MS EXCEL BUILT-IN PROGRAM FOR SEDIMENTOLOGY. PROBABILITY PLOT

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Abstract. Results: easy access to all necessary parameters of a complete granulometric (grain size) analysis (simple and cumulative frequencies, percentages-percentiles, mean, median, dispersion-(standard) deviation-sorting, asymmetry, kurtosis, skewness, gravel-sand-silt-clay factions and all their subfactions from Very Coarse Gravel to Fine Clay - the names are in keeping with the Shepard / Link / Folk ternary classifications; the complex graphic representations for each individual sample or for sample groups taken in every chosen number from 1 to 65000 simultaneously, in probability paper diagrams (Probability Plots) or in linear scales, frequencies histograms and polygons, every MS-Excel diagram type (column, bar, line, pie, xy-scatter, area, doughnut, radar, surface, stock etc, the possibility to use absolutely all MS-Office graphic and table facilities of selecting, copying, pasting, resizing, moving, aligning, colouring, sorting, filtering, every font formatting, transferring of texts, tables and graphics between different applications, pivot tables and reports, etc as the main purpose of all directly MS-Excel built-in programs, in order to allow entire work as if everything would have been programmed by Microsoft itself, beginning from raw data input, intermediate and final processing, untill the results presentation, everything in only one Workbook, by a mere click on the buttons of a toolbar, independent, but absolutely similar to the original Excel toolbars.

Key words: probability paper (probability plot), granulometric parameters, simple and cumulate frequencies, percentile, ternary classifications and diagrams, repartition and density functions, "S" curves and Gauss "bells"

It should, first, be strongly emphasized that the colours are crucial to this program, both for presenting the maximum amount of information (since coloured presentations supply much more information than a black-white-grey graphic, which, however, provides incomparably more information than the mere text, without graphics) and to facilitate the following of one and the same sample through all possible types of graphic presentations (simple and cumulative frequencies in real or normal repartitions, in linear or logarithmic scales, probability paper, ternary diagrams, bar, column, line, pie, xy-scatter, area, doughnut … diagrams, etc).

- to provide optimal access to the pursuit of data and corresponding graphics, the program can also automatically colour the sample data/numbers from tables, in the same colour as the sample's graphics;
- you will find presented herein only the Probability Paper (PP) simulation on the computer screen; the rest of the graphic facilities offered by this complex program (ternary diagrams, histograms, column / bar / line / pie / xy-scatter / area /… doughnut diagrams etc), will be presented in a subsequent number of this journal, respecting the same consistency of the unique, constant color of a same sample in absolutely all types of graphical presentations in which it can appear;
- before long we intend to present a demonstrative variant on floppy or CD, which will readily prove the distinct qualities of this computing program, specialized for sedimentology, as well as the qualities of other programs by the same authors, programs specialized on important research fields, such as biology-ecology, flow and depths, GPS-bathymetry synchronization, etc. All of them are MS-Excel built-in programs in order to allow for all facilities offered by the entire MSOffice programs packet, especially Excel, Word, Power-Point, etc concerning data transfer between programs (for example, graphics, texts and tables from Excel to and from Word, etc), the working in only one spreadsheet from the very beginning, from the input of data, passing through all the types of data processing, specific to MS-Excel or built by the authors in MS-Excel (MSE) up to the final presentation as differ-

ent tables, auto-formatted or customized, and all types of graphic presentations, specific to MS-Excel or built by the authors in MS-Excel (such as cumulative curves on Probability Paper, or Shepard / Link / Folk ternary diagrams for samples with or without gravel, dendrograms, etc);

- we should emphasize that absolutely all native MSOffice (MSO) facilities (for selecting, copying, pasting, resizing, moving, alignment, colouring, sorting, filtering, every font formatting, transferring of texts, tables and graphics between different applications, pivot tables and reports, etc) are also available for the entire part built-in in Excel by the authors of these programs, and that is precisely why the "built-in" program type is made;
- the present program for sedimentology is in fact an improvement of a program package realized before 1995 in the Borland Pascal programming language, which made these computations, tables and graphic presentations independently of MSOffice. It was much more hard work for users, requiring much copying and pasting from an application to another up to the final MSWord presentation form (data input in tabular format in Excel spreadsheet, in *.xls files, input data saving in *.csv file format, tabular and graphic processing by the executables programs realized in Borland Pascal programming language, much copying and cutting from tables resulted in *.txt, *.xls or *.csv file formats, and from the graphics resulted directly on the MSDOS screen, intermediate adjusting in Paint or Paintbrush, pasting in Word, etc), all rather complicated, with great time loss and nonetheless, without the graphic accuracy MSOffice offers, without buttons or icons with associated routines and without the other numerous Microsoft (MS) facilities;
- almost all achievements of the old program are retained in the new one: the possibilities to display on the screen and print on one paper page only a maximum of information, most clearly and obviously, about as many samples as possible. The samples are simultaneously and comparatively studied, using distinct colours automatically assigned by the program to each sample (either in the order of the name of the sample which is introduced or in the order of the order number of the sample introduced, in the data input processing part) and maintaining the same colour for all the information regarding the same sample (number, name, simple curve, cumulative curve, real and normalized curve, histogram, frequencies polygon, parameters table, colour of the corresponding point on the Shepard / Link / Folk ternary diagrams with or without gravel, etc.).
- the program user can choose a second colour correspondence between a) the colours of the segments bar indicating sub-factions fields (from Coarse Gravel, Medium Gravel…to Coarse, Medium and Fine Clay) on the graphics Probability Paper type and b) the colours of the corresponding segments on the bar, column, ring, doughnut…diagrams.
- the applicability of this program is general, for every geographic area and entire granulometric scale, but, in this case, all graphic and tabular exemplifications are selected from the latest data processed in GeoEcoMar, namely from the 2003 Black Sea campaign; more precisely the intervals of profoundness in sediments of 9 -11 and 14 - 16 cm, as follows:

Figure 1 represents the Probability Paper, PP, (Probability Plot) with the global spectrum of all the 104 samples from the Black Sea bottom taken from the depths in sediments of 9-11 and 14-16 cm, in the mentioned campaign, which gives a first global image on the respective sediments. It should be emphasized that the only purpose of this paper is to highlight the possibilities of the program and not to examine thoroughly a certain group of samples, from a given region at a given moment, which is the aim of other researchers, in other works. To simplify understanding, it should also be underlined that, the Probability Paper graphic - which benefits from all the available MS-Excel facilities - can be minimized to the size of a button, an icon, etc, by selecting a predefined percentage or by typing any desired percentage in the corresponding zoom area, so that any detail in the graphic can be made as distinct as possible. From all viewpoints, the study is by far much more accurately displayed directly on the computer screen than on printed paper, on as big a format as we need, be it even A3, A2, A1, due to other Microsoft Office facilities, such as the automatic appearance of a narrow band with the name of the curve on which the user sets the mouse pointer and waits for the menu to appear (so that we can have hundreds and even thousands of curves on the screen simultaneously, in numerous colours and shades, and the user can still find out the name of each of them). We also used this MS facility for the screen simulated Probability Paper's grid: more precisely, at the predefined initial zoom, 100%, the PP size on the screen is identical to the real, actual Probability Paper, with which our researchers are accustomed. Yet, since the entire range of horizontals of the paper's grid are displayed (from 0.01 to 0.01 % inclusive, in the intervals of the very little and very big frequencies, respectively, as the main PP purpose is precisely the emphasizing of these extreme fields, by transforming every "S" curve into a straight-line curve), the screen would appear unattractively oversaturated with a permanent display of all horizontals marks values which makes them difficult to read and, thus, useless. Now one can learn (on the screen only, not on the actual paper too) each horizontal value by simply touching a point of it with the mouse arrow point. Moreover, any horizontal marking can be selected and erased, thickened or coloured at request, although, generally speaking, it is not needed, because the main horizontals, those of the percentiles used in the computation of the statistical granulometric parameters (graphical mean, sorting/standard deviation, asymmetry, kurtosis), calculated based on the Folk and Ward formulae, namely the 1, 5,16, 25, 75, 86 and 99 (%) percentiles, are anyhow, highlighted by the program, with black versus grey for the rest of the grid, while the

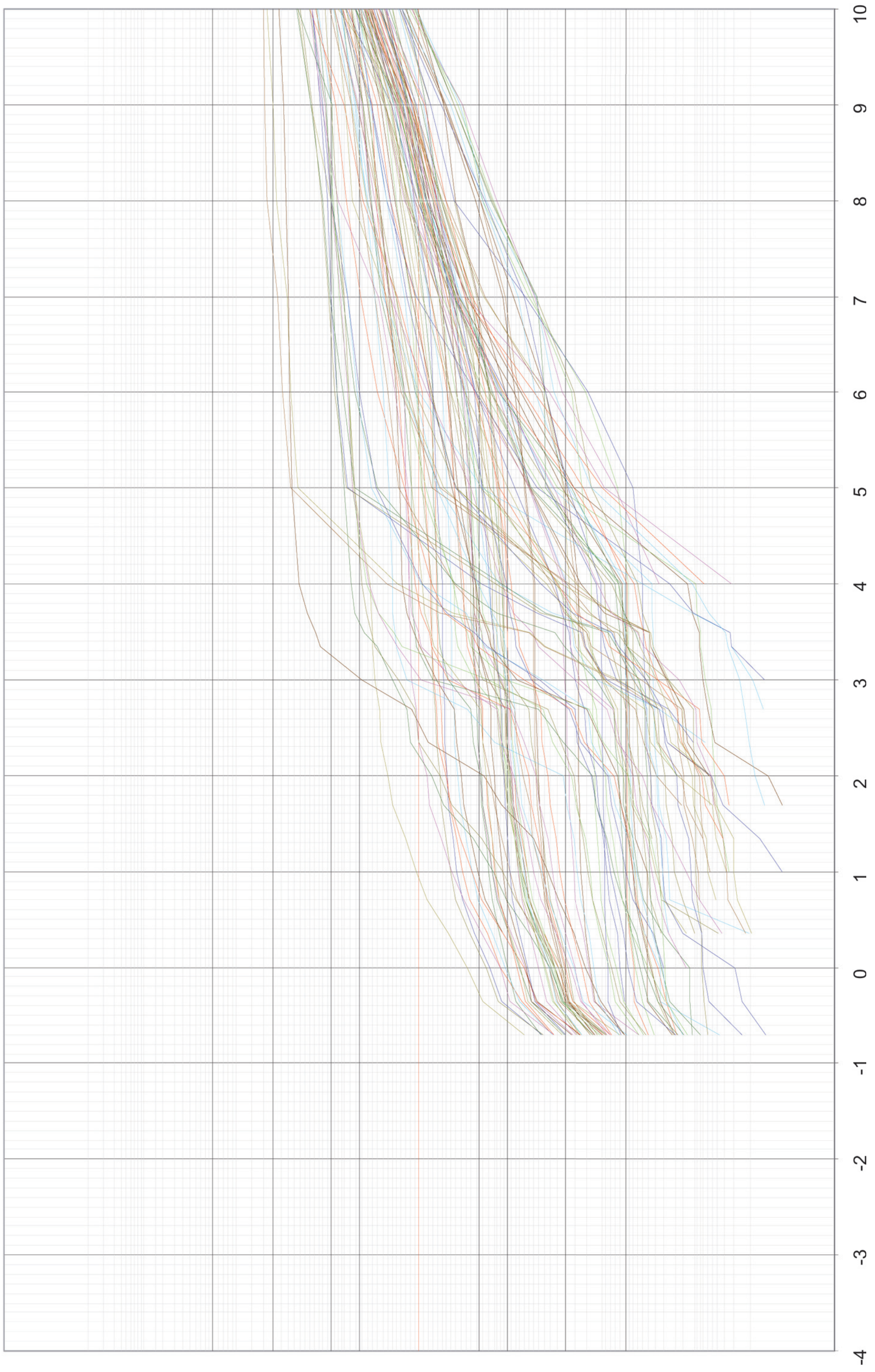

Fig. 1 The global spectrum of the 104 samples taken from the depths (in sediments) of 9-11 cm and 14-16 cm in the 2003 Black Sea campaign

most important percentile, of 50%, which corresponds to the median, is represented by an extremely visible red horizontal. The program was mainly conceived to enable the user to work directly on the screen. Thus, apart from the maximum information gain, easy access and clarity the program also helps save a great amount of paper and, especially, coloured ink, a very expensive consumable, because only some graphics will be printed, with some especially selected samples. Meanwhile, the user can study on the screen millions and millions of PP simulations without any supplementary cost, for each sample separately or for samples groups selected at request in as many numbers as you please, from one to hundreds and even thousands, if the computer power permits. Only the most representative graphics will be printed, namely, those to be finally included in scientific works or communications.

Considering the above explanations, it is easy to perceive the possibilities offered by the program for the following very rapid conclusions. So, from Figure 1, for the particular case studied, everyone can immediately see that:

- all curves begin from the right of the φ = -1 abscissa, so no sample contains gravel;
- more than 50% of the samples begin at abscissa between -1 and 0. It means that they contain factions starting from coarse sand to clays, but almost all curves have slow increases, gentle slopes, that is, weak sorting (high dispersion, σ), and so a content of sand and silts and also clays, the sand faction being however less important and entering in the Shepard denominations of much less samples, while the silt and especially the clay (even fine clays, over 10 φ), enter in most of the Shepard denominations (this is confirmed in the values tables as well as in the Shepard ternary diagrams and in other graphic representations that will be presented in the future).
- most of the samples intersect the φ=10 abscissa at an ordinate's narrow interval, between 50 and 75%, some of them reach 84%; 3 samples only intersect it at about 95%, indicating mostly very fine textures, clays and even colloidal clays, which would thus need further finer detail methods (subsequent to the sand faction dry sieving followed by the pipette/sedimentation method for silt and clay factions determination).
- the medians (the curves' intersections with the red horizontal, of the 50% percentile), are, most of them, at the farthest right of the figure, at the right of the φ=4 vertical, that is, in the silt zone and especially the clay zone; only a very little number of samples begin in the sand zone, that is, at the left of the φ=4 vertical.
- many samples contain a very small amount of sand: < 5% and some, even, < 1%; they are silt or even clay mud, which is also confirmed by the tables and ternary diagrams.

Figure 2, with the normal repartitions spectrum for the same 104 real samples from Figure 1, supports the previous conclusions concerning the slow increases, gentle slopes of quasi-totality lines which substantiate the conclusion regarding the big dispersion, big σ value, or reduced sorting; only two samples make exception, obvious at the upper part of the figure, with great slopes and consequently, good sorting, reduced dispersion… together with few other samples at the lower part of the figure, with bigger slopes and consequently good sorting. They are, in fact, entirely contained in the zone of the silt and especially clay mud, quasi-integrally at the right side of 4φ value, many of them intersecting the 8φ value under 25% - some of them intersect it even under 16% - which means that they have over 84% clay. The latter have been selected for a separate presentation in figures 3 and 4.

- the great majority of the medians (the intersections with the red horizontal of the 50% percentile) are situated at the right side of 5φ, that is at the right side of medium silt, few medians are between 2 and 5 φ and only one curve is at approximately 1φ.
- the spectra of the normal repartitions will however be rarely used, as we now have a rapid, computerized access to the real repartitions. Yet we have presented them herein to demonstrate, once again, the accuracy of our program in the computerized simulation of the Probability Paper, which really transforms in straight lines all normal repartitions (which is the declared purpose of the PP invention). We demonstrated this accuracy with all 104 samples, not with only one (in fact, benefiting from this marvelous electronic instrument named computer, we developed greater accuracy than that provided by the Mathematical Tables, the big mathematical achievements of the recent centuries).

After we had processed the data at indicators (tabled granulometric parameters) standard - initially, we used this program for all samples - we also compared the spectra real curves for the two profoundness fields (depths in cores), separately for the 9-11 cm field, and separately for the 14-16 cm field. The comparison confirms the same previously presented conclusions, and highlights another conclusion: that the two profoundness fields' spectra' resemble in almost all. These spectra lead to the same conclusions, but now based on the normalized repartition straight lines, used especially to demonstrate the precision of the program by clearly showing a single abrupt slope straight line at each top side and a bunch of straight lines relatively more abrupt at each bottom side while highlighting the intersections with the 50%, red percentile, that is, the medians, piled to the right, towards the mud.

The program also matches colour to entire groups of samples, whatever the number of groups and whatever the number of samples in each group. For instance, a specific colour is assigned for a certain profoundness in core (*e.g.* 0.2 cm, 2-4 cm, … 9-11 cm, 14-16 cm, 16-20 cm, etc), by simply completing the Message-Box in an interactive-conversational manner; the MessageBox appears on the screen by merely clicking our special button from the program's toolbar.

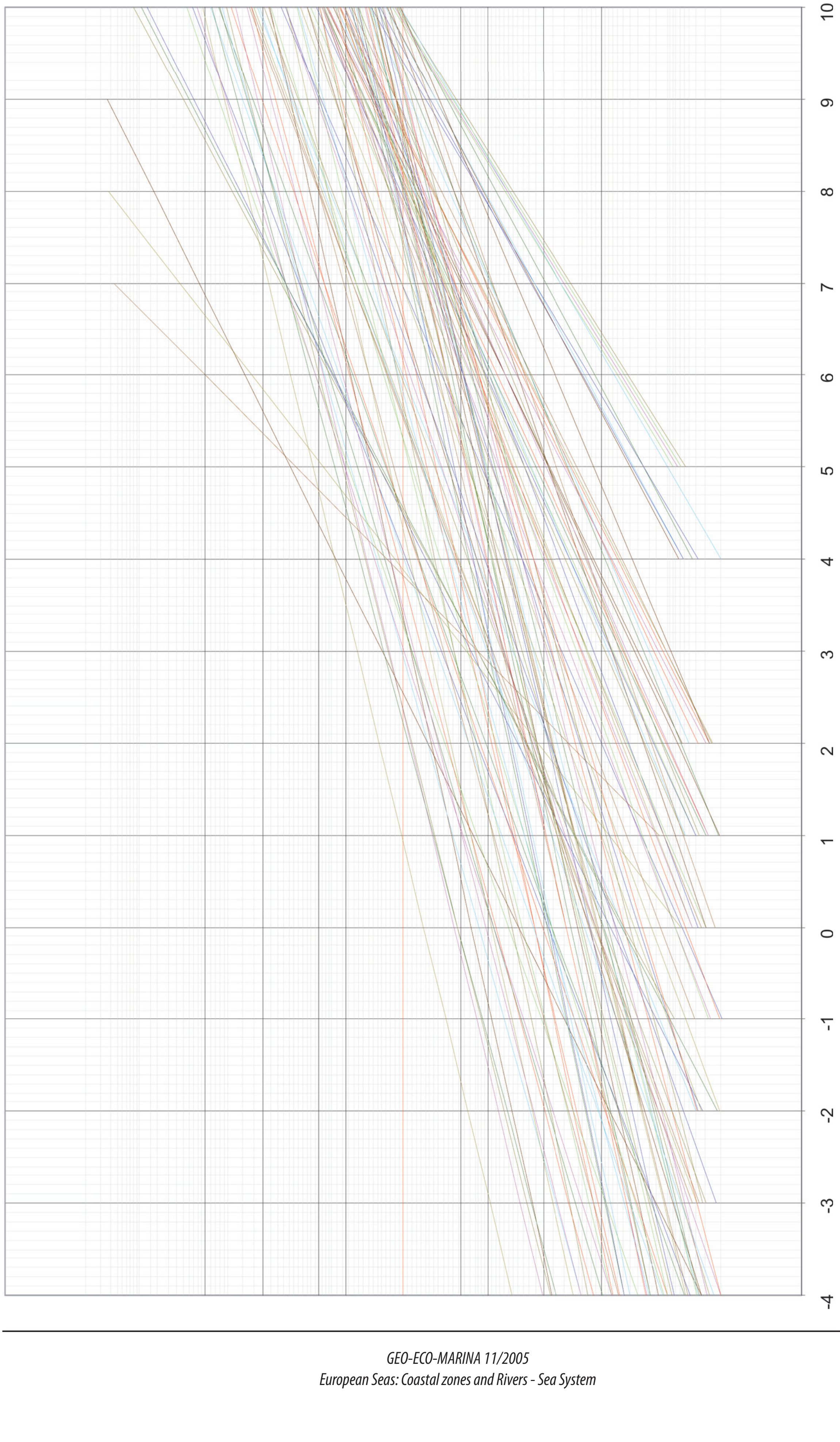

Fig. 2 Normal Repartitions Spectrum for the 104 samples in Fig.1

Figures 3 and 4 present - for a final and decisive comparison and also to emphasize the particular benefits of the electronic Probability Paper simulation, for sedimentology, at least - eight of the most representative curves from the big pile of sample data previously presented en-bloc in figures 1, 2 (We also give, in brackets, the order number of each sample in the input data and final results tables, of 5 maximum characters, MSExcel is able to work with 65500 lines at the most, that is 65500 different samples simultaneously. The numbers are, in any case, much shorter than the names given to the samples by the researchers, up to 255 characters, that is, made as explicit as requested; aiming not to lose too much space with whole names we used these numbers, and not the names, in the caption for Figure 4; moreover, we indicated by the abbreviations fs=Simple frequencies, fc=Cumulative frequencies and by 0-1 the fact that we used the 0 to 1 ordinate scale and not that of percentages, 0 to 100%. The colour correspondence is still total between the samples on the Figures 3 and 4, and all the other desired and possible graphic representations. By means of order numbers, the samples can more easily be found in tables, too; yet working in a MS-Excel built-in manner we can easily find any sample by name too, by using the MS Find/Search possibilities – it is one of the numerous advantages offered by this type of programs which we strongly recommend for a future generalization, considering that almost all types of problems can be solved in MS-Excel, with immediate transfer of every type of graphic or text type data.

The eight selected samples are:

a) the two most abrupt curves (that is, the best sorted, the least dispersed) from the top sides of the previous figures, named:
   - 22 CT 015 9-11, [52], in red, μ=3.8801 and the dispersion σ=1.1918
   - 22 CT 015 14-16, [53], magenta, having the median μ=3.8199 and the dispersion σ=0.9381, that is, the smallest dispersion values, that confirm all previous conclusions, and the medians are both situated in the fine sand zone, at the left side of the 4φ abscissa.

b) the most abrupt curves from the bottom sides of the figures 1…6, well sorted in the clay field, namely:
   - 59 DN 110 9-11, [20], light bleu, μ=9.8858 σ=1.7337
   - 59 DN 110 14-16, [21], dark blue, with the median μ=9.9209 and the dispersion σ=1.4889, that is, very big values for the medians, μ, in the clay field, and rather good sorting by comparison, to most of the other samples.

c) curves with gentle increasing, reduced slope, very weak sorting, great dispersion, in a large field of medians, (the intersections with 50% percentile red horizontal), from μ=0.9130, for the green curve, and to μ=7.6565, for the brown curve, that is, from the coarse sand field to the very fine silt field, namely, from left to right:
   - 60 DN 125 9-11, [62], green, with the median μ=0.9130 and the dispersion σ=3.8566
   - 29 CT 125 14-16, [67], light red, with the median μ=2.3310 and the dispersion σ=3.8941
   - 29 CT 125 9-11, [66], black, with the median μ=6.1068 and the dispersion σ=3.9850
   - 60 DN 125 14-16, [23], brown, with the median μ=7.6565 and the dispersion σ=4.0200, all of them with dispersions of about 4, that means gentle slopes and contents from all factions without gravel.

All the figures 1, 2 and 3, may lead to many other conclusions, such as about the populations mixtures (if abrupt variations appear or not in the real samples slopes) etc.

We only underline that the same curves, of exactly the same colours and shades, were represented in Figure 4, too, which show the Normal Repartitions: Simple Frequencies (Repartition Densities, or Gauss "Bells") and Cumulate Frequencies (Repartition Functions, Gauss Integrals or Error Integrals), in linear scale, proportional for ordinates, differently from the Probabilistic Scale, of the Probability Paper from the three previous figures.

Figure 4 confirms the previous conclusions, underlining that:
- the best sorting (the smallest dispersion) is met, naturally, at the red and magenta curves, [53] and [52], with the Gauss "bells" (that is, the simple frequencies, fs52 and fs53) the highest and narrowest, centered on medians situated a little to the left of 4φ, in the very fine sand zone; they also have, visibly, the most abrupt cumulative curves (the "S" curves, fc53 and fc52), half in the sand and half in the silts zone.
- a rather good sorting is also met at the curves centered on the very fine clays from the right side of Figure 4, which correspond to the curves situated in the right-bottom corner of figures 1..3, namely the blue curves, light and dark, having the order numbers [20] and [21] in the data tables; that is the "bells" of the simple frequencies fs20 and fs21 centered on medians next to the 10φ abscissa and the cumulative graphics, the "S" curves fc20 and fc21, almost as abrupt as the previous ones, but in another texture field, that of the fine clays, predominantly.
- the same conclusions are valid for the green curve, fs22, with a rather good sorting, but in the sand field, as its "bell" is centered on the $\varphi \approx +1$ median, which also represents the abscissa for the inflexion point of the "S" cumulative, fc22.
- conversely, the other curves (black, brown and light red) have very flattened simple frequencies bells (fs 23, 66 and 67), great dispersions, extremely weak sorting and, accordingly, their "S" cumulative curves have much more gentle increases, quasi-uniform contents in sand, silt and clay, etc.

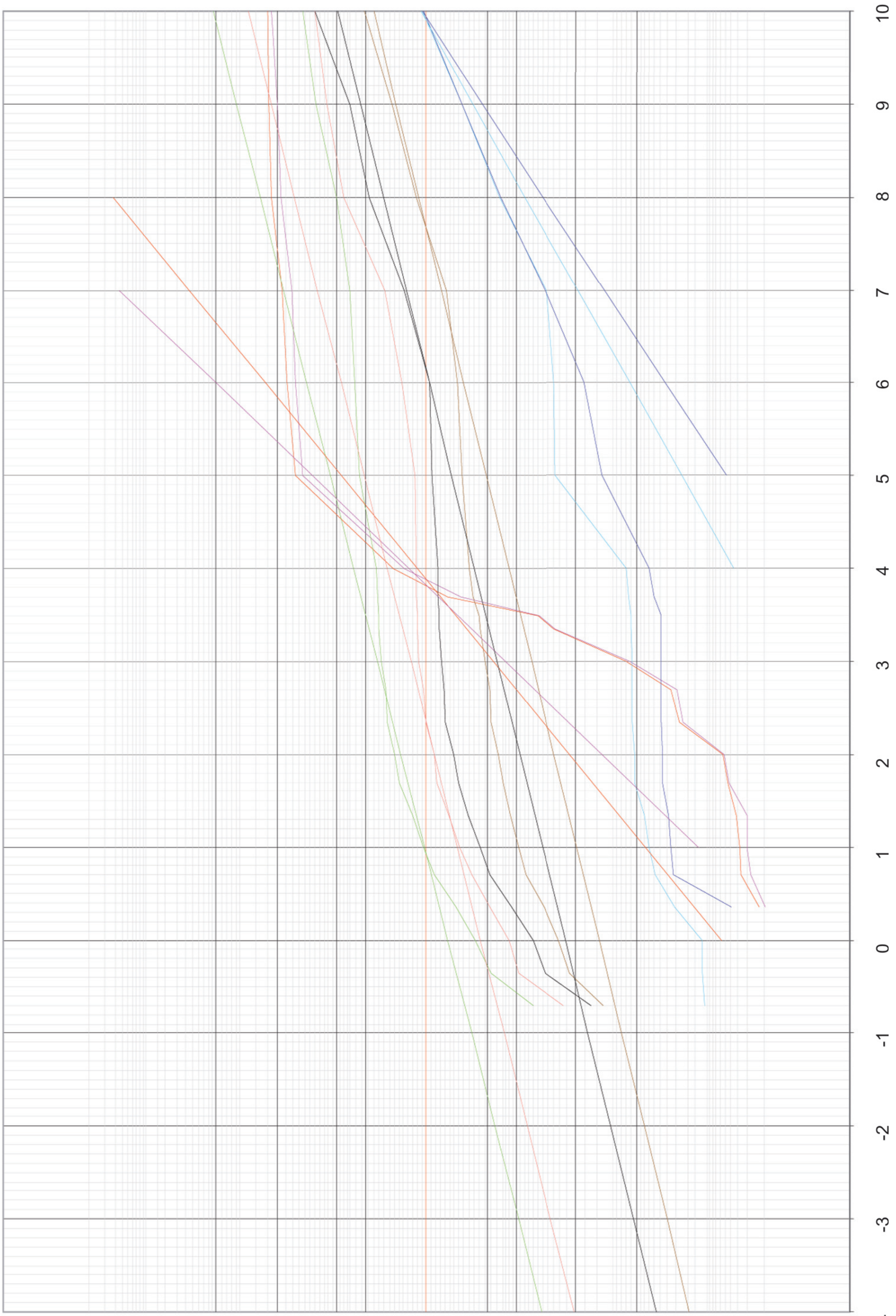

Fig. 3 Eight pairs of chosen curves (real and normal repartitions) - each pair is of a different colour

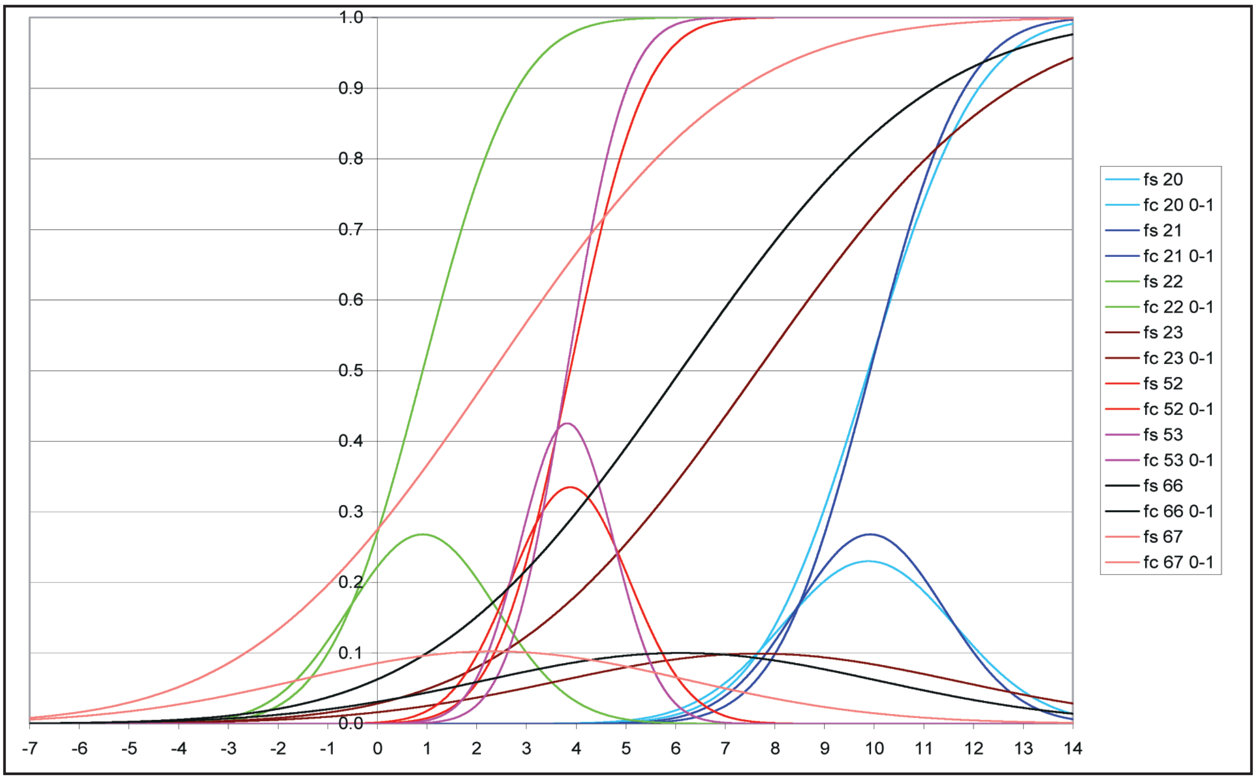

Fig. 4 Simple frequencies (repartition densities or Gauss bells) and cumulative ones (Repartition functions, Gauss integrals or error integrals) for the same eight exemplary pairs of samples chosen in the previous figure (Fig. 3), in the same colours. Linear Scale, proportionate for the ordinate, as opposed to the "probability" scale of the Probability Paper in the three previous figures

We have presented the figure 4, with the normal repartitions (simple ones, the Gauss bells, or cumulative ones, "S" curves, but based merely on the median and dispersion information). They are presented as such not only to confirm again the precision, complexity and even integrality of this program, but also to make evident once again the merit of the Probability Paper screen computerized simulation, for the real and complete repartition, with the distinct extreme sides contribution strongly emphasized (otherwise, hard to reveal), and also for the repartitions of the different constitutive populations in the same sample, by breaking the lines of the segments of the real repartitions etc, by using special, "probability" scales on the vertical, instead of the linear or of any other type. Another, and still better reinforcement for the program's maximum possible precision is shown in Figure 3 with the superposed intersections of all pairs (real curve – normal curve, of the same colour) exactly on the red horizontal of the 50% percentile, of the "median".

Other types of graphical representations - practically instantly drawn with this program (Shepard, Link, Folk ternary diagrams for samples with or without gravel; column, bar, line, pie, xy-scatter, area, doughnut, radar, surface, stock and all other diagram types), each time with the same initial dimensions, but allowing for later resizing and bettering specific to MSOffice - will be described in future works, with exactly the same samples, permanently keeping the same colours, and presenting other benefits too (sorting, filtering, pivot tables, automatic reports, auto format, etc).

- this program's tabular realizations (*cf.* Table 1) are, of course, less spectacular than the graphical ones (even if the program is able to automatically re-colour every row, that is, every sample, in the corresponding colour for the graphical presentation, or can keep the initial black for all samples). Yet, these realizations offer, in the 224 final columns, all necessary information for a complete study of the samples and for a rapid realization not only of our original special graphics, now incorporated ("built-in"), but also for all other types of graphics, pivot tables and reports generally allowed by MS-Excel, as well as instantly sorting, filtering by all criteria types, etc. In order to reduce the typographical space, we present now only the selection for the eight samples previously chosen (also, abbreviated: in each parameters field only the first and last columns are shown, separated by a column of 3 dots between them); so:
- the first columns (in the left side of the table), naturally contain the raw, input data (sample weight + recipient deadweight), introduced by the user: the A column (col.1) will contain the order (current) number, *nc*, previously mentioned in brackets (between 1 and 65500, the maximum line number with which Excel can work); B column, (col.2) – the sample's name, given by the user, as suggestive and complex as requested, of maximum 255 characters; the columns 3…32 (C…AF), for the raw data of the 30 sieving and pipette/sedimentation intervals; 33-AI:Dispersant; 34-AH: recipients' deadweight, "tare";

1	2	3	31	32	33	34	35	63	64	65	66	94	95	96	97	125	126	127	134
	NumeProba	1/-6	29//+10	2.73	disp	tara	Greutati gpi				Frecvente simple				Frecvente cumulate			P1	P95
nc	phi	-6.00	10.00	11.00			6.00	10.00	11.00	GT=suma gpi	6.00	10.00	11.00	Suma=100	6.00	10.00	11.00	1.00	95.00
20	59 DN 110 9-11	36.22	0.23	0.20	0.10	36.22	0.00	0.71	1.96	4.09	0.00	17.38	48.02	100.00	0.00	51.98	100.00	1.60	10.90
21	59 DN 110 14-16	36.22	0.25	0.21	0.10	36.22	0.00	0.74	2.16	4.44	0.00	16.60	48.69	100.00	0.00	51.31	100.00	4.16	10.90
22	60 DN 125 9-11	36.22	0.12	0.12	0.10	36.22	0.00	0.10	0.32	3.70	0.00	2.60	8.60	100.00	0.00	91.40	100.00	0.97	10.42
23	60 DN 125 14-16	36.22	0.20	0.17	0.10	36.22	0.00	0.58	1.37	5.56	0.00	10.36	24.68	100.00	0.00	75.32	100.00	0.88	10.80
52	22 CT 015 9-11	36.22	0.14	0.13	0.10	36.22	0.00	0.09	0.61	14.00	0.00	0.64	4.39	100.00	0.00	95.61	100.00	2.92	9.04
53	22 CT 015 14-16	36.22	0.14	0.13	0.10	36.22	0.00	0.03	0.68	17.01	0.00	0.15	4.00	100.00	0.00	96.00	100.00	2.89	7.47
66	29 CT 125 9-11	36.22	0.17	0.14	0.10	36.22	0.00	0.63	0.75	6.90	0.00	9.19	10.88	100.00	0.00	89.12	100.00	0.91	10.54
67	29 CT 125 14-16	36.22	0.14	0.13	0.10	36.22	0.00	0.15	0.57	5.27	0.00	2.89	10.79	100.00	0.00	89.21	100.00	0.95	10.54

135	136	137	138	139	140	141	142	143	144	145	147	157	158	159	160	161	162	164	190	193	207	209	223	224
Mdn	Mdz	Sig	SKI	Kg	P	N	S	A	Mal	PF	NFG	AM	COL	Shep	FolkP	Folk	Link	FCRect		RepNorm		FCRectRN2		
																		4.00	10.00	-4.00	10.00	-4.00	10.00	nc
9.89	9.37	1.73	0.59	1.18	0.00	1.37	19.73	78.90	98.63	0.00	0.12	17.38	48.02	A		MA	A		50.53	0.00	52.62		50.70	20
9.92	9.39	1.49	0.55	0.89	0.00	0.69	19.84	79.46	99.31	0.00	0.00	16.60	48.69	A		MA	A		50.35	0.00	52.12		50.57	21
0.91	2.78	3.86	0.67	0.94	0.00	71.11	12.88	16.01	28.89	0.00	29.68	2.60	8.60	NA		NS	NAS		64.63	10.13	99.07	36.34	75.23	22
7.66	6.36	4.02	0.43	0.65	0.00	31.78	22.63	45.59	68.22	0.00	7.22	10.36	24.68	NSA		SN	ANS		57.33	0.19	72.00	18.93	56.24	23
3.88	4.06	1.19	0.61	2.77	0.00	59.83	34.68	5.49	40.17	0.00	0.00	0.64	4.39	NS		NM	NS		68.30	0.00	100.00			52
3.82	4.02	0.94	0.61	2.23	0.00	64.18	31.52	4.30	35.82	0.00	0.00	0.15	4.00	NS		NM	NS		68.76	0.00	100.00			53
6.11	5.27	3.98	0.24	0.61	0.00	45.10	28.51	26.39	54.90	0.00	12.00	9.19	10.88	NSA		SN	NSA		63.21	0.56	83.57	22.82	60.47	66
2.33	3.51	3.89	0.43	0.65	0.00	54.76	27.27	17.97	45.24	0.00	18.00	2.89	10.79	NS		NS	NSA		63.26	5.20	97.55	32.58	71.10	67

Table 1 The 224 columns of input, intermediate and final data for 8 exemplifying samples

Sortarea ascendentă dupa Mediană			Sort. asc. după σ (Dispersie, "Sortare")			Asimetria (Ski), descendent			Conținutul în Nisip, descendent			Coloizi,(argile f.fine), ascendent		
22	60 DN 125 9-11	0.91	53	22 CT 015 14-16	0.94	90	05 VA 065 9-11	0.81	68	14 CK 015 9-11	91.20	53	22 CT 015 14-16	4.00
100	10 BG 025 9-11	2.21	52	22 CT 015 9-11	1.19	69	15 CK 025 9-11	0.79	100	10 BG 025 9-11	77.78	52	22 CT 015 9-11	4.39
67	29 CT 125 14-16	2.33	21	59 DN 110 14-16	1.49	74	18 CK 065 9-11	0.79	101	10 BG 025 14-16	73.99	68	14 CK 015 9-11	5.77
101	10 BG 025 14-16	2.35	49	33 SG 110 14-16	1.49	70	16 CK 035 9-11	0.70	69	15 CK 025 9-11	72.42	80	64 VA 015 9-11	8.44
68	14 CK 015 9-11	2.53	47	34 SG 090 14-16	1.51	84	02 VA 025 9-11	0.70	87	03 VA 035 14-16	71.29	22	60 DN 125 9-11	8.60
74	18 CK 065 9-11	2.94	19	58 DN 090 14-16	1.52	87	03 VA 035 14-16	0.68	22	60 DN 125 9-11	71.11	70	16 CK 035 9-11	8.70
87	03 VA 035 14-16	3.03	35	62 SU 090 14-16	1.56	22	60 DN 125 9-11	0.67	53	22 CT 015 14-16	64.18	81	64 VA 015 14-16	9.14
69	15 CK 025 9-11	3.28	34	62 SU 090 9-11	1.60	55	23 CT 025 14-16	0.67	74	18 CK 065 9-11	62.03	67	29 CT 125 14-16	10.79
90	05 VA 065 9-11	3.29	65	28 CT 110 14-16	1.69	80	64 VA 015 9-11	0.66	52	22 CT 015 9-11	59.83	69	15 CK 025 9-11	10.81
58	25 CT 045 9-11	3.37	64	28 CT 110 9-11	1.72	81	64 VA 015 14-16	0.65	58	25 CT 045 9-11	57.69	**66**	**29 CT 125 9-11**	**10.88**
97	08 VA 125 14-16	3.44	20	59 DN 110 9-11	1.73	85	02 VA 025 14-16	0.65	67	29 CT 125 14-16	54.76	85	02 VA 025 14-16	11.44
86	03 VA 035 9-11	3.78	81	64 VA 015 14-16	1.74	52	22 CT 015 9-11	0.61	97	08 VA 125 14-16	54.35	55	23 CT 025 14-16	11.46
53	22 CT 015 14-16	3.82	18	58 DN 090 9-11	1.75	53	22 CT 015 14-16	0.61	90	05 VA 065 9-11	53.28	87	03 VA 035 14-16	11.48
52	22 CT 015 9-11	3.88	80	64 VA 015 9-11	1.77	101	10 BG 025 14-16	0.58	86	03 VA 035 9-11	51.87	36	39 SG 015 9-11	12.08
84	02 VA 025 9-11	4.03	27	41 SU 025 14-16	1.81	83	01 VA 015 14-16	0.57	84	02 VA 025 9-11	49.43	100	10 BG 025 9-11	12.48
85	02 VA 025 14-16	4.07	42	36 SG 045 9-11	1.82	36	39 SG 015 9-11	0.56	85	02 VA 025 14-16	48.52	84	02 VA 025 9-11	12.78
92	06 VA 090 9-11	4.32	55	23 CT 025 14-16	1.84	100	10 BG 025 9-11	0.55	92	06 VA 090 9-11	48.43	101	10 BG 025 14-16	14.46

Table 2 The sorting according to a variety of parameters (such as Median, Dispersion, Asymmetry, etc) for the top 17 (out of 104) samples

- further on, there are the almost 200 columns of rapidly, even instantly, obtained results, by a rather strong computer and for a not too exaggerated number of samples. They are obtained by mere "dragging" the mouse or by mere clicking on an incorporated button, possibly, in the standard MS-Excel toolbars themselves;
- col. 35…64: the 30 columns of the samples raw weight, obtained, for the sand, by subtracting the recipient weight from the total measured weight for the silt and clay, respectively (distinguished by the pipette/sedimentation method), by a specific formula calculation; summarized in column 64, the sample's Total Weight is obtained, as denominator for calculating all simple and cumulative frequencies;
- 66…95, the 30 samples simple frequencies columns (densities of repartition, in mathematical terms, and Histograms and Frequencies Polygons, in graphical terms are easy to represent in Excel, as it will be shown in a future paper; these are exemplified for eight samples in Fig. 4.); these columns are summarized in column 96, for checking (here, if the result is not 100 %, a sonorous warning is emitted to signal wrong input data);
- 97…126, the 30 samples cumulate frequencies columns (the Function of Repartition, mathematically speaking, and, graphically speaking, just the real cumulate curves, named the "S" curves, too). To verify, the last cumulative columns, 126, must also be 100 (%);
- 127…134: the main percentiles (1%, 5%, 16%, 25%, 50%, 75%, 84% and 99%), used in the graphical parameters computation, in different combinations, by different authors; The 50% percentile represents the exact mean (or median, where a population is approximated by a representative selection, as in our case). In fact, these are the horizontals highlighted in black on the computerized Probability Paper, on the screen and in the figures 1…3, in order to distinguish them from the rest of the PP grid, which is in grey; the most important horizontal, the one for 50%, is a very distinct red horizontal;
- 135…139: The Mdn, Mdz, σ, Ski and Kg granulometric parameters (medians, sorting-dispersion-standard deviation, asymmetry, kurtosis) were largely presented in different works, therefore we shall not discuss them herein.
- 140…144: the global Gravel, Sand, Silt, Clay, Mud (Silt + Clay) percentages;
- 145…158: the detailed percentages, the sub-factions, from Very Coarse Gravel to Medium and Fine Clay;
- 159…162: the Shepard, Link, Folk (with or without gravel samples) ternary classifications denominations;
- 164…190: the rectified values (according to a special routine, elaborated by us and incorporated in Excel) of the real cumulate frequencies, values that can be later copied or dragged directly in the PP pattern, directly on the screen; the user can select and group as many values as he choses, from 1 to all samples simultaneously;
- the rest of the columns, 191…223, are only useful for the researchers interested in the normal repartitions too, that is, the Straight-Lines of the Repartition on the PP (of the figures 2, 3 type) and the "S" curves and Gauss bells on the graphics with linear ordinate scale, of the figure 8 type (more precisely, the data from 193…207 columns are copied or dragged directly in linear diagrams of figure 4 type, and from 209…223 columns are copied or dragged directly in the Probability Paper pattern). We have used them to clearly prove the precision of our program, considering that the most important output data are, however, those for the real curves, which do not loose any information, and not the data for the normalized curves.

We selected the first columns from several tables (from the numerous tables rapidly achievable in the same workbook) in a second table, Table 2 (ascending or descending sorting - ordering - filtering for the 104 samples, according to numerous parameters such as medians, dispersions, sharpness, etc or percentage contents in sand, clay, etc), in which the occurence of the above-mentioned eight previously selected samples are easily highlighted (while all the other samples are set in black) by the aforesaid program colour constancy. These tables also confirm the graphical representations (for example, the red and magenta samples, with [52] and [53] order numbers, always appear on top, with the smallest content in Fine Clay, the best sorting, a sorting which is in the Sand field…) and further suggest other very good samples for exemplifications, such as those in mauve…

Moreover, we should also point out that this printed presentation of a program meant for sedimentology, created in the Excel in which it is built-in, cannot encompass the full range of facilities offered to the researchers. (For instance, the option to individualize each sample, on the screen only, from an enormous number of samples, by simply moving the mouse pointer to the selected curve; it instantly makes the complete name to appear temporarily on-screen in a small rectangle). It is the program CD presentation only that also offers the feedback needed to learn the opinions of other researchers: appreciations, suggestions and supplementary requests, even for program customizing for different users.

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