million spores were identified (some were classified as unknown taxa). To give an idea of the investment in time (and research money) mostly 1 to 2 pollen samples are analyzed per day.

The map in Figure 1 shows the locations of the records uploaded in DANS.

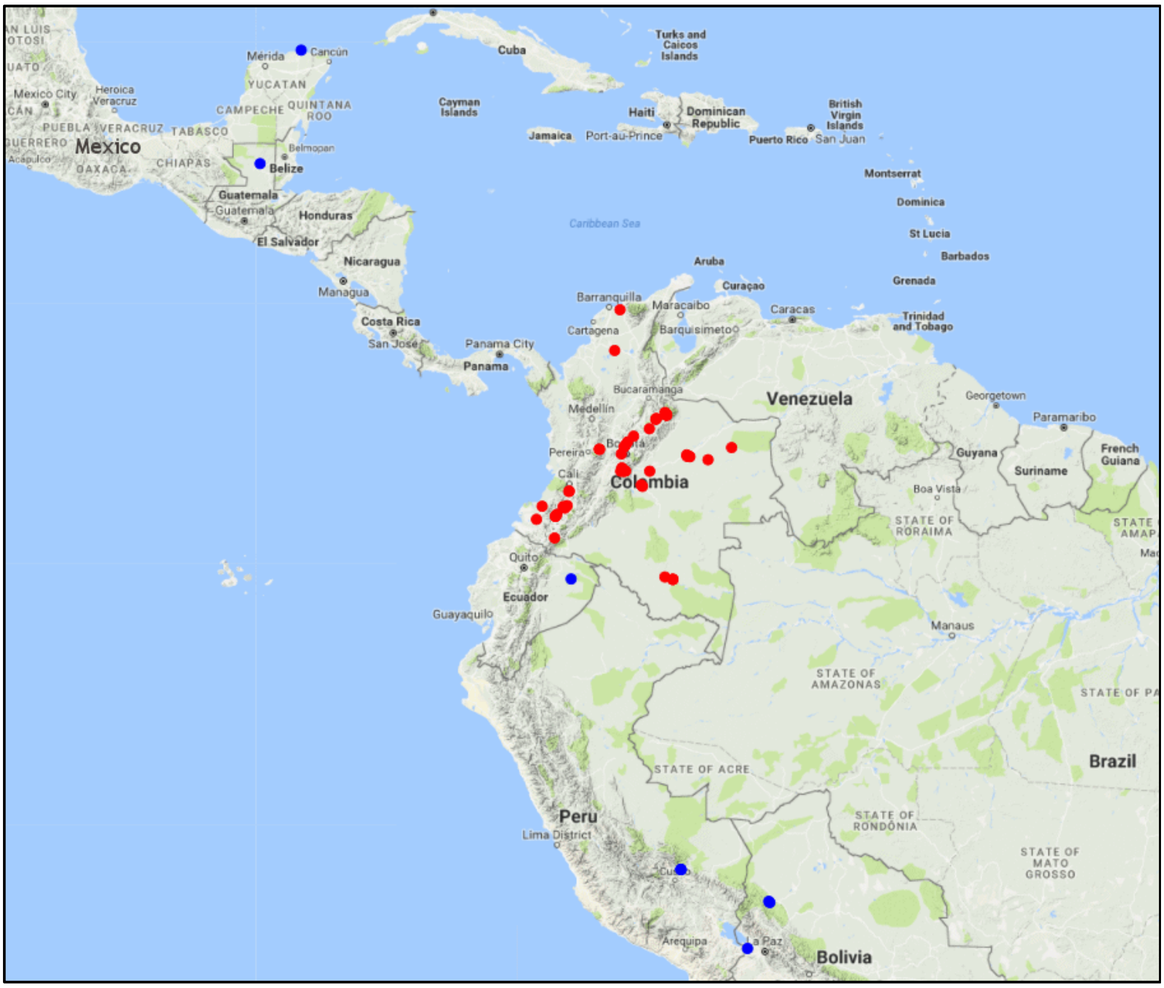

Figure 1: *Locations where the cores were collected. Red dots represent cores in Colombia and blue dots show cores in other countries. Some coring sites are so close together that they not show up as separate dots (map by Eric Grimm).*

4. Data organization and data format

The data files reside in 6 folders, one for each country for which we have data: Bolivia, Colombia, Ecuador, Guatemala, Mexico and Peru. Within these folders there is one subfolder for each record. The naming of these subfolders is equivalent to that of the file names: that is COUNTRY_HANDLE_YEAR, where COUNTRY is the 3-letter abbreviation for the country, HANDLE is an 8-letter code for the record and YEAR is the year the sediment core was retrieved (also see Table 2). If the date of core collection is unknown 9999 is entered for the year. Each subfolder contains at least 4 files: the spreadsheet with all the information in an easily readable format and three ASCII files in CSV format for the metadata, the chronology and the pollen counts (Table 2, Figure 2). Most subfolders also contain an ASCII file in CSV format describing the lithology.

The Excel spreadsheets present the data in a readable format. The spreadsheets contain 5 worksheets titled: Metadata, Raw_data, Geochronology, Chronologies and Lithology. These will be described in more detail in the sub-sections below. However, the disadvantage of spreadsheets is that the way the data are represented internally varies for different spreadsheet programs and will also vary between different versions of the same program. LOTUS123, once the standard spreadsheet, is hardly used anymore. We had some difficulties reading old data from the LOTUS123 spreadsheets in the WK1 format. So it is well possible that in 10 or 20 years from now it will be difficult to read the spreadsheets we are using now.

This is the reason why the data are also stored as ASCII files. ASCII already existed long before spreadsheets were invented and ASCII files will probably continue to be used in the far future. The files are in CSV format, where CSV stand for Comma Separated Values. However, since commas can also be used as a decimal mark or as a thousand mark, it is inconvenient to use them to separate the values. Therefore, here the values in the CVS file are separated by semicolons (";") and not by commas. These CSV files can easily be imported into spreadsheets (also into other spreadsheets than Excel). In the CSV files the Geochronology and the Chronologies are combined into one file. So there are 4 CSV files per core or 3 if there is no information on the lithology.

Appendix 1a, 2a, 3a and 4a include screen shots showing what the data look like in the original Excel spreadsheet. Appendix 1b, 2b, 3b and 4b show what they look like as an ASCII file in CSV format and what they will look like when the CSV file is imported again into a spreadsheet. With some formatting the original layout can be restored.

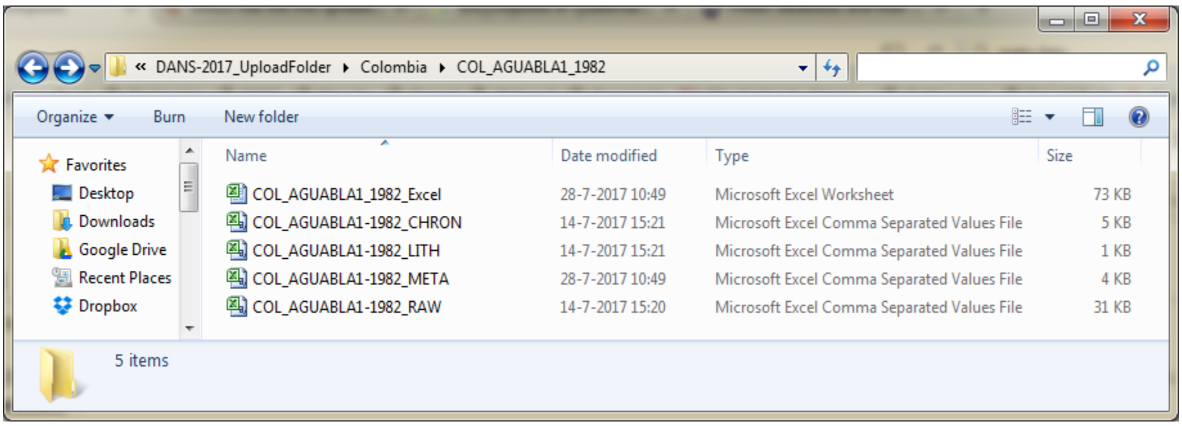

Figure 2: *Typical content of a folder containing the data from one record.*

5. Conclusion

A significant volume of unconsolidated paleoecological data has been saved and has been made public domain to serve new research and to fuel new research questions. The uploaded database now contains 62 palynological records from 6 countries in Latin America: Colombia, Mexico, Guatemala, Ecuador, Peru and Bolivia. 53 records are from Colombia. Storing these records at DANS safe guards many years of work and also makes the data available for other researchers. The metadata of all records have been checked, including coordinates and taxon names, and age models were recalibrated using the modern IntCal13 calibration curve. Also the original age model is retained in the data files.

Since the data were also entered in TILIA it is also possible to upload them to the international Neotoma database.

Finally, we are pleased to observe a change in opinion about the ownership of data produced with financial support from national funding agencies. For a long time such data have been considered as belonging to the private domain. Nowadays many palynologists are willing to make their data public domain. The DANS initiative is timely and important to save data, produced during tens of years of NWO and WOTRO funded research. The present project reflects a welcome start and deserves continuation.

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Appendix 1a: Excel worksheet Metadata

This worksheet contains the metadata for the core. The labels explain which type of metadata it is.

METADATA

Site description

Site Name:	Laguna De La Cocha
Latitude:	1.12
Longitude:	-77.15
Altitude (m):	2780
Area of Site (ha):	4200

Country:	Colombia
Department:	Nariño
Third Geop Division:	
Administrative Unit:	
Lake Parameters:	

Site Description:
La Cocha lies in a tectonic "pull-apart" basin formed along the Algeciras fault system. The lake lies in the Andean forest zone with frequent elements of Weinmannia, Alnus, Myrica, Styloceras, Podocarpus, Clusia, Myrsine, Juglans, Ilex, and Hedyosmum. Today most forest has bee replaced by pasture, meadows, and agricultural fields. Forest remnants are dominated by Ocotea guianensis and Weinmannia pubescens. The shrubs Miconia harlineii and Miconia sp. along with the ferns Ascotrichyum arborium, Polypodium, Anthurium and Cavendishia.

Site Notes:
Lake site includes large wetland on north end. Lake data derived from Duque-Trujillo, J., M. Hermelin, and G.F. Toro. 2016. The Guamuéz (La Cocha) Lake. In: Landscapes and landforms of Colombia, pp. 203-210 (M. Hermelin, ed.) World geomorphological landscapes. Springer, Cham, Switzerland. DOI: 10.1007/978-3-319-11800-0_17.

Collection Unit

Handle:	LACOCHA3
Collection Unit Type:	Core
Collection Unit Name:	C-3
Collection Device:	Russian corer (7 cm diameter)
Location in Site:	
Collectors:	Berrío Mogollón, J.C.; González-Carranza, Z.
Date Collected:	May 2006

GPS Coordinates	
Latitude:	1.145
Longitude:	-77.160
Altitude (m):	
Error (m):	

Depositional Environment:	Lake Marginal Fen
Substrate:	
Slope Angle (degrees):	
Slope Aspect (degrees):	
Water Depth (m):	

Collection Unit Notes:
Core is from a large wetland on the north end of Laguan De La Cocha.

Dataset

Dataset Type:	Pollen inventory
Dataset Name:	
Investigators:	Epping, I; González-Carranza, Z.
Publications:	Epping 2009
Dataset Notes:	
Data Processors:	Grimm, E.C.

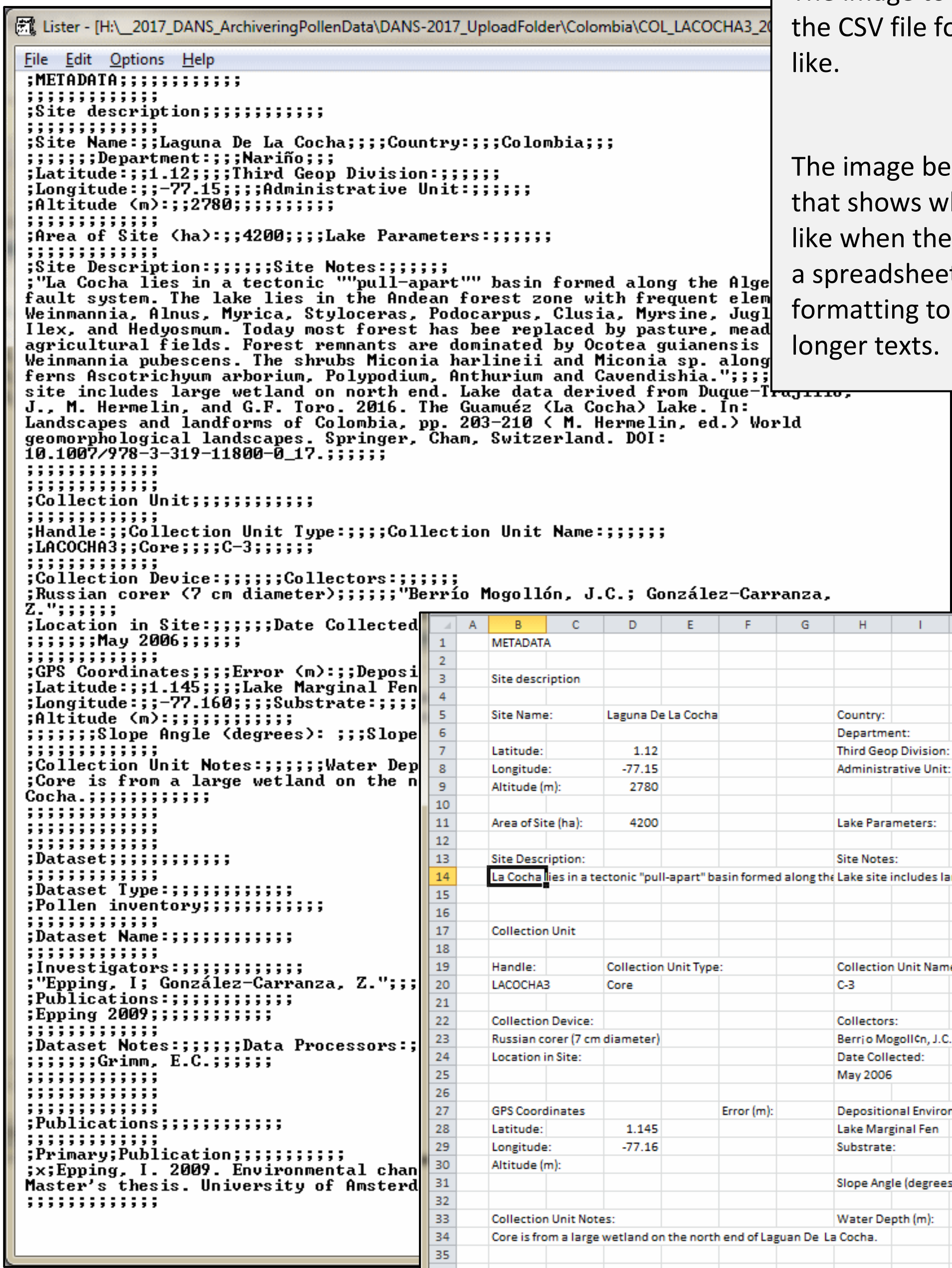
Publications

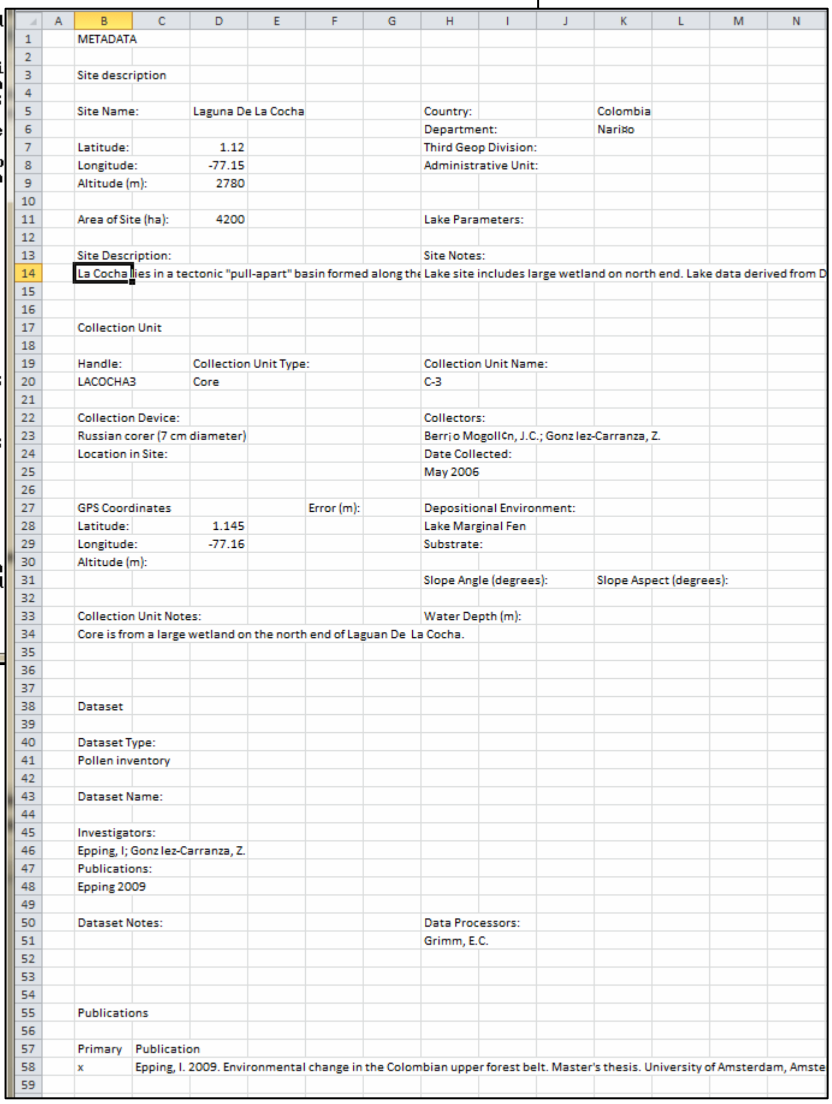
Primary	Publication
☒	Epping, I. 2009. Environmental change in the Colombian upper forest belt. Master's thesis. University of Amsterdam, Amsterdam, The Netherlands.

Appendix 1b: Metadata as a CSV file

The image to the left shows what the CSV file for the metadata looks like.

The image below is a screenshot that shows what the CSV data look like when they are imported it into a spreadsheet. It will need a bit of formatting to be able to read the longer texts.





Appendix 2a: Excel worksheet Raw_data

	A	B	C	D	E	F	G	H	I	J	K	L
1		pollen			Depth (cm)	1	3	5	7	9	11	13
2	Code	Name	Element	Units	Group							
3	#Chron1	Clam best age				-23	-13	-3	6	16	26	35
4	#Chron1.Young	Clam min age				-84	-79	-73	-68	-64	-59	-54
5	#Chron1.Old	Clam max age				18	30	42	55	68	80	93
6	#Chron2	Clam best age				100	106	111	116	121	127	132
7	#Chron2.Young	Clam min age				-181	-170	-159	-148	-137	-126	-115
8	#Chron2.Old	Clam max age				277	278	280	282	283	284	285
9	#Chron3	Bacon weighted mean age	PREFERRED			-51	-41	-31	-20	-10	1	11
10	#Chron3.Young	Bacon min age				-57	-57	-56	-56	-55	-52	-49
11	#Chron3.Old	Bacon max age				-41	-11	19	49	79	98	105
12	#Anal.Thick	Analysis Unit Thickness				1	1	1	1	1	1	1
13	#Samp.Analyst	Sample Analyst				Epping, I.	Epping, I.	Epping, I.	Epping, I.	Epping, I.	Epping, I.	Epping, I.
14	samp.quant	Sample quantity	volume	ml	LABO	1	1	1	1	1	1	1
15	Lyc.tab	Lycopodium tablets	quantity added	number	LABO	1	1	1	1	1	1	1
16	Lyc.tab	Lycopodium tablets	concentration	grains/tablet	LABO	12542	12542	12542	12542	12542	12542	12542
17	Lyc.spik	Lycopodium spike	counted	number	LABO	366	142	180	214	116	204	127
18	Areeae.ud	Arecaceae undiff.	pollen	NISP	PALM	0	0	0	0	0	0	0
19	Cey-t	Ceroxylon-type	pollen	NISP	PALM	0	0	0	0	0	0	0
20	Alc	Alchornea	pollen	NISP	TRSH	0	0	0	0	0	0	0
21	Ahr	Alchorneopsis	pollen	NISP	TRSH	0	0	0	0	0	0	0
22	Aln	Alnus	pollen	NISP	TRSH	0	0	0	1	0	0	0
23	Anaeae	Anacardiaceae	pollen	NISP	TRSH	0	0	0	0	0	0	0
24	Bigeae	Bignoniaceae	pollen	NISP	TRSH	0	0	0	0	0	0	0
25	Brl-t	Brunellia-type	pollen	NISP	TRSH	0	0	0	0	0	0	0
26	Clseae	Celastraceae	pollen	NISP	TRSH	0	0	0	0	0	0	0
27	Cle	Clethra	pollen	NISP	TRSH	1	0	0	0	0	0	0
28	Clu-t	Clusia-type	pollen	NISP	TRSH	0	0	0	0	0	0	0
29	Erceae	Ericaceae	pollen	NISP	TRSH	2	16	8	5	3	5	5
30	Gaa	Gaiadendron	pollen	NISP	TRSH	0	0	0	0	0	0	0
31	Hdm	Hedyosmum	pollen	NISP	TRSH	5	11	14	3	7	11	4
32	Ilx	Ilex	pollen	NISP	TRSH	0	0	0	0	0	0	0
33	Mlaeae.ud	Melastomataceae undiff.	pollen	NISP	TRSH	6	11	8	14	11	3	11
34	Mco	Miconia	pollen	NISP	TRSH	23	35	29	32	68	22	67
35	Myr	Myrica	pollen	NISP	TRSH	56	21	50	53	52	54	53
36	Mrs	Myrsine	pollen	NISP	TRSH	0	0	0	0	0	0	0
37	Pre-t	Pera-type	pollen	NISP	TRSH	0	0	0	0	0	0	0
38	Pod	Podocarpus	pollen	NISP	TRSH	1	5	3	1	1	2	0
39	Prieae.sf.Mrsdae.ud	Primulaceae subf. Myrsinoideae undiff.	pollen	NISP	TRSH	1	0	1	2	0	0	0
40	Psy	Psychotria	pollen	NISP	TRSH	13	6	4	7	3	7	8
41	Que	Quercus	pollen	NISP	TRSH	0	0	0	0	0	0	0
42	Rubeae.ud	Rubiaceae undiff.	pollen	NISP	TRSH	0	0	0	0	0	0	0
43	Spm	Sapium	pollen	NISP	TRSH	0	0	0	0	0	0	0
44	Syp	Symplocos	pollen	NISP	TRSH	1	2	3	2	0	0	0
45	Urteae/Moreae	Urticaceae/Moraceae	pollen	NISP	TRSH	3	2	10	2	3	0	2
46	Vll	Vallea	pollen	NISP	TRSH	1	0	0	0	0	0	0
47	Vib	Viburnum	pollen	NISP	TRSH	0	0	0	0	0	0	0
48	Wei	Weinmannia	pollen	NISP	TRSH	4	12	13	12	11	4	15
49	Acy	Acalypha	pollen	NISP	UPHE	0	1	3	3	3	0	0
50	Amaeae	Amaranthaceae	pollen	NISP	UPHE	0	0	0	0	0	0	0
51	Amreae	Amaryllidaceae	pollen	NISP	UPHE	1	1	0	0	0	0	0
52	Atu	Anthurium	pollen	NISP	UPHE	3	4	2	3	0	0	2
53	Apieae	Apiaceae	pollen	NISP	UPHE	0	0	0	0	0	0	0
54	Apoeae	Apocynaceae	pollen	NISP	UPHE	0	0	0	0	0	0	0

The first row lists the depths at which the samples were taken.

The second row only has the column headers for columns A-E.

Then follow the ages as determined by the different chronologies. In this example the third chronology is considered the preferred chronology (as indicated).

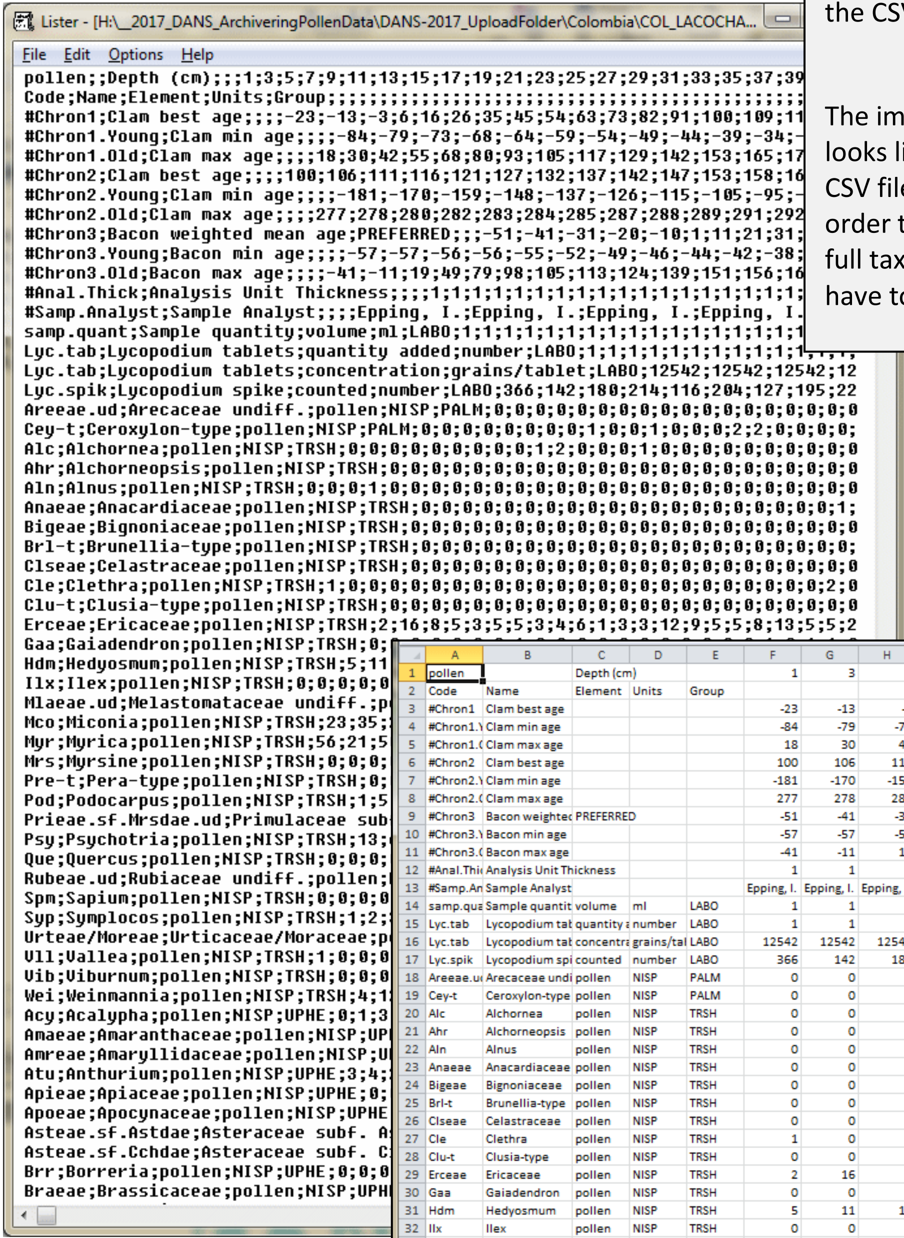
After a few rows on the Sample Analyst and the added lycopodium tablets follow the pollen counts. There are much more rows below and columns to the right, which are not shown in the screenshot.

Note: When summing the total number of pollen grains and spores that were identified, the rows "*Sample quantity*" up to "*Lycopodium spike*" were not included.

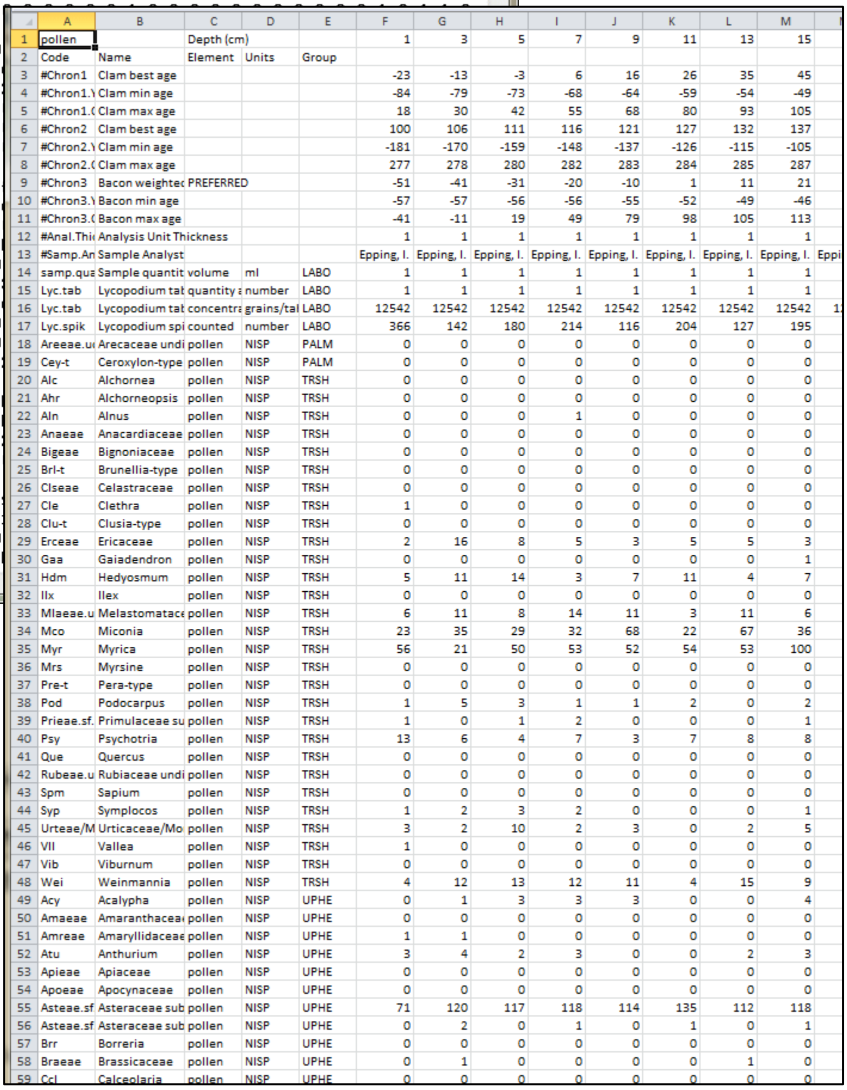
Appendix 2b: Raw data as a CSV file

The image to the left shows the CSV file for the raw data.

The image below is what it looks like when you import the CSV file into a spreadsheet. In order to be able to read the full taxon names one would have to widen column B.



```
Lister - [H:\__2017_DANS_ArchiveringPollenData\DANS-2017_UploadFolder\Colombia\COL_LACOCHA...
File  Edit  Options  Help
pollen;;Depth (cm);;;1;3;5;7;9;11;13;15;17;19;21;23;25;27;29;31;33;35;37;39
Code;Name;Element;Units;Group;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
#Chron1;Clam best age;;;;-23;-13;-3;6;16;26;35;45;54;63;73;82;91;100;109;11
#Chron1.Young;Clam min age;;;;-84;-79;-73;-68;-64;-59;-54;-49;-44;-39;-34;-
#Chron1.Old;Clam max age;;;;18;30;42;55;68;80;93;105;117;129;142;153;165;17
#Chron2;Clam best age;;;;100;106;111;116;121;127;132;137;142;147;153;158;16
#Chron2.Young;Clam min age;;;;-181;-170;-159;-148;-137;-126;-115;-105;-95;-
#Chron2.Old;Clam max age;;;;277;278;280;282;283;284;285;287;288;289;291;292
#Chron3;Bacon weighted mean age;PREFERRED;;;-51;-41;-31;-20;-10;1;11;21;31;
#Chron3.Young;Bacon min age;;;;-57;-57;-56;-56;-55;-52;-49;-46;-44;-42;-38;
#Chron3.Old;Bacon max age;;;;-41;-11;19;49;79;98;105;113;124;139;151;156;16
#Anal.Thick;Analysis Unit Thickness;;;;1;1;1;1;1;1;1;1;1;1;1;1;1;1;1;1;1;1;
#Samp.Analyst;Sample Analyst;;;;Epping, I.;Epping, I.;Epping, I.;Epping, I.
samp.quant;Sample quantity;volume;ml;LABO;1;1;1;1;1;1;1;1;1;1;1;1;1;1;1;1
Lyc.tab;Lycopodium tablets;quantity added;number;LABO;1;1;1;1;1;1;1;1;1;1;1;1;
Lyc.tab;Lycopodium tablets;concentration;grains/tablet;LABO;12542;12542;12542;12
Lyc.spik;Lycopodium spike;counted;number;LABO;366;142;180;214;116;204;127;195;22
Areeae.ud;Arecaceae undiff.;pollen;NISP;PALM;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0
Cey-t;Ceroxylon-type;pollen;NISP;PALM;0;0;0;0;0;0;0;1;0;0;1;0;0;0;2;2;0;0;0;0;
Alc;Alchornea;pollen;NISP;TRSH;0;0;0;0;0;0;0;0;1;2;0;0;0;1;0;0;0;0;0;0;0;0;0
Ahr;Alchorneopsis;pollen;NISP;TRSH;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0
Aln;Alnus;pollen;NISP;TRSH;0;0;0;1;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0
Anaeae;Anacardiaceae;pollen;NISP;TRSH;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;1;
Bigeae;Bignoniaceae;pollen;NISP;TRSH;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0
Brl-t;Brunellia-type;pollen;NISP;TRSH;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;
Clseae;Celastraceae;pollen;NISP;TRSH;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0
Cle;Clethra;pollen;NISP;TRSH;1;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;2;0
Clu-t;Clusia-type;pollen;NISP;TRSH;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0
Erceae;Ericaceae;pollen;NISP;TRSH;2;16;8;5;3;5;5;3;4;6;1;3;3;12;9;5;5;8;13;5;5;2
Gaa;Gaiadendron;pollen;NISP;TRSH;0;
Hdm;Hedyosmum;pollen;NISP;TRSH;5;11
Ilx;Ilex;pollen;NISP;TRSH;0;0;0;0;0
Mlaeae.ud;Melastomataceae undiff.;p
Mco;Miconia;pollen;NISP;TRSH;23;35;
Myr;Myrica;pollen;NISP;TRSH;56;21;5
Mrs;Myrsine;pollen;NISP;TRSH;0;0;0;
Pre-t;Pera-type;pollen;NISP;TRSH;0;
Pod;Podocarpus;pollen;NISP;TRSH;1;5
Prieae.sf.Mrsdae.ud;Primulaceae sub
Psy;Psychotria;pollen;NISP;TRSH;13;
Que;Quercus;pollen;NISP;TRSH;0;0;0;
Rubeae.ud;Rubiaceae undiff.;pollen;
Spm;Sapium;pollen;NISP;TRSH;0;0;0;0
Syp;Symplocos;pollen;NISP;TRSH;1;2;
Urteae/Moreae;Urticaceae/Moraceae;p
Vll;Vallea;pollen;NISP;TRSH;1;0;0;0
Vib;Viburnum;pollen;NISP;TRSH;0;0;0
Wei;Weinmannia;pollen;NISP;TRSH;4;1
Acy;Acalypha;pollen;NISP;UPHE;0;1;3
Amaeae;Amaranthaceae;pollen;NISP;UP
Amreae;Amaryllidaceae;pollen;NISP;U
Atu;Anthurium;pollen;NISP;UPHE;3;4;
Apieae;Apiaceae;pollen;NISP;UPHE;0;
Apoeae;Apocynaceae;pollen;NISP;UPHE
Asteae.sf.Astdae;Asteraceae subf. A
Asteae.sf.Cchdae;Asteraceae subf. C
Brr;Borreria;pollen;NISP;UPHE;0;0;0
Braeae;Brassicaceae;pollen;NISP;UPH
```



	A	B	C	D	E	F	G	H	I	J	K	L	M
1	pollen		Depth (cm)			1	3	5	7	9	11	13	15
2	Code	Name	Element	Units	Group								
3	#Chron1	Clam best age				-23	-13	-3	6	16	26	35	45
4	#Chron1.\	Clam min age				-84	-79	-73	-68	-64	-59	-54	-49
5	#Chron1.(	Clam max age				18	30	42	55	68	80	93	105
6	#Chron2	Clam best age				100	106	111	116	121	127	132	137
7	#Chron2.\	Clam min age				-181	-170	-159	-148	-137	-126	-115	-105
8	#Chron2.(	Clam max age				277	278	280	282	283	284	285	287
9	#Chron3	Bacon weightec	PREFERRED			-51	-41	-31	-20	-10	1	11	21
10	#Chron3.\	Bacon min age				-57	-57	-56	-56	-55	-52	-49	-46
11	#Chron3.(	Bacon max age				-41	-11	19	49	79	98	105	113
12	#Anal.Thi	Analysis Unit Thickness				1	1	1	1	1	1	1	1
13	#Samp.An	Sample Analyst				Epping, I.	Epping, I.	Epping, I.	Epping, I.	Epping, I.	Epping, I.	Epping, I.	Epping, I.
14	samp.qua	Sample quantit	volume	ml	LABO	1	1	1	1	1	1	1	1
15	Lyc.tab	Lycopodium tal	quantity a	number	LABO	1	1	1	1	1	1	1	1
16	Lyc.tab	Lycopodium tal	concentra	grains/tal	LABO	12542	12542	12542	12542	12542	12542	12542	12542
17	Lyc.spik	Lycopodium spi	counted	number	LABO	366	142	180	214	116	204	127	195
18	Areeae.u	Arecaceae undi	pollen	NISP	PALM	0	0	0	0	0	0	0	0
19	Cey-t	Ceroxylon-type	pollen	NISP	PALM	0	0	0	0	0	0	0	0
20	Alc	Alchornea	pollen	NISP	TRSH	0	0	0	0	0	0	0	0
21	Ahr	Alchorneopsis	pollen	NISP	TRSH	0	0	0	0	0	0	0	0
22	Aln	Alnus	pollen	NISP	TRSH	0	0	0	1	0	0	0	0
23	Anaeae	Anacardiaceae	pollen	NISP	TRSH	0	0	0	0	0	0	0	0
24	Bigeae	Bignoniaceae	pollen	NISP	TRSH	0	0	0	0	0	0	0	0
25	Brl-t	Brunellia-type	pollen	NISP	TRSH	0	0	0	0	0	0	0	0
26	Clseae	Celastraceae	pollen	NISP	TRSH	0	0	0	0	0	0	0	0
27	Cle	Clethra	pollen	NISP	TRSH	1	0	0	0	0	0	0	0
28	Clu-t	Clusia-type	pollen	NISP	TRSH	0	0	0	0	0	0	0	0
29	Erceae	Ericaceae	pollen	NISP	TRSH	2	16	8	5	3	5	5	3
30	Gaa	Gaiadendron	pollen	NISP	TRSH	0	0	0	0	0	0	0	1
31	Hdm	Hedyosmum	pollen	NISP	TRSH	5	11	14	3	7	11	4	7
32	Ilx	Ilex	pollen	NISP	TRSH	0	0	0	0	0	0	0	0
33	Mlaeae.u	Melastomatace	pollen	NISP	TRSH	6	11	8	14	11	3	11	6
34	Mco	Miconia	pollen	NISP	TRSH	23	35	29	32	68	22	67	36
35	Myr	Myrica	pollen	NISP	TRSH	56	21	50	53	52	54	53	100
36	Mrs	Myrsine	pollen	NISP	TRSH	0	0	0	0	0	0	0	0
37	Pre-t	Pera-type	pollen	NISP	TRSH	0	0	0	0	0	0	0	0
38	Pod	Podocarpus	pollen	NISP	TRSH	1	5	3	1	1	2	0	2
39	Prieae.sf.	Primulaceae su	pollen	NISP	TRSH	1	0	1	2	0	0	0	1
40	Psy	Psychotria	pollen	NISP	TRSH	13	6	4	7	3	7	8	8
41	Que	Quercus	pollen	NISP	TRSH	0	0	0	0	0	0	0	0
42	Rubeae.u	Rubiaceae undi	pollen	NISP	TRSH	0	0	0	0	0	0	0	0
43	Spm	Sapium	pollen	NISP	TRSH	0	0	0	0	0	0	0	0
44	Syp	Symplocos	pollen	NISP	TRSH	1	2	3	2	0	0	0	1
45	Urteae/M	Urticaceae/Mo	pollen	NISP	TRSH	3	2	10	2	3	0	2	5
46	Vll	Vallea	pollen	NISP	TRSH	1	0	0	0	0	0	0	0
47	Vib	Viburnum	pollen	NISP	TRSH	0	0	0	0	0	0	0	0
48	Wei	Weinmannia	pollen	NISP	TRSH	4	12	13	12	11	4	15	9
49	Acy	Acalypha	pollen	NISP	UPHE	0	1	3	3	3	0	0	4
50	Amaeae	Amaranthacea	pollen	NISP	UPHE	0	0	0	0	0	0	0	0
51	Amreae	Amaryllidaceae	pollen	NISP	UPHE	1	1	0	0	0	0	0	0
52	Atu	Anthurium	pollen	NISP	UPHE	3	4	2	3	0	0	2	3
53	Apieae	Apiaceae	pollen	NISP	UPHE	0	0	0	0	0	0	0	0
54	Apoeae	Apocynaceae	pollen	NISP	UPHE	0	0	0	0	0	0	0	0
55	Asteae.sf	Asteraceae sub	pollen	NISP	UPHE	71	120	117	118	114	135	112	118
56	Asteae.sf	Asteraceae sub	pollen	NISP	UPHE	0	2	0	1	0	1	0	1
57	Brr	Borreria	pollen	NISP	UPHE	0	0	0	0	0	0	0	0
58	Braeae	Brassicaceae	pollen	NISP	UPHE	0	1	0	0	0	0	1	0
59	Ccl	Calceolaria	pollen	NISP	UPHE	0	0	0	0	0	0	0	0

Appendix 3a: Excel worksheets Geochronology and Chronologies

In the ASCII files both the worksheet "*Geochronology*" and "*Chronologies*" appear in the CSV files marked by the abbreviation CHRON.

The worksheet "*Geochronology*" specifies the radio carbon dates (in radiocarbon years) as they were determined in the lab by ^{14}C dating. The worksheet "*Chronologies*" specifies which dates were actually used in the different chronologies.

GEOCHRONOLOGY

Investigators: Epping, I.; González-Carranza, Z. Notes:

Method	Age Units	Depth (cm)	Thickness (cm)	Lab Number	Age	SD	Params	Material Dated	Publication	Notes
Carbon-14	Radiocarbon years BP	35	1	GrA-35558	220	30	Method:AMS	bulk sediment		
Carbon-14	Radiocarbon years BP	122	1	GrA-40162	370	30	Method:AMS	bulk sediment		
Carbon-14	Radiocarbon years BP	270	1	GrA-35562	1685	35	Method:AMS	bulk sediment		
Carbon-14	Radiocarbon years BP	830	1	GrA-35560	7640	40	Method:AMS	bulk sediment		
Carbon-14	Radiocarbon years BP	1046	1	GrA-35561	11760	50	Method:AMS	bulk sediment		Date not in Epping (2009).

Metadata | raw_data | geochronology | chronologies | lithology

CHRONOLOGIES

Chron. No.	Name	Age Units	Default	Age Model	Older Bound	Younger Bound	Preparers	Date Prepared	Notes		
1	LAPD 1	Cal. radiocarbon years BP		clam	2700	-30	Blaauw, M.		This chronology submitted with the data by Z. González-Carranza.		
	Depth (cm)	Thickness (cm)	Age Units	Age	Older Limit	Younger Limit	Age Basis	Cal Curve	Cal Program	Geochronology Links	Notes
	0	1	Calendar	-56	-46	-66	Core top				
	35	1	Radiocarbon	220	250	190	Radiocarbon			{GrA-35558;220}	
	122	1	Radiocarbon	370	400	340	Radiocarbon			{GrA-40162;370}	
	270	1	Radiocarbon	1685	1720	1650	Radiocarbon			{GrA-35562;1685}	
	830	1	Radiocarbon	7640	7680	7600	Radiocarbon			{GrA-35560;7640}	
	1046	1	Radiocarbon	11760	11810	11710	Radiocarbon			{GrA-35561;11760}	
2	Flantua et al. 2016	Cal. radiocarbon years BP		clam	2610	100	Blaauw, M.	9-10-2015	Note: Dangerous extrapolation downward. Unreliable ages. Calibr		
	Depth (cm)	Thickness (cm)	Age Units	Age	Older Limit	Younger Limit	Age Basis	Cal Curve	Cal Program	Geochronology Links	Notes
	35	1	Radiocarbon	220	250	190	Radiocarbon			{GrA-35558;220}	
	122	1	Radiocarbon	370	400	340	Radiocarbon			{GrA-40162;370}	
	270	1	Radiocarbon	1685	1720	1650	Radiocarbon			{GrA-35562;1685}	
3	DANS 1	Cal. radiocarbon years BP		Bacon	3140	-60	Grimm, E.C.	25-4-2017	Based on IntCal13 calibration curve.		
	Depth (cm)	Thickness (cm)	Age Units	Age	Older Limit	Younger Limit	Age Basis	Cal Curve	Cal Program	Geochronology Links	Notes
	0	1	Calendar	-56	-55	-57	Core top				
	35	1	Radiocarbon	220	250	190	Radiocarbon			{GrA-35558;220}	
	122	1	Radiocarbon	370	400	340	Radiocarbon			{GrA-40162;370}	
	270	1	Radiocarbon	1685	1720	1650	Radiocarbon			{GrA-35562;1685}	
	830	1	Radiocarbon	7640	7680	7600	Radiocarbon			{GrA-35560;7640}	

Metadata | raw_data | geochronology | chronologies | lithology

In this example there are three chronologies.

1. The chronology by Maarten Blauw, which was submitted with the data by Z. Gonzalez.
2. Apparently Flantua et al. (2016) found the last two dates not reliable and fitted a new age model (also with the help of Maarten Blauw).
3. Eric Grimm considered the long downward extrapolation risky and included the ^{14}C date at depth 830 cm and also inserted a date for the core top.

The latter chronology was considered the most reliable and was indicated as "PREFERRED" in the worksheet "Raw_data".

Appendix 3a: Geochronology and Chronologies as a CSV file

Lister - [H:_2017_DANS_ArchiveringPollenData\DANS-2017_UploadFolder\Colombia\COL_LACOCHA3_2006\COL_LACOCHA3-2006_CHRON.csv]

File Edit Options Help 100 %

```
;GEOCHRONOLOGY;;;;;;;;;;;;;
;;;;;;;;;;;;;;;
;Investigators:;"Epping, I.; Gonz lez-Carranza, Z.";;Notes:;;;;;;;;;;
;;;;;;;;;;;;;;;
;;;;;;;;;;;;;;;
;Method;Age Units;Depth (cm);Thickness (cm);Lab Number;Age;SD;Params;Material Dated;Publication;Notes;;;;
;Carbon-14;Radiocarbon years BP;35;1;GrA-35558;220;30;Method:AMS;bulk sediment;;;;;;
;Carbon-14;Radiocarbon years BP;122;1;GrA-40162;370;30;Method:AMS;bulk sediment;;;;;;
;Carbon-14;Radiocarbon years BP;270;1;GrA-35562;1685;35;Method:AMS;bulk sediment;;;;;;
;Carbon-14;Radiocarbon years BP;830;1;GrA-35560;7640;40;Method:AMS;bulk sediment;;;;;;
;Carbon-14;Radiocarbon years BP;1046;1;GrA-35561;11760;50;Method:AMS;bulk sediment;;Date not in Epping (2009).;;;;
;;;;;;;;;;;;;;;
;;;;;;;;;;;;;;;
;CHRONOLOGIES;;;;;;;;;;;;;
;;;;;;;;;;;;;;;
;Chron. No.;Name;Age Units;Default;Age Model;Older Bound;Younger Bound;Preparers;Date Prepared;Notes;;;;;
;1;LAPD 1;Cal. radiocarbon years BP;;clam;2700;-30;Blaauw, M.;;This chronology submitted with the data by Z. Gonz lez-C
;;Depth (cm);Thickness (cm);Age Units;Age;Older Limit;Younger Limit;Age Basis;Cal Curve;Cal Program;Geochronology Links
;;0;1;Calendar;-56;-46;-66;Core top;;;;;;
;;35;1;Radiocarbon;220;250;190;Radiocarbon;;;"{GrA-35558;220}";;;;
;;122;1;Radiocarbon;370;400;340;Radiocarbon;;;"{GrA-40162;370}";;;;
;;270;1;Radiocarbon;1685;1720;1650;Radiocarbon;;;"{GrA-35562;1685}";;;;
;;830;1;Radiocarbon;7640;7680;7600;Radiocarbon;;;"{GrA-35560;7640}";;;;
;;1046;1;Radiocarbon;11760;11810;11710;Radiocarbon;;;"{GrA-35561;11760}";;;;
;;;;;;;;;;;;;;;
;;;;;;;;;;;;;;;
;2;Flantua et al. 2016;Cal. radiocarbon years BP;;clam;2610;100;Blaauw, M.;9-10-2015;Note: Dangerous extrapolation down
;;Depth (cm);Thickness (cm);Age Units;Age;Older Limit;Younger Limit;Age Basis;Cal Curve;Cal Program;Geochronology Links
;;35;1;Radiocarbon;220;250;190;Radiocarbon;;;"{GrA-35558;220}";;;;
;;122;1;Radiocarbon;370;400;340;Radiocarbon;;;"{GrA-40162;370}";;;;
;;270;1;Radiocarbon;1685;1720;1650;Radiocarbon;;;"{GrA-35562;1685}";;;;
;;;;;;;;;;;;;;;
;;;;;;;;;;;;;;;
;3;DANS 1;Cal. radiocarbon years BP;;Bacon;3140;-60;Grimm, E.C.;25-4-2017;Based on IntCal13 calibration curve.;;;;;
;;Depth (cm);Thickness (cm);Age Units;Age;Older Limit;Younger Limit;Age Basis;Cal Curve;Cal Program;Geochronology Links
;;0;1;Calendar;-56;-55;-57;Core top;;;;;;
;;35;1;Radiocarbon;220;250;190;Radiocarbon;;;"{GrA-35558;220}";;;;
;;122;1;Radiocarbon;370;400;340;Radiocarbon;;;"{GrA-40162;370}";;;;
;;270;1;Radiocarbon;1685;1720;1650;Radiocarbon;;;"{GrA-35562;1685}";;;;
;;830;1;Radiocarbon;7640;7680;7600;Radiocarbon;;;"{GrA-35560;7640}";;;;
```

The image above shows what the CSV file for the chronologies looks like.

Below is what it looks like when you import it into a spreadsheet.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1		GEOCHRONOLOGY											
2													
3		Investigato	Epping, I.; Gonz lez-C		Notes:								
4													
5													
6		Method	Age Units	Depth (cm	Thickness	Lab Numb	Age	SD	Params	Material D	Publicatic	Notes	
7		Carbon-14	Radiocarb	35	1	GrA-3555	220	30	Method:A	bulk sediment			
8		Carbon-14	Radiocarb	122	1	GrA-4016	370	30	Method:A	bulk sediment			
9		Carbon-14	Radiocarb	270	1	GrA-3556	1685	35	Method:A	bulk sediment			
10		Carbon-14	Radiocarb	830	1	GrA-3556	7640	40	Method:A	bulk sediment			
11		Carbon-14	Radiocarb	1046	1	GrA-3556	11760	50	Method:A	bulk sediment		Date not in Epping (2009).	
12													
13													
14		CHRONOLOGIES											
15													
16		Chron. No.	Name	Age Units	Default	Age Mode	Older Bou	Younger B	Preparers	Date Prepa	Notes		
17		1	LAPD 1	Cal. radiocarbon yea		clam	2700	-30	Blaauw, M.		This chronology submitted with the data by Z. Gonz lez-Carranza.		
18			Depth (cm	Thickness	Age Units	Age	Older Lim	Younger L	Age Basis	Cal Curve	Cal Progra	Geochron	Notes
19			0	1	Calendar	-56	-46	-66	Core top				
20			35	1	Radiocarb	220	250	190	Radiocarbon			{GrA-35558;220}	
21			122	1	Radiocarb	370	400	340	Radiocarbon			{GrA-40162;370}	
22			270	1	Radiocarb	1685	1720	1650	Radiocarbon			{GrA-35562;1685}	
23			830	1	Radiocarb	7640	7680	7600	Radiocarbon			{GrA-35560;7640}	
24			1046	1	Radiocarb	11760	11810	11710	Radiocarbon			{GrA-35561;11760}	
25													
26													
27		2	Flantua et	Cal. radiocarbon yea		clam	2610	100	Blaauw, M	9-10-2015	Note: Dangerous extrapolation downward. Unreliable ages. Calibratio		
28			Depth (cm	Thickness	Age Units	Age	Older Lim	Younger L	Age Basis	Cal Curve	Cal Progra	Geochron	Notes
29			35	1	Radiocarb	220	250	190	Radiocarbon			{GrA-35558;220}	
30			122	1	Radiocarb	370	400	340	Radiocarbon			{GrA-40162;370}	
31			270	1	Radiocarb	1685	1720	1650	Radiocarbon			{GrA-35562;1685}	
32													
33													
34		3	DANS 1	Cal. radiocarbon yea		Bacon	3140	-60	Grimm, E.	25-4-2017	Based on IntCal13 calibration curve.		
35			Depth (cm	Thickness	Age Units	Age	Older Lim	Younger L	Age Basis	Cal Curve	Cal Progra	Geochron	Notes
36			0	1	Calendar	-56	-55	-57	Core top				
37			35	1	Radiocarb	220	250	190	Radiocarbon			{GrA-35558;220}	
38			122	1	Radiocarb	370	400	340	Radiocarbon			{GrA-40162;370}	
39			270	1	Radiocarb	1685	1720	1650	Radiocarbon			{GrA-35562;1685}	
40			830	1	Radiocarb	7640	7680	7600	Radiocarbon			{GrA-35560;7640}	

Appendix 4a: Excel worksheet Lithology

In the ASCII data the worksheet "Lithology" will be in the CSV file marked ad "LITH". This a mostly brief description of the lithology of the core as it was observed (see example below). This description is usually made when the core is laid out in the lab.
Most cores have a lithological description, but for some cores this description is missing.

LITHOLOGY		
Top (cm)	Bottom (cm)	Description
0	50	Dark-brown peat, compact, wiht abundant roots and some dark fragments (charcoal?)
50	100	Dark-brown clay with abundant roots.
100	150	Dark-brown organic mud, not very compact at the top and middle. Juncus fragments near the bottom.
150	190	Dark-brown peat, abundant plant fragments.
190	225	Black peat.
225	525	Dark brown peat with abundant roots and plant macrofossil remains. Wood at 425-500 cm.
525	560	Light brown clayey peat.
560	562	Gray sand.
562	700	Brown-reddish peat, compact
700	705	Clayey peat.
705	800	Brown-reddish peat with wood, transitioning to black peat
800	1000	Dark-brown to black peat, abundant plant material.
1000	1050	Black peat transitioning to reddish peat with roots, compact.

Metadata / raw_data / geochronology / chronologies / lithology

Appendix 4b: Lithology as a CSV file

Lister - [H:_2017_DANS_ArchiveringPollenData\DANS-2017_UploadFolder\Colombia\COL_LACOCHA3_2006\COL_LACOCHA3-2006_LITH.csv]

File Edit Options Help 100 %

```
;LITHOLOGY;;
;;;
;Top (cm);Bottom (cm);Description
;0;50;Dark-brown peat, compact, wiht abundant roots and some dark fragments (charcoal?)
;50;100;Dark-brown clay with abundant roots.
;100;150;Dark-brown organic mud, not very compact at the top and middle. Juncus fragments near the bottom.
;150;190;Dark-brown peat, abundant plant fragments.
;190;225;Black peat.
;225;525;Dark brown peat with abundant roots and plant macrofossil remains. Wood at 425-500 cm.
;525;560;Light brown clayey peat.
;560;562;Gray sand.
;562;700;Brown-reddish peat, compact
;700;705;Clayey peat.
;705;800;Brown-reddish peat with wood, transitioning to black peat
;800;1000;Dark-brown to black peat, abundant plant material.
;1000;1050;Black peat transitioning to reddish peat with roots, compact.
;;;
```

The image above shows what the CSV file for the lithology looks like.

Below is what it looks like when you import it into a spreadsheet.

LITHOLOGY		
Top (cm)	Bottom (c	Description
0	50	Dark-brown peat, compact, wiht abundant roots and some dark fragments (charcoal?)
50	100	Dark-brown clay with abundant roots.
100	150	Dark-brown organic mud, not very compact at the top and middle. Juncus fragments near the bottom.
150	190	Dark-brown peat, abundant plant fragments.
190	225	Black peat.
225	525	Dark brown peat with abundant roots and plant macrofossil remains. Wood at 425-500 cm.
525	560	Light brown clayey peat.
560	562	Gray sand.
562	700	Brown-reddish peat, compact
700	705	Clayey peat.
705	800	Brown-reddish peat with wood, transitioning to black peat
800	1000	Dark-brown to black peat, abundant plant material.
1000	1050	Black peat transitioning to reddish peat with roots, compact.

COL_LACOCHA3-2006_LITH