

Fig. 1 Sampling depths used for geochemical analyses (chemical and stable isotope analyses) of clay pore waters

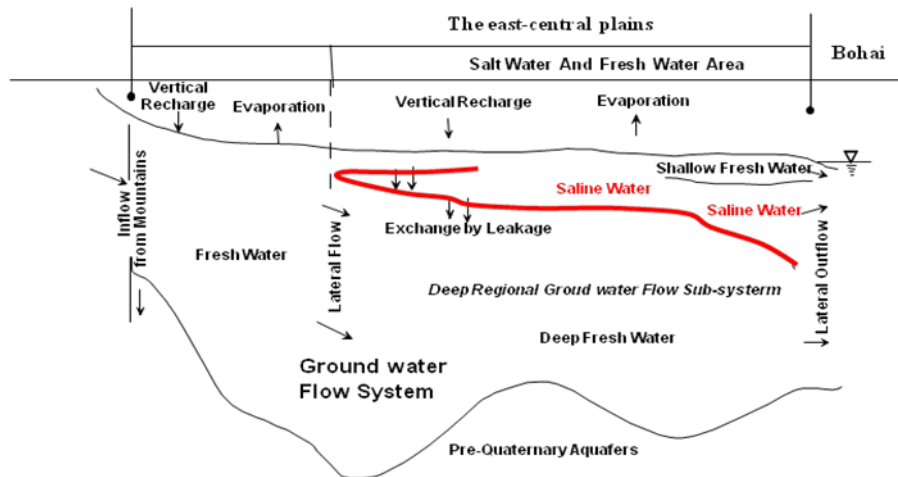
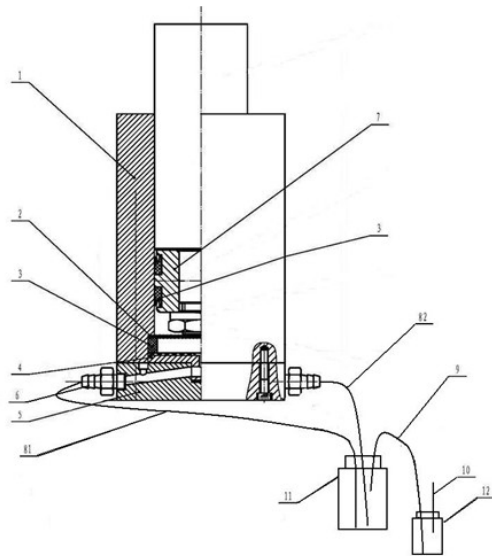


Fig. 2. Schematic transect of ground flow in the North China Plain(zhang zonghu)



1. Hollow column; 2. Filter membrane; 3. O-ring; 4. Filter ; 5. Base; 6. Outlet; 7. Piston; 8. Aqueduct; 9. Connecting pipe; 10. Exhaust pipe; 11. Collection bottles; 12. Non-evaporation bottles; 13. Joints

Fig. 3. Set-up for the extraction of pore water by mechanical squeezing of clay cores

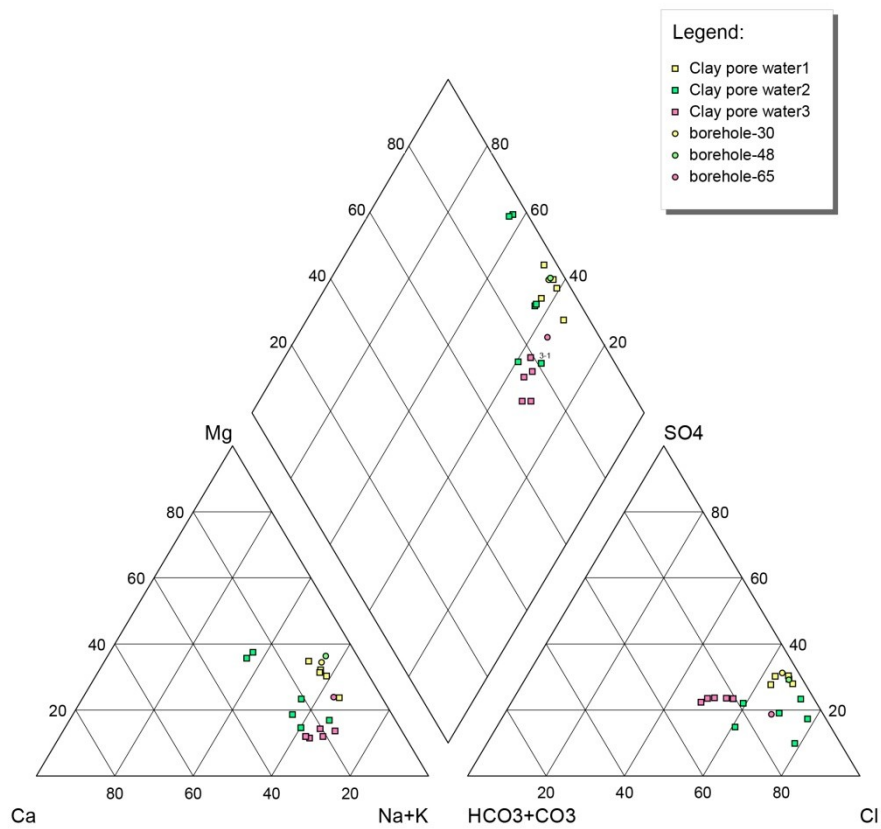


Fig. 4. Piper diagram of pore water from different levels of clay samples

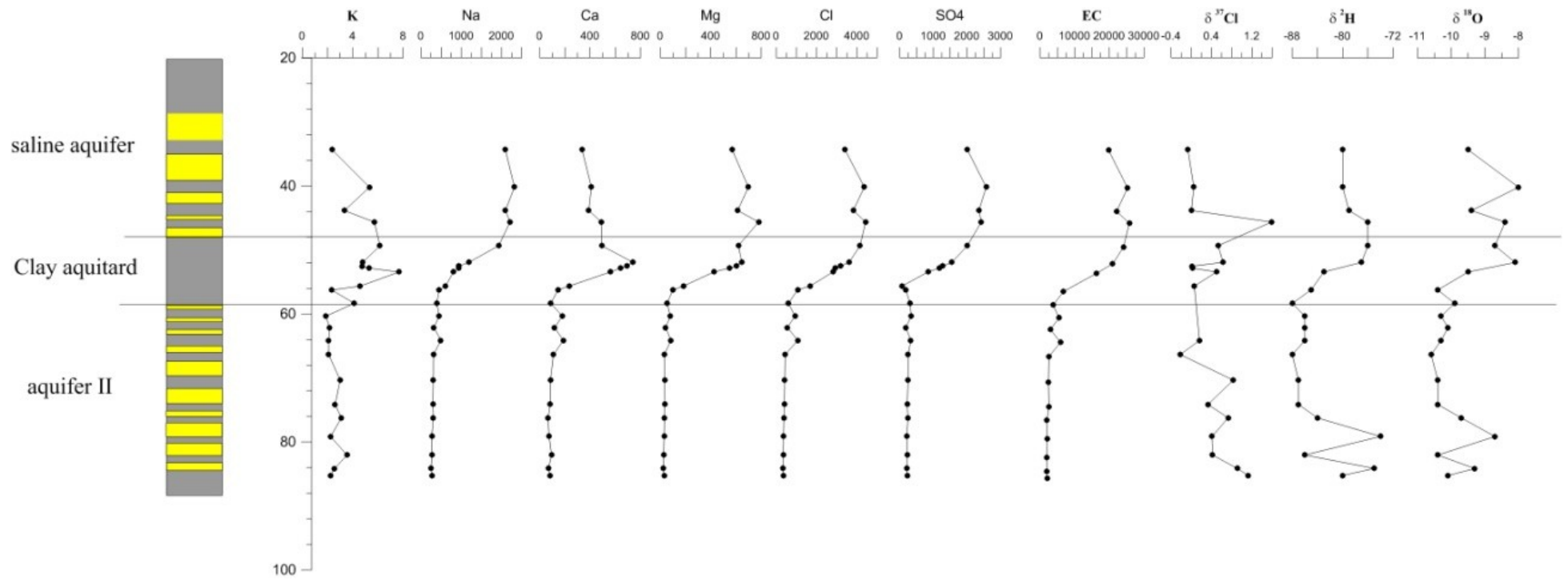


Fig. 5. Main compositions of clay layer pore water change with depth

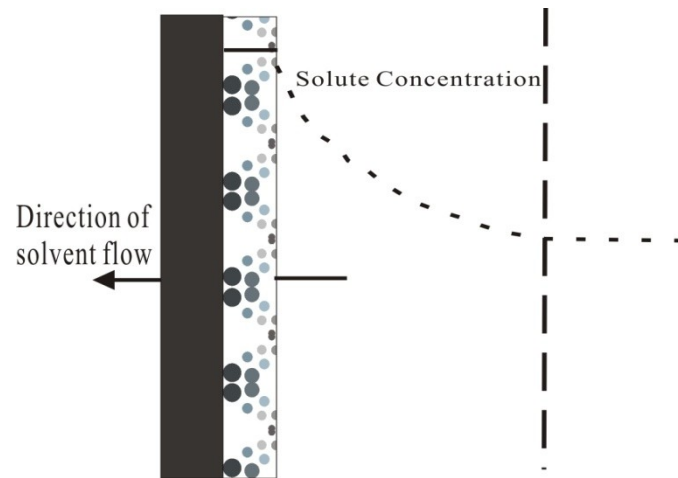


Fig. 6. Concentration polarization layer (CPL) at a clay membrane

Sample	D (H)	K+ (mg/L)	Na+ (mg/L)	Ca ²⁺ (mg/L)	Mg ²⁺ (mg/L)	Cl ⁻ (mg/L)	δD (‰)	δ ¹⁸ O (‰)	δ ³⁷ Cl (‰)	Type
H1	30.00	2.15	2608.00	412.30	854.40	4622.00	-85.0	-11.3	0.08	aquifer
#1	34.35	2.36	2091.00	335.90	568.90	3404.00	-80.0	-9.50	-0.07	Clay pore water 1
#2	40.20	5.32	2318.00	409.80	698.00	4364.00	-80.0	-8.00	0.05	Clay pore water 1
#3	43.85	3.34	2094.00	389.10	613.10	3815.00	-79.0	-9.40		Clay pore water 1
#4	45.65	5.71	2208.00	487.50	779.80	4427.00	-76.0	-8.40	1.59	Clay pore water 1
H2	48.00	2.32	2493.00	312.80	860.70	4694.00	-74	-9.5	0.31	aquifer
#5	49.35	6.16	1928.00	491.70	619.00	4154.00	-76.0	-8.70	0.53	Clay pore water 2
#6	51.95	4.78	1189.00	740.20	646.20	3611.00	-77.0	-8.0	0.63	Clay pore water 2
#7	52.55	4.75	935.10	690.60	605.50	3182.00			0.01	Clay pore water 2
#8	52.85	5.31	940.70	642.50	548.10	2928.00			0.02	Clay pore water 2
#9	53.45	7.67	804.50	561.70	425.60	2811.00	-83.0	-9.50	0.05	Clay pore water

										2
#10	55.65	4.59	613.00	236.90	184.80	1685.00			0.06	Clay pore water 2
#11	56.25	2.32	450.80	146.50	99.56	1062.00	-85.00	-10.40	0.06	Clay pore water 2
#12	58.35	4.12	391.90	87.36	53.06	601.40	-88.00	-9.90		Clay pore water 2
#13	60.35	1.87	452.00	178.90	79.42	927.40	-86	-10.3		Clay pore water 3
#14	62.15	2.16	322.60	118.40	41.53	548.50	-86.00	-10.10		Clay pore water 3
#15	64.15	2.09	494.80	187.20	84.05	1070.00	-86.00	-10.30	0.16	Clay pore water 3
H3	65.00	0.32	300.90	50.19	59.42	520.60	-84	-10	0.67	aquife r
#16	66.35	2.09	310.30	109.70	31.39	440.50	-88	-10.60	0.22	Clay pore water 3
#17	70.35	3.00	307.10	84.56	35.73	419.20	-87.0	-10.40	0.83	Clay pore water 3
#18	74.15	2.60	299	83	36	404	-87.0	-10.40	0.33	Clay pore water 3
#19	76.25	3.10	309.00	66.47	32.24	379.20	-84.0	-9.70	0.73	Clay pore water 3

#20	79.15	2.24	271	74	30	359	-74.0	-8.70	0.41	Clay pore water 3
#21	82.05	3.54	278.20	93.94	26.56	356.00	-86.0	-10.40	0.42	Clay pore water 3
#22	84.15	2.56	248	69	24	323	-75.0	-9.30	0.91	Clay pore water 3
#23	85.25	2.24	273	84	31	367	-80.0	-10.10	1.13	Clay pore water 3

Table 1. The chemical composition and isotopic of all analysed samples of the borehole and Clay pore water

Table 2. The chemical composition and isotopic of Clay pore water

Type	$\delta D(\text{‰})$	$\delta^{18}O(\text{‰})$	$\delta^{37}Cl(\text{‰})$
Saline aquifer	-76 ~ -80	-8.4 ~ -9.5	-0.07 ~ 1.59
Clay aquitard	-76 ~ -88	-8.0 ~ -10.4	-0.01 ~ 0.63
Aquifer II	-74 ~ -88	-8.7 ~ -10.6	-0.22 ~ 1.13