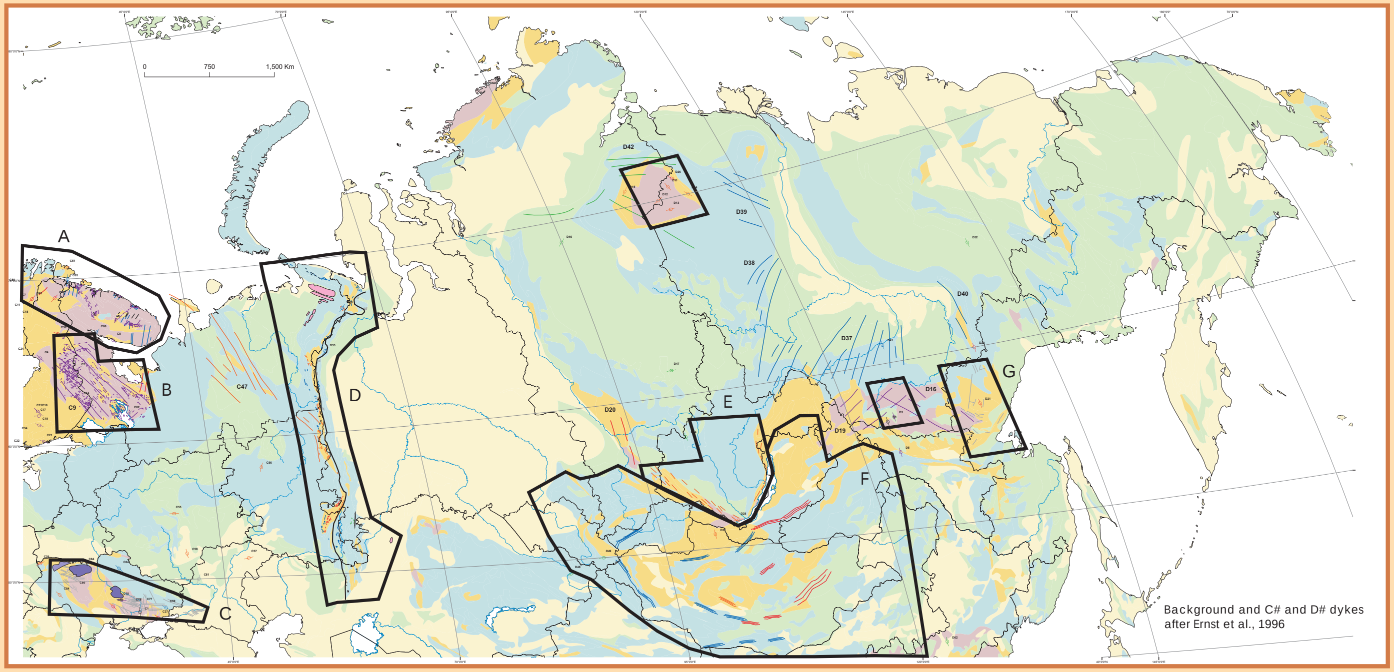
Map of Dolerite Dyke Swarms and Related Units of Russia and Selected Adjacent Regions

Карта роев долеритовых даек и связанных с ними комплексов России и избранных соседних регионов



LABEL	SWARM NAME	LOCATION	AGE	TREND	LENGTH (km)	WIDTH (km)	RELATED UNITS	REFERENCE
K1	East Kola (dolerite)	Kola Peninsula	?380 Ma	N-S				G. Fedotov
K2	Pechenga (dolerite)	Kola Peninsula	380 Ma Ar-Ar	NNE				G. Fedotov
K3	Rybachy	Kola Peninsula	540-600 Ma	NE				G. Fedotov
K4	Vochelambina (olivine dolerite)	Kola Peninsula	1160 Ma	E-W	Local	Local		G. Fedotov
K5	Verkhnetulomsky (lamprophyre)	Kola Peninsula	1760 Ma					G. Fedotov
K6	Barenzevomorsky (dolerite, poikioophhitic)	Kola Peninsula	1900 Ma (Sm-Nd)	NW	120 km			G. Fedotov
K7	Njasjukka (ol gabbro, krs plagioperidotite)	Kola Peninsula	1940 Ma	NW				G. Fedotov
K8	Uraguba (ferropicrite)	Kola Peninsula	? 1940-2000 Ma	N-S				G. Fedotov
K9	Drozdovka (ferrodolerite)	Kola Peninsula	?	E-W				G. Fedotov
K10	Marjok (ferrodolerite)	Kola Peninsula	2450-2500 Ma?	N-S				G. Fedotov
K11	Murmansk (ferrodolerite)	Kola Peninsula	1900-2100 Ma	NE				G. Fedotov
K12	Moncha-Pechenga (ferrodolerite)	Kola Peninsula	1900-2100 Ma	swings NW to NNW				G. Fedotov
K13	Dolgaja Tshely (picrodolerite)	Kola Peninsula	1900-2200 Ma	NW				G. Fedotov
K14	Pecheguba (low Al microgabbro)	Kola Peninsula	2000-2200 Ma	N-S				G. Fedotov
K15	Kolmozero (low Al microgabbro)	Kola Peninsula	2000-2200 Ma	NE				G. Fedotov
K16	Bauman pit (quartz dolerite)	Kola Peninsula	Ca. 2040 Ma (Sm-Nd)	NW				G. Fedotov
K17	North Pechenga (quartz dolerite)	Kola Peninsula	2050-2300 Ma	NNE				G. Fedotov
K18	Rosljakovo (quartz dolerite)	Kola Peninsula	2050-2300 Ma)	NW				G. Fedotov
K19	Keyvy-2 (quartz dolerite)	Kola Peninsula	2050-2300 Ma	NE				G. Fedotov
K20	Keyvy-1 (olivine gabbronorite	Kola Peninsula	Ca. 2320 Ma Sm-Nd	E-W				G. Fedotov
K21	Olegorsk pit (olivine gabbronorite)	Kola Peninsula	2495 Ma U-Pb	NE				G. Fedotov
K22a	Loypishnun (norite)	Kola Peninsula	2487 Ma, 2496 Ma U-Pb	NW				G. Fedotov
K22b	Loypishnun (gabbronorite)	Kola Peninsula	2506 Ma U-Pb	NW				G. Fedotov
K22c	Loypishnun (low K tholeiite)	Kola Peninsula	Ca. 2.52 Ma Sm-Nd	NW				G. Fedotov
K23	Mustatunturi (olivine gabbronorite)	Kola Peninsula	Ca. 2550 Ma Sm-Nd	NNE				G. Fedotov
K24	Plagioclase dolerite	Kola Peninsula	>2600 Ma	Various trends				G. Fedotov
K25	Kigora pit (gabbronorite)	Kola Peninsula	2740 Ma U-Pb	NW				G. Fedotov
BS1	Sayan swarm	Sayan-Baikal area	780-740 Ma					Gladkochub et al. (2007)
BS2	Baikal & northern Baikal swarms	Sayan-Baikal area	800-760 Ma					Gladkochub et al. (2007)
U1	T	Urals	Triassic					V.N. Puchkov
U2	C	Urals	Carboniferous					V.N. Puchkov
U3	D	Urals	Devonian dykes					V.N. Puchkov
U4	D	Urals	Devonian sheeted complexes					V.N. Puchkov
U5	O	Urals	Ordovician dykes (?)					V.N. Puchkov
U6	O	Urals	Ordovician sheeted complex					V.N. Puchkov
U7	UR	Urals	Upper Riphean					V.N. Puchkov
U8	EMR	Urals	Early and Middle Riphean					V.N. Puchkov
K1	Ludikoviy	Karelia	2060-1960 Ma	NW				V. Kulikov
K2	Jatuliy	Karelia	2220-2100 Ma	variable				V. Kulikov
K3	Sumiy	Karelia	2500-2400 Ma	NW & NE				V. Kulikov
M1	MZ	Mongolia area	Mesozoic	ENE				V.V. Yarmolyuk
M2a	P1	Mongolia area	Paleozoic	WNW				V.V. Yarmolyuk
M2b	P2	Mongolia area	Paleozoic	ENE-NE				
M2c	C3-P1	Mongolia area	Paleozoic	E				V.V. Yarmolyuk
M2d	D1-2	Mongolia area	Devonian	WSW & NNW				
M3	NP2	Mongolia area	Neoproterozoic	NW				V.V. Yarmolyuk
Uk1		Ukraine	?	variable				I.K. Pashkevich
AD1		Eastern Aldan shield	Proterozoic?	NNE-NE				A.N Didenko
AD2		Eastern Aldan shield	Proterozoic?	NW				A.N Didenko
AD3		Eastern Aldan shield	Proterozoic?	E-ESE				A.N Didenko
AD4		Eastern Aldan shield	Proterozoic?	E				A.N Didenko
AD5		Eastern Aldan shield	Proterozoic?	N				A.N Didenko
1	Gashunnur dyke complex	Mongolia, China,	~320 Ma (Sm-Nd)	ESE	600	30		Baykova and Amelin (1995)
2	Khatanga dyke swarm	Siberia	Late Archean?	NNW-NW	1000?			Glukhovskii and Moralev (2003)
3	Sunnagin		Early Archean?					Glukhovskii and Moralev (2003)
D52	Ust'Nera	e. Russia (65.0N, 142.0E)	100-65 Ma	E, NE, N	50	60		D52 in [1]
D44	Bratsk	e. Russia (57.5N, 101E)	<250 Ma	N-NNW	150	120		D44 in [1]
D42	Ebekhaya	e. Russia (72N, 110E)	250 Ma	ESE	400	20		D42 in [1]
D45	Kochikha	e. Russia (70.5N, 97E)	<250 Ma	E	220	120		D45 in [1]
D46	Kureyka	e. Russia (69N, 95E)	<250 Ma	NE	310	240		D46 in [1]
D43	Maymecha	e. Russia (70N, 101E)	<250 Ma	ESE-SE	450	130		D43 in [1]
D47	Mutoray	e. Russia (61.5N, 102.0E)	<250 Ma	E	150	60		D47 in [1]
D48	Serebryansk	Russia (49N, 84E)	250-245 Ma	~NE-E	100	150		D48 in [1]
D49	Tashanta	Russia (50N, 88E)	250-205 Ma	E	50	70		D49 in [1]
C64	Anton-Taram	Ukraine (51N, 33E	360-328 Ma	SE	200	10		C64 in [1]
D37	--Chara-Sinsk	e. Russia (61N, 124E)	360 Ma	NE	700	600		D37 in [1]
D39	--Dzhardzhan (Yakutsk Northwest)	e. Russia (69N, 120E)	360 Ma	SE	200	200		D39 in [1]
D40	--Tomporuk (Yaktusk South)	e. Russia (63N, 137E)	360 Ma	N	300	100		D40 in [1]
D38	--Vilyui-Marcha	e. Russia (64N, 115E)	360 Ma	NE	800	400		D38 in [1]
D37-D40	Yakutsk		360 Ma	NW-S (fan)				D37-D40 in [1]
D41	Zhil'Gur	e. Russia (61N, 127E)	? 360 Ma	N	160	90		D41 in [1]
D35	Inta	Russia (65N, 61.5E)	450-440 Ma	NE	210	35		D35 in [1]
D36	Yeletskiy	Russia (67.3N, 65E)	450-440 Ma or 375-325 Ma	NE	30	10		D36 in [1]
C60	Kandalaksha Bay	w. Russia (67N, 33E)	550-250	NE				C60 in [1]
C56	Kirov (Kazhim)	w. Russia (58N, 51E)	< 600	NNE	150	50		C56 in [1]
C54	L'vov	Ukraine (49N, 26E)	< 600	SE	250	150		C54 in [1]
C55	Moskva	w. Russia (55N, 40E)	< 600	E	600	200		C55 in [1]
C57	Saratov	w. Russia (51.5N, 48E)	< 600	E-ENE	400	250		C57 in [1]
C58	Voronezh	w. Russia (52N, 41E)	< 600; ~380 Ma	N-NNW	300	200		C58 in [1]
D31	Hovsgol	Mongolia (51N, 101E)	680 Ma (K-Ar)	N				D31 in [1]
C47	Timan	w. Russia (65N, 50E)	680-350?	SE-SSE	1500	300		C47 in [1]
D28	Slyudyanka	Russia (51.8N, 104E)	900-550 Ma	E	90	15		D28 in [1]
C39	Kovel'	Ukraine (51.5N, 24E)	1100-1000 Ma	E-NE	200	200		C39 in [1]
D26	Chieress	Anabar Shield (70.8N, 112.0E)	1384+/-2 Ma (U-Pb baddeleyite)	SE	30	30		Ernst et al. (2000); D26 in [1]
D22	Brindakit	e. Russia (60N, 137E)	1400-1000 Ma	N	200	30		D22 in [1]
D21	Tomptokan	e. Russia (57N, 135E)	1400-1000 Ma	N	100	100		D21 in [1]
C30	Bobrinets	Ukraine (48N, 32E)	1440-1380 Ma	SE	150	60		C30 in [1]
D14	Juken	e. Russia (70N, 113E)	1500-1200 Ma (K-Ar)	SE				D14 in [1]
D15	West Anabar	e. Russia (70.7N, 105.5E)	1500-1000 Ma (K-Ar)	NE				D15 in [1]
D12	Kuonamka	Anabar Shield (69.0N, 111.0E)	1503+/-5 Ma (U-Pb baddeleyite)	E	250	30		Ernst et al. (2000); Veselovsky et al. (2006); Ernst et al. (2008)
C27	Azovian Block	Ukraine (47N, 37E)	1550-1200 Ma	SE	150	100		C27 in [1]
D13	Kengede	Anabar Shield (69.5N, 110.0E)	1600-1200 Ma (K-Ar)	E	280	50		D13 in [1]
D20	Krasnoyarsk	Russia (56.5N, 93E)	1600-550 Ma	N	360	60		D20 in [1]
D11	East Anabar	Anabar Shield 70.5N, 111.0E)	1750 Ma (Ar-Ar)	SSE	150	40		D11 in [1]; Ernst et al. (2008)
D16	Timptono-Algamaisky	Aldan Shield (57N, 129E)	1750 Ma (Ar-Ar)	130	430	120		D16 in [1]; Ernst et al. (2008)
D12	Central Anabar	Anabar Shield (70.0N, 109.0E)	1800-1400 Ma (K-Ar)	ENE	190	40		D12 in [1]
D19	Kalaro-Nimnyrsky	Aldan Shield (58N, 126E)	1880 Ma (Ar-Ar)	NE	600	310		D19 in [1]; Ernst et al. (2008)
D5	Tukuringra Zone	e. Russia (55N, 125E)	1900-1800 Ma					D5 in [1]
C9	Karelian	Russia & Scandinavia (64N, 32E)	U~ 2100 Ma	SE	700?	300?		C9 in [1]
C10	Kirovohrad	Ukraine (48.5N, 33E)	2100-1800 Ma	E-ESE	50	50		C10 in [1]
D3	Sutam Belt	e. Russia (56.5N, 125E)	~2100 Ma					D3 in [1]
C3	Kolvitsa	w. Russia ~(67N, 36E)	~2450 Ma					C3 in [1]
C4	Paajarvi	w. Russia & Scandinavia	U ~2450 Ma	SE				C4 in [1]
C1	Dnipropetrovsk	Ukraine (47.5N, 35E)	>2500 Ma	N	100	50		C1 in [1]
C2	Murmansk	w. Russia (68N, 37E)	>2500 Ma	N-NW	150	250		C2 in [1]
C8	Tersky	w. Russia (66.5N, 35E)	2600-2100 Ma	SE	150	10		C8 in [1]
C77	Bazavluk	Ukraine (48N, 35E)	2700-1800 Ma	N-NNW	250	150		C77 in [1]
D1	Stanovik	e. Russia (56N, 124E)	~2700 Ma					D1 in [1]
C81	Khopier giant dyke	w. Russia (50N, 42E)	??	NNE	200			C81 in [1]
C84	Zvisdal-Zalesk giant dyke	Ukraine (51.2N, 29.1E)	??	N	80			C84 in [1]

Dyke swarm maps at a continental scale are a powerful tool for identification of large igneous provinces (LIPs), interpreting geodynamic settings, locating mantle plumes, characterizing the breakup history of supercontinents, and paleocontinental reconstructions. Such a map at 1:5 000 000 scale is now available for Canada and adjacent regions (Buchan & Ernst, 2004, Geol. Surv. Canada. Map 2022A) and has proven to be very important in this context. Preparation of a similar map for the dyke swarms of Russia and adjacent areas will undoubtedly prove equally useful.

THE MODERN VIEW OF DYKE SWARMS: In recent years there has been a revolution in the study and understanding of dyke swarms. Aeromagnetic maps reveal swarms of vast scale but simple geometry (linear and radiating). They can now be routinely dated to better than +/-5 million years precision using the U-Pb method on baddeleyite and zircon, and, in some instances, using the Ar-Ar technique. Dating indicates that many swarms are emplaced in short duration events of <10 million years. Paleomagnetic studies of precisely dated dykes can yield well constrained Apparent Polar Wander Paths (APWPs) and paleocontinental reconstructions.

CANADIAN NATIONAL DYKE SWARM MAP: The benefits of producing a Russian national dyke swarm map are well illustrated by the Canadian compilation (Buchan & Ernst 2004). This map compiles 453 swarms with an age distribution as follows: 35 Archean, 76 Paleoproterozoic, 60 Mesoproterozoic, 31 Neoproterozoic, and 162 Phanerozoic (97 Paleozoic, 27 Mesozoic, 38 Cenozoic) swarms, as well as 89 that are very poorly dated. Forty seven swarms are considered to be giant swarms because they have a length >300 km. At least 6 of these swarms are longer than 1000 km and 10 swarms have a radiating geometry (evidence for a mantle plume). The dykes are compiled from all regions and geological settings, including the Canadian Precambrian shield and Precambrian inliers, Phanerozoic cover terranes, and orogenic belts. The Canadian map shows 111 units that are related to the dyke swarms, including volcanics, sills and mafic-ultramafic intrusions. The map and associated report required about 2 'person years' of work and was assembled by consulting more than 2000 detailed geological reports, and geological and aeromagnetic maps.

PROPOSAL FOR A RUSSIAN DYKE SWARM MAP: Herein we announce plans to produce a map of "Dolerite Dyke Swarms and Related Units of Russia and Selected Adjacent Regions". Based on the density and age distribution of swarms on the Canadian map, we estimate that such a map of Russia and adjacent regions would likely contain more than 700 swarms (>200 of Precambrian age and >500 of Phanerozoic age). Of these perhaps 100 would be giant swarms (>300 km in length), 10 would be >1000 km, and 20 would show a giant radiating geometry. As with the Canadian map the Russian map will undoubtedly prove to be of great use in solving fundamental tectonic and geodynamic problems.

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