

EPOCHS AND CYCLES OF DIAMOND GENESIS IN CRATONS AND MOBILE BELTS.

Mal'kov¹, B.A., Holopova¹, E.B.

1. Institute of Geology, Komi Science Centre of the Ural division, Russian Acad. Sci., Syktyvkar, 167610, Russia

The diamond genesis in the lithosphere took place during the last 16 cosmic tectonic cycles (CTC) from 3300 m.y. ago till now. The synphase episodes of the mantle diamond genesis in different cosmic tectonic cycles are grouped into four typical homological rows with periodisity of 215 m.y. Thus the eclogitic paragenesis from the Premier diamonds is 1150 ± 60 m.y. (6 CTC), the same paragenesis in the Finsch and Argyle diamonds - 1580 ± 50 m.y. (8 CTC), the peridotitic paragenesis in the Kimberley and Finsch diamonds - 3300 m.y. (16 CTC). They make up the first homological row which corresponds to one phase ($t:T = 140:215$) in the cosmic tectonic cycle (Table 1). The second homological row ($t:T = 120:215$) includes the diamond-bearing gneisses in the Kokchetav massif - 530 ± 7 m.y. (3 CTC), the diamond-bearing eclogites from the Udachnaya pipe - 2670 m.y. (13 CTC), the unknown paragenesis diamonds from Arkansas - 3100 m.y. (15 CTC) and the peridotitic paragenesis in the Finsch diamonds - 3320 ± 20 m.y. (16 CTC). The third homological row ($t:T = 91:215$) includes the eclogitic paragenesis in the Orapa - 990 ± 50 m.y. (5 CTC) and the Premier diamonds - 1198 ± 14 m.y. (6 CTC) and the diamond-bearing eclogites from the Roberts Victor pipe - 2700 m.y. (13 CTC). The fourth homological row ($t:T = 6:215$) includes the diamond- and coesite-bearing eclogites from the Dabie Shan mobile belt - 209 ± 2 m.y. (1 CTC) and the zircon-bearing diamonds from the pipe in Zaire - 636 ± 22 m.y. (3 CTC).

It is remarkable that epochs of the mantle diamond genesis coincide in the age and phase of the cosmic tectonic cycle with the epochs of the high-grade metamorphism in the Earth's mobile belts (Table 1).

Table 1. Epochs and cycles of diamond genesis

№	Absolute age, m.y.	Inclusion-bearing diamonds and diamond-bearing rocks of different paragenesis and their locations	Phase of CTC: T	№
1	3320 \pm 20	Peridotitic diamonds from the Finsch pipe, the Kaapvaal craton: Sm-Nd model age (Lowry et al., 1993)	120:215	16
2	3300 \pm 200	Peridotitic diamonds from the Finsch and Kimberley pipes, the Kaapvaal craton: Sm-Nd model age (Richardson et al., 1984)	140:215	16
3	3100	Diamonds of unknown paragenesis from the pipe in Arkansas, USA: Ar-Ar model age (Melton, Giardini, 1980)	125:215	15
4	2700	Diamond-bearing eclogites from the Roberts Victor pipe, the Kaapvaal craton: Sm-Nd, Rb-Sr, Pb-Pb methods (Jacob et al., 1993)	95:215	13
5	2670	Diamond-bearing eclogites from the Udachnaya pipe, the Siberian craton: Sm-Nd, Rb-Sr, Pb-Pb methods (Jacob et al., 1993)	125:215	13
6	2000	Diamonds of unknown paragenesis from the Kimberley pipe, the Kaapvaal craton: U-Pb age (Kramers, 1979)	150:215	10
7	1580 \pm 50	Eclogitic diamonds from the Finsch pipe, the Kaapvaal craton: Sm-Nd model age (Richardson et al., 1990)	140:215	8
8	1580 \pm 60	Eclogitic diamonds from the Argyle pipe, the Kimberley craton: Sm-Nd model age (Richardson, 1986)	140:215	8
9	1198 \pm 14	Eclogitic diamonds from the Premier pipe, the Kaapvaal craton: Ar-Ar laser-probe dating (Philips et al., 1989)	92:215	6
10	1150 \pm 60	Eclogitic diamonds from the Premier pipe, the Kaapvaal craton: Sm-Nd model age (Richardson, 1986)	140:215	6
11	990 \pm 50	Eclogitic diamonds from the Orapa pipe, the Kaapvaal craton: Sm-Nd model age (Richardson et al., 1990)	88:215	5
12	636 \pm 22	Zircon-bearing diamonds of unknown paragenesis from the pipe in Zaire, the Congo craton: U-Pb age (Kinny, Meyer, 1994)	9:215	3

Table 1. Epochs and cycles of diamond genesis
(continuation)

№	Absolute age, m.y.	Inclusion-bearing diamonds and diamond-bearing rocks of different paragenesis and their locations	Phase of CTC: t : T	CTC №
13	628 \pm 21	Zircon-bearing diamonds of unknown paragenesis from the pipe in Zaire, the Congo craton: U-Pb age (Kinny, Meyer, 1994)	17:215	3
14	530 \pm 7	Diamond-bearing gneisses from the Kokchetav massif, Kazakhstan: U-Pb age (Claoue-Long et al., 1991)	115:215	3
15	209 \pm 2	Diamond-bearing eclogites from the Dabie Shan, China: U-Pb age (Ames et al., 1993)	6:215	1

The idea of the cosmic tectonic cycle is universal. The period (T) of the harmonic vibration of the Earth-Moon system is constant (~215 m.y.). The synphase events of the volcanic and metamorphic activities are geodynamically predetermined. They happen at definite moments of time (t) from beginning of each cosmic cycle (Mal'kov, 1994).

Each dated episode of the diamond genesis corresponds to a certain homological row. Hence we can prognosticate the absolute age and phase of the cycle of the vacant episodes of the diamond genesis in such rows.