SEDIMENTOLOGY OF THE CERCAPUQUIO AND CHAUCHA FORMATIONS (CENTRAL-PERU)

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Sedimentologic investigations on the Cercapuquio and Chaucha Formations in the Azulcocha area (central Peru, 12°35'S, 75°40'W, Fig. 1) are presented. Both the Cercapuquio and the Chaucha Formations are characterized by sedimentological cyclicity (Fig. 2 and 3). It may be related to the first uplift phases of the Marañón Geanticline.

Fig. 1. Location of the Azulcocha area

The **Cercapuquio** Formation consists of braided river deposits. It is subdivided into four cycles or sequences (Fig. 2). Within each sequence a granulometry decrease from bottom to top is observed, whereas the formation as a whole shows a granulometry increase to the top. Sorting and skewness values indicate fluviatile transport. This is consistent with facies analysis.

The mineralogical analysis of the Cercapuquio sandstones reveals a fairly mature composition. The Brazilian Craton appears to be the most probable source region. This indicates that during deposition communication between the basin and the Brazilian Craton existed.

The **Chaucha** Formation was deposited in a peritidal carbonate environment. Three upwards shallowing cycles are distinguished (Fig. 3). The first one comprises intertidal and supratidal sediments, with characteristics of "Sabkha-type" deposition (including formation of early diagenetic dolomite and evaporitic minerals) and wich are overlayed by a thick red siltstone. The second cycle evolves from subtidal to supratidal environment and ends with red siltstone too. The third cycle is subdivided into three subcycles characterized each of them by evolution from subtidal (with barrier facies) to supratidal environments. The cycle finishes also with a thick red siltstone layer. The top of

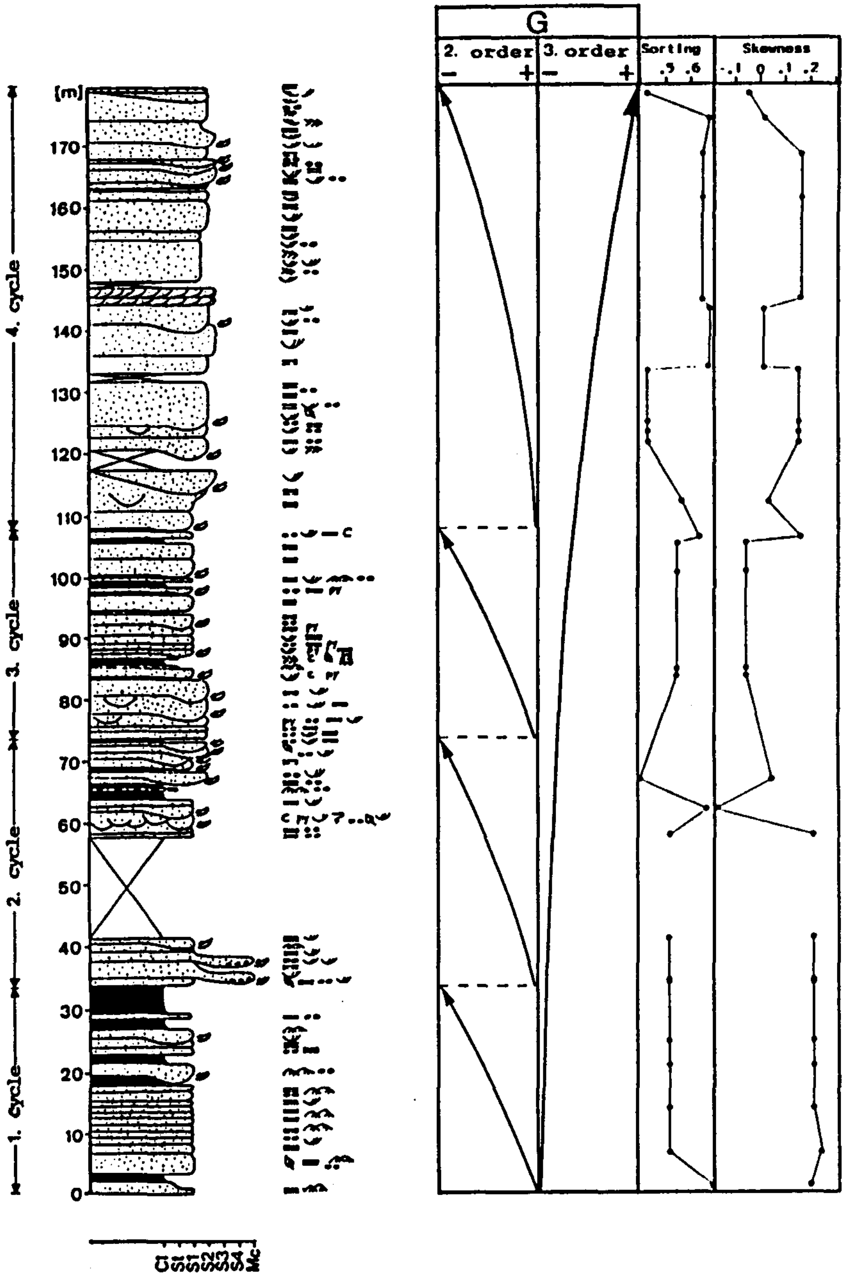

Fig. 2. Facies analysis of the Cercapuquio Formation

Cl.Claystone
St.Siltstone
S1.Very fine sandstone
S2.Fine sandstone
S3.Medium sandstone
S4.Coarse sandstone
Mc.Microconglomerate

G..Granulometry
.Erosion surface
.Horizontal bedding
.Through cross-bedding
.Ripple marks
.Flaser bedding
.Overturn

.Clay gall
.Leaf remain
.Trunk remain
C .Coal
.Bioturbation
PY .Pyrite

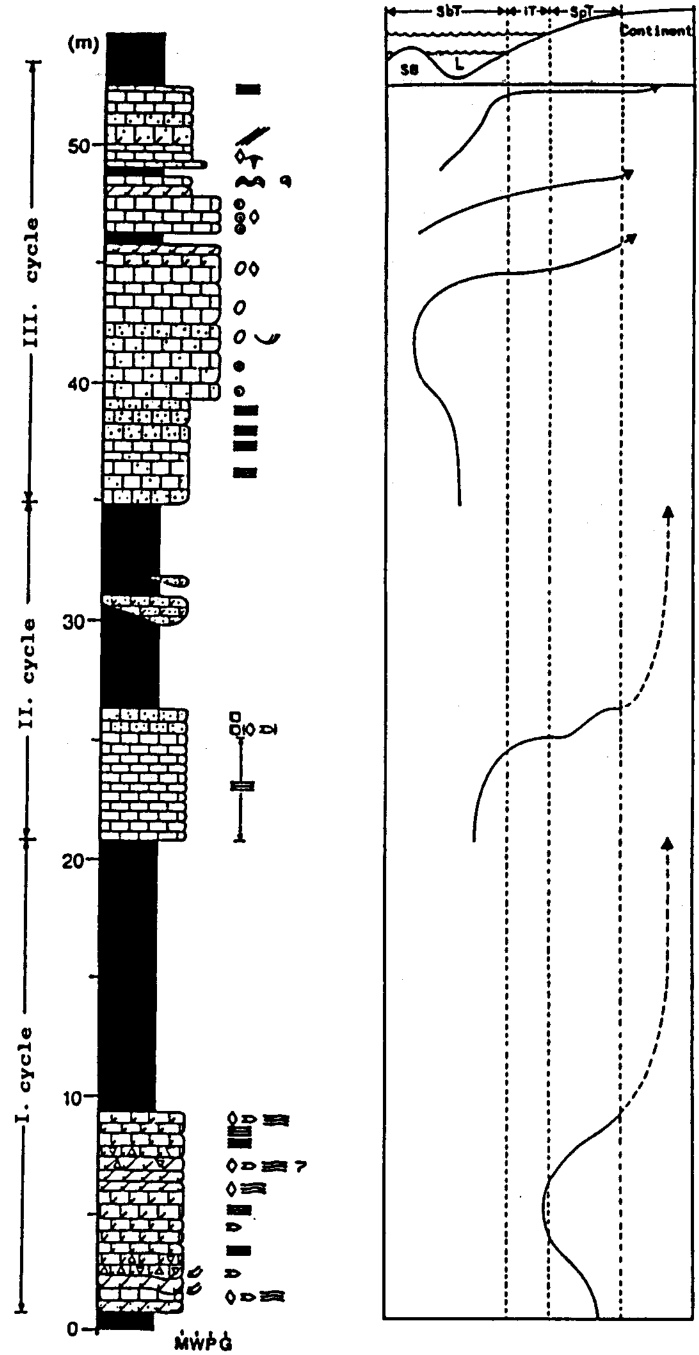

Fig. 3. Facies analysis of the Chaucha Formation

.Limestone
.Sandy limestone
.Dolomitic limestone
.Sandy dol. limestone
.Dol. brecc. limestone
.Calcareous dolomite
.Sandy calc. dolomite
.Calc. brecc. dolomite
.Red siltstone (Terra-rossa?)
M...Mudstone

W...Wackestone
P...Packstone
G...Grainstone
SbT.Subtidal
IT..Intertidal
SpT.Supratidal
SB..Submarine barrier
L...Lagoon
..Erosion surface
..Horizontal bedding
..Through cross-bedding
..Oblique bedding

..Wavy lamination (calcrete)
..Algal lamination
..Pseudom. after halite
.Pseudom. after anhydrite or gypsum
..Pelecypod
..Gastropod
..Bioturbation
..Ooid
..Pellet

each cycle is characterized by progressive dolomitization, occurrence of calcrete layers, detritic dolomite, and/or reworked carbonate sediments (Fig. 3). All these features indicate that the cycles culminate in emersion. The red siltstones are easily wheathered and poorly exposed, making it difficult to determine their deposition environment. CEDILLO (1988) investigated similar facies 45 km to the southeast in the Cercapuquio region and interpreted them as "terra-rossa". This interpretation is compatible with the emersion sequences recognized below each siltstone layer and with the ocurrence of two small channels filled with micrite and clastic material within the red siltstones at the end of the second cycle, and which are interpreted as supratidal channels.

Lithogeochemical investigations on the carbonate rocks of the Chaucha Formation indicate that trace element contents are normal for carbonate rocks (Tab. 1). Sr displays, as expected, lower values in dolomitic layers (100-160 ppm) than in limestones (up to 300 ppm). Mn correlates well with dolomitization (ROSAS, 1989). Zn (14 to 130 ppm) and Pb (8 to 30 ppm) values are also normal except in a sample of the basal dolomite (Zn = 500 ppm) located close to a barite-bearing layer ($BaSO_4$ = 54000 ppm).

TAB.1. GEOCHEMISTRY OF THE CHAUCHA FORMATION

FIELD	ALT (m)	CACO3 (%)	MGCO3 (%)	BASO4 (ppm)	P2O5 (ppm)	FECO3 (%)	K2O (%)	SIO2 (%)	AL2O3 (%)	TIO2 (ppm)	SR (ppm)	MNCO3 (ppm)	PB (ppm)	ZN (ppm)	SUM (%)
C-30	52.4	91.3	1.6	34	200	0.96	0.16	4.03	0.93	740	305	2084	10	128	99.33
C-29	51.2	72.4	2.4	119	500	1.72	0.87	14.95	4.10	2990	239	632	12	20	96.90
C-28	50.4	84.9	6.7	51	200	1.17	0.25	5.11	1.37	910	213	592	12	27	99.70
C-27	49.1	85.1	1.4	85	400	0.97	0.39	8.69	1.65	1740	209	1019	12	133	98.56
C-26	48.4	90.0	2.1	17	200	1.00	0.22	4.58	1.22	710	194	1360	8	87	99.38
C-25	46.6	93.4	1.6	17	100	0.78	0.10	2.48	0.74	470	288	969	13	51	99.30
C-23	45.4	66.7	29.2	<5	100	1.03	0.05	1.45	0.50	310	111	1580	11	21	99.16
C-22	44.8	84.7	11.6	17	100	0.87	0.06	2.47	0.55	380	157	1119	12	44	100.45
C-21	42.3	81.2	4.2	102	200	0.72	0.39	9.33	1.95	920	234	523	15	17	98.00
C-20A	39.4	82.4	1.9	68	300	1.47	0.39	8.49	2.05	1670	248	335	13	19	97.00
C-20	38.8	79.9	2.5	85	400	1.49	0.62	9.84	2.61	2130	215	650	13	27	97.32
C-19	36.4	90.4	1.7	51	200	0.79	0.28	5.61	1.23	770	196	1257	13	21	100.27
C-17	30.6	67.0	3.8	221	700	1.63	1.22	21.25	4.52	3220	203	1483	17	28	100.02
C-15A	25.7	82.8	1.6	85	200	1.55	0.58	9.88	2.28	2210	222	625	16	18	99.04
C-15	25.4	76.3	2.1	119	300	2.13	0.85	12.55	3.16	2980	210	648	18	21	97.53
C-14	25.1	93.2	1.4	17	100	0.85	0.25	4.45	1.06	750	200	604	15	18	101.38
C-13	22.5	93.7	1.4	<5	<100	0.56	0.17	3.27	0.88	730	248	569	12	21	100.15
C-12	21.0	93.4	1.6	17	100	0.61	0.18	3.19	0.89	710	235	558	13	16	100.04
C-10	8.8	79.2	13.1	187	100	1.80	0.23	3.09	0.90	690	132	5259	19	15	98.96
C-09A	8.2	72.4	15.6	373	200	3.94	0.34	3.53	1.08	780	110	4886	22	42	97.56
C-09	7.3	67.6	23.0	14245	<100	1.87	0.14	2.05	0.55	380	429	3668	13	14	97.10
C-08	6.4	70.6	22.7	1920	300	3.15	0.12	1.21	0.53	380	164	4993	13	21	99.09
C-07	4.8	92.8	5.1	34	200	0.83	0.13	2.03	0.58	440	201	1479	16	15	101.72
C-06	4.0	78.4	12.9	68	500	1.54	0.29	3.24	0.98	870	176	2124	21	15	97.73
C-05	2.8	75.0	14.9	594	200	3.94	0.17	1.86	0.62	450	104	3698	20	500	97.05
C-04	2.0	59.0	21.1	10828	100	7.91	0.17	0.41	0.48	250	257	9683	30	39	91.20
C-03	1.5	87.4	1.8	53819	<100	0.73	0.04	1.06	0.30	440	928	2950	12	18	97.15
C-02	0.8	53.1	22.8	1257	400	5.24	0.65	4.80	1.56	1200	163	9428	11	20	89.42

The age of the Cercapuquio and Chaucha formations is still controversial. They lie between the Condorsinga Formation (up to Toarcian) and the Goyllarisquizga Group (Neocomian). In the absence of explicit paleontological findings a Bajocian age is favored on the basis of lithological correlation with carbonate platform sediments of Bajocian age in the Huancavelica region (Chunumayo Formation) and in the Arequipa region (Socosani Formation). Bajocian sediments are observed also in other regions whereas in the time span between Bajocian and Titonian/Berriasian. no carbonate sedimentation is known in Peru.

CEDILLO, E. (1988) Dissertation Univ. Heidelberg, 201 p.

ROSAS, S. (1989) Diplomarbeit Univ. Heidelberg, 126 p.