

Appendix 1: Gem corundum age data from the literature.

To accompany the article:

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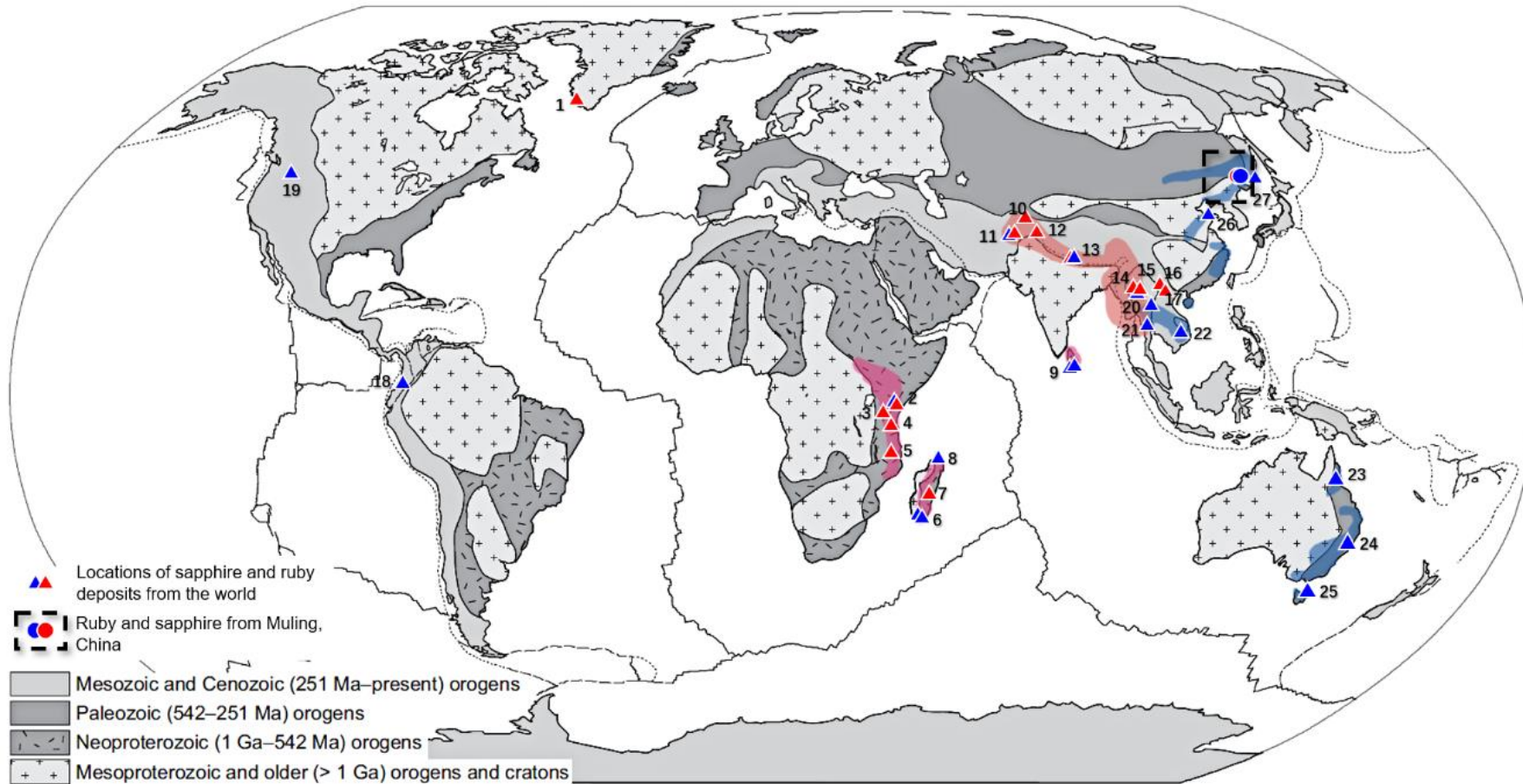


Figure caption: World map of formation ages of well-known ruby and sapphire deposits, superimposing the distribution of continental crust ages. The blue swaths

are alkali basalt-related deposits which are dominantly sapphire and subordinate ruby deposits. The pale red swathes are Himalayan Orogeny-related deposits which are dominantly ruby and subordinate sapphire deposits. The pink swathes are Pan-African Orogeny-related deposits, producing both rubies and sapphires. Adapted from Stern *et al.* (2013), Graham *et al.* (2008) and Sorokina *et al.* (2017).

**Table: Age-dating information for world's well-known gem corundum deposits.**

No.	Deposit(s)	Country	Gem material	Testing method(s)	Host rock type	Age	References
1	Fiskeneset	Greenland	Ruby	Zircon megacryst by U-Pb dating, Pb-Pb isochron ages of ruby	Metasomatic	2.8–2.6 Ga	Nutman <i>et al.</i> 2007; Smith <i>et al.</i> 2016; Fagan 2018; Krebs <i>et al.</i> 2019
2	Mangari (John Saul mine)	Kenya	Ruby	Zircon and monazite megacryst by U-Pb dating; garnet megacryst by Sm-Nd dating	Metasomatic/metamorphic	609–520 Ma	Simonet <i>et al.</i> 2000; Sorokina <i>et al.</i> 2017
3	Garba Tula	Kenya	Sapphire	Zircon megacryst by U-Pb dating	Magmatic	579 Ma	Simonet <i>et al.</i> 2000, 2004; Hauzenberger <i>et al.</i> 2007
4	Longido	Tanzania	Ruby	Titanite and rutile megacrysts by U-Pb dating	Metamorphic	640–610 Ma	Schwarz <i>et al.</i> 2008; Le Goff <i>et al.</i> 2010
5	Morogoro	Tanzania	Ruby	Titanite and rutile megacryst by U-Pb dating; rutile inclusions in corundum by U-Pb dating	Metamorphic	640–499 Ma	Fritz <i>et al.</i> 2005; Hauzenberger <i>et al.</i> 2007; Sorokina <i>et al.</i> 2017
6	Montepuez	Mozambique	Ruby	Zircon and monazite megacryst by U-Pb dating	Metasomatic	550 Ma	Pardieu <i>et al.</i> 2009; Boyd <i>et al.</i> 2010; Pardieu <i>et al.</i> 2013
7	Andranondambo	Madagascar	Sapphire	Zircon megacryst by U-Pb dating	Metamorphic & metasomatic	650–510 Ma	Kröner <i>et al.</i> 1999; Rakotondrazafy <i>et al.</i> 2008; Link 2015
8	Soamiakatra	Madagascar	Ruby	Bulk rock analysis?	Magmatic	Neogene–Quaternary (65 Ma–present)	Giuliani <i>et al.</i> 2007; Rakotondrazafy <i>et al.</i> 2008

No.	Deposit(s)	Country	Gem material	Testing method(s)	Host rock type	Age	References
9	Sahambano	Madagascar	Fancy-colored sapphire	Biotite megacryst by Ar–Ar dating	Metamorphic	492 ± 5 Ma	Rakotondrazafy <i>et al.</i> 2008
10	Ratnapura, Bakamuna	Sri Lanka	Sapphire	Zircon megacryst by U-Pb dating; zircon inclusions in corundum by U-Pb dating	Metamorphic	608–539 Ma	Kröner and Williams 1993; Nasdala <i>et al.</i> 2008; Elmaleh <i>et al.</i> 2015, 2019
11	Central Pamir region	Tajikistan	Ruby	Rutile megacryst by U-Pb dating	Metamorphic	23 ± 1.6 Ma	Smith 1998; Litvinenko <i>et al.</i> 2020
12	Jegdalek	Afghanistan	Ruby	Mica megacryst by Ar-Ar dating	Metamorphic	24.7 ± 0.3 Ma	Bowersox <i>et al.</i> 2000; Garnier <i>et al.</i> 2006
13	Hunza, Azad Kashmir	Pakistan	Ruby	Mica megacryst by Ar-Ar dating	Metamorphic	>16 Ma	Pêcher <i>et al.</i> 2002; Garnier <i>et al.</i> 2006
14	Chumar	Nepal	Ruby and Sapphire	Mica megacryst by Ar-Ar dating	Metamorphic	>5.6 Ma	Garnier <i>et al.</i> 2006
15	Mogok	Myanmar	Ruby and Sapphire	Zircon, zirconolite and titanite inclusions in corundum by U-Pb dating	Metamorphic	67–22 Ma	Searle <i>et al.</i> 2007; Elmaleh <i>et al.</i> 2015; Link 2016; Phyo <i>et al.</i> 2020
16	Mong Hsu	Myanmar	Ruby	Zircon inclusions in corundum by U-Pb dating	Metamorphic	23.9 Ma	Sutherland <i>et al.</i> 2019
17	Luc Yen	Vietnam	Ruby	Mica megacryst by Ar-Ar dating; zircon inclusions in corundum by U-Pb dating	Metamorphic	42–30 Ma	Garnier <i>et al.</i> 2002, 2005, 2006; Ngoc Khoi <i>et al.</i> 2016
18	Quy Chau	Vietnam	Ruby	Zircon inclusions in corundum by U-Pb dating	Metamorphic	53.8 Ma	Garnier <i>et al.</i> 2002, 2006
19	Rio Mayo	Colombia	Sapphire	Zircon, fluorapatite and allanite inclusions in corundum by U-Pb dating	Metamorphic or metasomatic	11–8 Ma	Sutherland <i>et al.</i> 2008
20	Yogo, Montana	USA	Sapphire	Mica megacryst by Ar-Ar dating	Magmatic	50–48 Ma	Gauthier 1995; Palke <i>et al.</i> 2016

No.	Deposit(s)	Country	Gem material	Testing method(s)	Host rock type	Age	References
21	Ban Huai Sai	Laos	Sapphire	Zircon inclusions in corundum by U-Pb dating	Magmatic	1.3–1.2 Ma	Sutherland <i>et al.</i> 2002
22	Bo Phloi	Thailand	Sapphire	Zircon inclusions in corundum by U-Pb dating	Magmatic	24 Ma	Khamloet <i>et al.</i> 2014; Sutthirat <i>et al.</i> 2020
23	Bo Loei	Cambodia	Sapphire	Zircon inclusions in corundum by U-Pb dating	Magmatic	0.93 Ma	Barr & MacDonald, 1981; Sutherland <i>et al.</i> 1998; Sutherland <i>et al.</i> 2015
24	Queensland	Australia	Sapphire	Zircon inclusions in corundum by U-Pb dating	Magmatic	5–2 Ma	Guo <i>et al.</i> 1996; Sutherland <i>et al.</i> 2015
25	New South Wales	Australia	Sapphire	Zircon inclusions in corundum by U-Pb dating; zircon megacryst by U-Pb dating	Magmatic	47–2 Ma	Sutherland <i>et al.</i> 1998; Sutherland & Fanning 2001; Sutherland <i>et al.</i> 2002
26	Tasmania	Australia	Sapphire	Zircon inclusions in corundum by U-Pb dating	Magmatic	45, 47 Ma	McGee 2005; Zaw <i>et al.</i> 2006
27	Shandong	China	Sapphire	Zircon inclusions in corundum by U-Pb dating	Magmatic	16–15.5 Ma	Guo <i>et al.</i> 1992; Liu <i>et al.</i> 2018
28	Primorye	Russia	Sapphire	Zircon megacryst by U-Pb dating	Magmatic	15–5 Ma	Akinin <i>et al.</i> 2004; Nechaev <i>et al.</i> 2009

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