Ms 210SR-101, Table T1. Occurrences and ages of igneous and metamorphic rocks in the Newfoundland-Iberia rift.

Age (Ma)	Stage	Crustal age (Ma)	Location	Sample designation†	Sample type	Mineral analyzed	Method	Closure temperature (°C)	Interpretation from reference (additional notes)	Reference
~68–58	Maastrichtian–Paleocene	~146? Continental?	Mt. Ormonde, Gorringe Bank	Various	Alkaline rocks	Various	K/Ar and $^{40}Ar/^{39}Ar$		Magmatic event associated with compression between Europe and Africa	Féraud et al. (1982, 1986)
69.1 ± 1.1	Maastrichtian	~127	Newfoundland Basin, peridotite ridge	210-1277A-6R-1, 9–12 cm	MORB-type gabbro clast	Plagioclase	$^{40}Ar/^{39}Ar$	~150–250	Termination of plagioclase recrystallization related to hydrothermal activity and/or intraplate magmatism	Jagoutz et al. (submitted [N1])
69.3 ± 2.1	Maastrichtian	~127	Newfoundland Basin, peridotite ridge	210-1277A-6R-1, 26–31 cm	MORB-type gabbro clast	Plagioclase	$^{40}Ar/^{39}Ar$	~150–250	Termination of plagioclase recrystallization related to hydrothermal activity and/or intraplate magmatism	Jagoutz et al. (submitted [N1])
76.1 ± 0.4	Campanian	~127	Newfoundland Basin, peridotite ridge	210-1277A-1W-2, 76–77 cm	MORB-type gabbro clast	Plagioclase	$^{40}Ar/^{39}Ar$	~150–250	Termination of plagioclase recrystallization related to hydrothermal activity and/or intraplate magmatism	Jagoutz et al. (submitted [N1])
77.1 ± 0.4	Campanian	~146? Continental?	Mt. Ormonde, Gorringe Bank	CY15-03	Ferrogabbro to ferrodiorite	Zircon	U-Pb	~500–600	Gabbro crystallization age; part of Late Cretaceous alkali intrusion event on southwest Iberia margin and Gorringe Bank	Schärer et al. (2000)
82 ± 3	Campanian	~143?	Mt. Gettysburg, Gorringe Bank	Various	Gabbro	Plagioclase	K/Ar	~150–250	Age reset by deformation at Europe/Africa plate boundary	Prichard and Mitchell (1979)
91.6 ± 0.3	Turonian	~127	Newfoundland Basin, peridotite ridge	210-1277A-5R-2, 83–86 cm	MORB-type gabbro clast	Plagioclase	$^{40}Ar/^{39}Ar$	~150–250	Termination of plagioclase recrystallization related to hydrothermal activity and/or intraplate magmatism	Jagoutz et al. (submitted [N1])
96.4 ± 3.8	Cenomanian	Continental	Southern Grand Banks	Emerillon C-56 well, 2975-2996 m	Porphyritic monzodiorite dike	Biotite (sample at 2990 m)	K/Ar		Probably a zone of dikes intruded along northeast-southwest strike	Jansa and Pe-Piper (1986)
97.7 ± 1.5	Cenomanian	~124	Scruncheon Seamount, Newfoundland Basin	HD74-021-25	Trachyte	Plagioclase	$^{40}Ar/^{39}Ar$	~150–250	Seamount volcanism	Sullivan and Keen (1977)
95.9 ± 2.0 and 99.7 ± 1.8	Cenomanian	~130	Newfoundland Basin	Lower sill: 210-1276A-99R-6, 24–30 cm, and 99R-3, 19–22 cm, respectively	Alkaline diabase sill	Whole rock	$^{40}Ar/^{39}Ar$		Postrift emplacement within sediments overlying basement	Hart and Blusztajn (2006)
~100–70	Albian–Maastrichtian	Continental	Southern half of western Iberia margin		Alkaline dikes and volcanics				Postrift alkaline magmatism	Summary of Pinheiro et al. (1996)
100 ± 5	Albian	~128–130?	Northwest Galicia margin		Tholeiitic basalt		$^{40}Ar/^{39}Ar$		Postrift emplacement over peridotite and gabbro	Malod et al. (1993)
101 ± 5	Albian	~128	Southern Galicia margin, peridotite ridge	173-1070A-9R-1, 132–136 cm	E-MORB gabbroic pegmatite	Plagioclase	$^{40}Ar/^{39}Ar$	~150–250	Termination of plagioclase recrystallization related to hydrothermal activity and/or intraplate magmatism	Jagoutz et al. (submitted [N1])
104.7 ± 1.7 and 105.9 ± 1.8	Albian	~130	Newfoundland Basin	Upper sill: 210-1276A-88R-2, 88–92 cm, and 88R-3, 76–80 cm, respectively	Alkaline diabase sill	Whole rock	$^{40}Ar/^{39}Ar$		Postrift emplacement within sediments overlying basement	Hart and Blusztajn (2006)
Range of ages, mostly ~110 ± 10–15	~Aptian–Albian	~143–146?	Gorringe Bank	Various	Gabbros, dolerites, amphibolites	Various	K/Ar and $^{40}Ar/^{39}Ar$		Possibly associated with tectonism at the plate boundary between Europe and Africa, but may be older rocks reset by the thermal event at ~68–58 Ma	Prichard and Mitchell (1979), Féraud et al. (1982, 1986)
111.0 ± 0.3*	Albian	~128	Southern Galicia margin, peridotite ridge	173-1070A-9R-2, 72–75 cm	Pegmatitic gabbro	Plagioclase	$^{40}Ar/^{39}Ar$	~150–250	Termination of plagioclase recrystallization related to hydrothermal activity and/or intraplate magmatism	Jagoutz et al. (submitted [N1])
113.2 ± 2.1	Aptian	~127	Newfoundland Basin, peridotite ridge	210-1277A-9R-7, 50–53 cm	Alkaline hornblende-plagioclase gabbro dike	Zircon	U/Pb	~500–600	Crystallization age of zircon during revival of alkaline magmatism	Jagoutz et al. (submitted [N1])
115 ± 20	Aptian	Continental	Bay of Exploits, north central Newfoundland	GSC 65-145 (sample WF 511-64)	Porphyritic lamprophyre dikes	Brown hornblende	K/Ar	~500	Dikes intruding Ordovician and Silurian strata as well as Devonian intrusive rocks	Wanless et al. (1967)
115.7 ± 0.3*	Aptian	~128	Southern Galicia margin, peridotite ridge	173-1070A-9R-3, 20–30 cm	Pegmatitic gabbro	Plagioclase	$^{40}Ar/^{39}Ar$	~150–250	Termination of plagioclase recrystallization related to hydrothermal activity and/or intraplate magmatism	Jagoutz et al. (submitted [N1])
116.9 ± 0.8*	Albian	~128	Southern Galicia margin, peridotite ridge	173-1070A-9R-1, 143–144 cm	Hornblende gabbro pegmatite	Plagioclase	$^{40}Ar/^{39}Ar$	~150–250	Termination of plagioclase recrystallization related to hydrothermal activity and/or intraplate magmatism	Jagoutz et al. (submitted [N1])
117 ± 5	Aptian	Continental	Southern Grand Banks	Twillick G-47 well, 1287-1320 m	Porphyritic diabase	Whole rock	K/Ar		Shallow subsurface sill or thick subaerial flow emplaced before or at the time of the Avalon unconformity (dated regionally as late Aptian)	Jansa and Pe-Piper (1986)
117.7 ± 0.9	Aptian	~128–129, subcontinental mantle	Northwest Galicia margin, peridotite ridge	GAL-86-10-04	Mylonitized diorite dikelet in serpentinized peridotite	Plagioclase	$^{40}Ar/^{39}Ar$	~150–250	Cooling following high-temperature (>750°C) ductile deformation	Boillot et al. (1989)
121.7 ± 0.4	Aptian	~128–129, subcontinental	Northwest Galicia margin, peridotite ridge	GAL-32-07	Chlorite schist from interpreted gabbro protolith	Zircon	U-Pb	~500–600	Gabbro crystallization age in host peridotite, predating brittle deformation	Schärer et al. (2000)
122.1 ± 0.3	Aptian	~128–129, subcontinental	Northwest Galicia margin, peridotite ridge	GAL-86-10-09	Chlorite schist from interpreted gabbro protolith	Zircon	U-Pb	~500–600	Gabbro crystallization age in host peridotite, predating brittle deformation	Schärer et al. (1995)
122.0 ± 0.6	Aptian	~128–129, subcontinental mantle	Northwest Galicia margin, peridotite ridge	GAL-86-10-04	Mylonitized diorite dikelet in serpentinized peridotite	Large, post-tectonic brown amphiboles from dikelet	$^{40}Ar/^{39}Ar$	~600	Postkinematic amphibole formed following high-temperature (>750°C) ductile deformation	Féraud et al. (1988)
123.9 ± 1.2	Aptian	~128	Southern Galicia margin, peridotite ridge	173-1070A-9R-1, 132–136 cm	E-MORB gabbroic pegmatite	Kaersutitic hornblende	$^{40}Ar/^{39}Ar$	~500	Minimum age of magmatism following basement emplacement	Jagoutz et al. (submitted [N1])
124.2 ± 0.7	Aptian	~128	Southern Galicia margin, peridotite ridge	173-1070A-9R-1, 143–144 cm	Hornblende gabbro pegmatite	Hornblende	$^{40}Ar/^{39}Ar$	~500	Minimum age of MORB-type magmatism following basement emplacement (recalculated age, originally reported by Whitmarsh and Wallace [2001] and Manatschal et al. [2001] as 119 ± 0.7 Ma)	Jagoutz et al. (submitted [N1])
~125–128	Barremian	Continental	South Whale Basin, southern Grand Banks	Brant P-87 well, 2843-2898 m	Basalt flows, possible sills	Not applicable	Biostratigraphy		Shallow-marine lava flows and possible sills with associated pyroclastic rocks	Jansa and Pe-Piper (1986)
126.1 ± 6.7	Barremian	~128–130, subcontinental	Northwest Galicia margin, peridotite ridge	GAL-19-03	Granulite	Apatite	Fission track	90 ± 30	Cooling during rifting/exhumation	Fuegenschuh et al. (1998)
127 ± 4	Barremian	~128	Southern Galicia margin, peridotite ridge	173-1070A-8R-4, 30–33 cm	Biotite-bearing albitite clast	Zircon	U-Pb	~500–600	Gabbro crystallization in host peridotite, following synrift decompression melting	Beard et al. (2002)
128 ± 3	Barremian	~127	Newfoundland Basin, peridotite ridge	210-1277A-9R-1, 20–23 cm	Alkaline gabbro dike	Phlogopite	$^{40}Ar/^{39}Ar$		Minimum age of crystallization of alkaline igneous intrusion into host peridotite at time of basement emplacement	Jagoutz et al. (submitted [N1])
129 ± 7	Barremian	Continental	North central Newfoundland	GSC 65-144 (sample WF 511-64), Bay of Exploits	Porphyritic lamprophyre dikes	Biotite	K/Ar		Dikes intruding Ordovician and Silurian strata as well as Devonian intrusive rocks	Wanless et al. (1967)
129.3 ± 13.4	Barremian	≥128–130, subcontinental	Northwest Galicia margin, peridotite ridge	GAL-26-10	Granulite	Apatite	Fission track	90 ± 30	Cooling during rifting/exhumation	Fuegenschuh et al. (1998)
131.7 ± 1.1	Hauterivian	Continental	Southern Galicia margin	173-1068A-16R-5, 65–68 cm	Amphibolite in breccia	Hornblende	$^{40}Ar/^{39}Ar$	~500	(From breccia above serpentinite basement; cooled below hornblende blocking temperature probably during or following continental rifting)	Jagoutz et al. (submitted [N1])
133.1 ± 0.3	Hauterivian	Continental	Southern Galicia margin	173-1068A-16R-3, 69–71 cm	Amphibolite in breccia	Plagioclase	$^{40}Ar/^{39}Ar$	~150–250	(From breccia above serpentinite basement; cooled below plagioclase blocking temperature probably during or following continental rifting)	Jagoutz et al. (submitted [N1])
135 ± 6	Hauterivian	Continental	South Whale Basin, southern Grand Banks	Brant P-87 well, 3460-3588 m	Basalt flows, possible sills	Whole rock (sample at 3535.7 m)	K/Ar		Subaerial to shallow-water extrusion	Jansa and Pe-Piper (1986)
135 ± 3	Hauterivian	~143?	Mt. Gettysburg, Gorringe Bank	Various	Gabbro	Brown hornblende	K/Ar	~500	Crystallization age of primary igneous hornblendes	Prichard and Mitchell (1979)
136.4 ± 0.3	Valanginian–Hauterivian	Continental	Southern Galicia margin	149-900A-83R-2, 77–82 cm	Flaser gabbro	Plagioclase	$^{40}Ar/^{39}Ar$	~150–250	Cooled below plagiclase blocking temperature during retrograde metamorphism following extension	Féraud et al. (1996)
137.5 ± 0.5	Valanginian	~143?	Mt. Gettysburg, Gorringe Bank	GOR-07-02	Leucogabbro	Zircon	U-Pb	~500–600	Gabbro crystallization age in host peridotite	Schärer et al. (2000)
137.5 ± 0.8	Valanginian	~143?	Mt. Gettysburg, Gorringe Bank	GOR-07-05	Olivine-plagioclase-clinopyroxene gabbro	Zircon	U-Pb	~500–600	Gabbro crystallization age in host peridotite	Schärer et al. (2000)
135 ± 8 and 139 ± 9	Valanginian–Hauterivian	Continental	Notre Dame Bay, north central Newfoundland	Budgells Harbour Stock	Alkaline ultramafic intrusion	Biotite	K/Ar			Helwig et al. (1974)
140 ± 2	Valanginian	Continental	Southern Galicia margin	173-1068A-16R-5, 65–68 cm	Amphibolite in breccia	Hornblende	$^{40}Ar/^{39}Ar$	~500	(From breccia above serpentinite basement; cooled below hornblende blocking temperature probably during or following continental rifting)	Jagoutz et al. (submitted [N1])
141.8 ± 0.4	Berriasian	Continental	Southern Galicia margin	173-1067A-18R-2, 87–89 cm	Amphibolite	Plagioclase	$^{40}Ar/^{39}Ar$	~150–250	(Cooled below plagioclase blocking temperature probably during or following continental rifting; recalculated age, originally reported by Whitmarsh and Wallace [2001] and Manatschal et al. [2001] as 137.2 ± 0.5 Ma)	Jagoutz et al. (submitted [N1])
143 ± 1	Berriasian	~143?	Mt. Gettysburg, Gorringe Bank	Shackleton Cruise 72/2, dredge 071-13	Gabbro	Hornblende	$^{40}Ar/^{39}Ar$	~500	Gabbro crystallization age in host peridotite	Féraud et al. (1986)
144 ± 12	Berriasian	Continental	Beach Island, Northwest Arm, New Bay, north central Newfoundland	GSC 63-171	Porphyritic melanocratic lamprophyre dike	Biotite	K/Ar		Dike cutting Ordovician and Middle Silurian strata as well as post-Middle Silurian granite	Wanless et al. (1965)
144-127 (Neocomian)	Berriasian–Barremian	Continental	South Whale Basin, southern Grand Banks	Mallard M-45 well, 2268.3–3150.1 m below rotary table	Volcaniclastics and volcanics	Not applicable	Biostratigraphy			Sinclair (1988), citing Canada Newfoundland-Labrador well history files
~144–130, concentrated at ~135–130	Berriasian–Hauterivian	Continental	Lusitanian Basin, west central Iberia margin		North-northeast and east-southeast trending dikes (dolerite, gabbro, diorite) and minor hypovolcanic massifs					Summary of Pinheiro et al. (1996)
145 ± 1	early Berriasian	~143?	Mt. Gettysburg, Gorringe Bank	Shackleton Cruise 72/2, dredge 071-461	Gabbro	Hornblende	$^{40}Ar/^{39}Ar$	~500	Gabbro crystallization age in host peridotite	Féraud et al. (1986)
152.6 ± 0.9	Kimmeridgian	Continental	Southern Galicia margin	173-1067A-22R-3, 1–7 cm	Amphibolite	Hornblende	$^{40}Ar/^{39}Ar$	~500	(Cooled below hornblende blocking temperature possibly during early continental rifting)	Jagoutz et al. (submitted [N1])
160.5 ± 0.8	early Oxfordian	Continental	Southern Galicia margin	173-1067A-22R-3, 1–7 cm	Amphibolite	Hornblende	$^{40}Ar/^{39}Ar$	~500	(Cooled below hornblende blocking temperature possibly during early continental rifting)	Jagoutz et al. (submitted [N1])
164.6 ± 0.5	early Callovian	Continental	Southern Galicia margin	173-1067A-18R-2, 87–89 cm	Amphibolite	Hornblende	$^{40}Ar/^{39}Ar$	~500	(Cooled below hornblende blocking temperature possibly during early continental rifting; recalculated age, originally reported by Whitmarsh and Wallace [2001] and Manatschal et al. [2001] as 161 ± 1 Ma)	Jagoutz et al. (submitted [N1])
167.3 ± 0.9	early Bathonian	Continental	Southern Galicia margin	173-1067A-18R-2, 87–89 cm	Amphibolite	Hornblende	$^{40}Ar/^{39}Ar$	~500	(Cooled below hornblende blocking temperature possibly during early continental rifting; recalculated age, originally reported by Whitmarsh and Wallace [2001] and Manatschal et al. [2001] as 161 ± 1 Ma)	Jagoutz et al. (submitted [N1])
197 ± 14	late Hettangian	~146? Continental?	Mt. Ormonde, Gorringe Bank		Diorite	Zircon	Fission track	~240 ± 60	Age of crystallization	Carpena (1984)
201 ± 2.6	Rhaetian (Late Triassic)	Continental	Avalon Peninsula, Newfoundland	Trans-Avalon Lineament Dike	Diabase sills and dike	Whole rock	K/Ar		Sill and dike intrusion related to continental rifting	Hodych and Hayatsu (1980)
~205–160, concentrated at 190–180	Norian–Oxfordian (Late Triassic–early Late Jurassic)	Continental	Southern half of western Iberia margin		Basalt and dolerite dikes, thoeiitic volcanics				Magmatism probably related to continental rifting	Pinheiro et al. (1996), summarizing Ribeiro et al. (1979) and Martins (1991)
203 ± 3 and 224 ± 11	Carnian–Rhaetian (Late Triassic)	Continental	Central Iberian Zone, Iberia		Lamprophyres, dolerite-basalt dikes		K/Ar		Sill and dike intrusion probably related to continental rifting	Pinheiro et al. (1996), summarizing Ribeiro et al. (1979) and Martins (1991)
270 ± 3	Guadalupian (Permian)	Continental	Southern Galicia margin	ODP Leg 173, Site 1067 (sample depth unknown)	Amphibolite	Magmatic zircon	U/Pb	~500–600	Age of crystallization	Manatschal et al. (2001)
287 ± 35	Cisuralian (Permian)	≥128–130, subcontinental	Northwest Galicia margin, peridotite ridge	GAL-26-10	Granulite	Zircon	Fission track	~240 ± 60	Lower to middle continental crust that equilibrated at an upper crustal level in Carboniferous–Permian time	Fuegenschuh et al. (1998)
307 ± 42	Pennsylvanian	~128–130, subcontinental	Northwest Galicia margin, peridotite ridge	GAL-19-03	Granulite	Zircon	Fission track	~240 ± 60	Lower to middle continental crust that equilibrated at an upper crustal level in Carboniferous–Permian time	Fuegenschuh et al. (1998)
340 ± 10	Middle Mississippian	Continental	Southern Galicia margin	ODP Leg 173 Site 1067 (sample depth unknown)	Metatonalite	Zircon, magmatic rim	U/Pb	~500–600	Continental basement ductilely deformed and mylonitized during the Hercynian	Rubenach (1999), Manatschal et al. (2001)
361.5 ± 0.5	Late Devonian	Continental	Southern Galicia margin	173-1069A-17R-1, 84–88 cm	Meta-arkosic wacke	Muscovite	$^{40}Ar/^{39}Ar$	~350	(Derived from igneous-metamorphic continental basement; recalculated age, originally reported by Whitmarsh and Wallace [2001] as 348 ± 0.8 Ma)	Jagoutz et al. (submitted [N1])
595	late Proterozoic	Continental	Southern Galicia margin	ODP Leg 173 Site 1067 (sample depth unknown)	Metatonalite	Zircon, core	U/Pb	~500–600	Intrusion in continental basement, later ductilely deformed and mylonitized during the Hercynian	Rubenach (1999), Manatschal et al. (2001)

Notes: Stages and crustal ages based on the timescale of Gradstein et al. (2004). * = Ages supplant 110.3 ± 1.1 Ma age originally reported by Whitmarsh and Wallace (2001). † = Prefixes 149, 173, and 210 designate ODP samples by Leg-Hole-Core-Section, depth in section. MORB = mid-ocean-ridge basalt, E-MORB = enriched mid-ocean-ridge basalt.