

The continents

Douglas Wilhelm Harder

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It seems that no one can agree on the continents of the world:

1. In North America, there are seven: North America, South America, Europe, Africa, Asia, Australia, and Antarctica.
2. In a number of European and Latin American countries, there are traditionally six: America, Europe or Europa, Africa, Asia, Oceania, and Antarctica. Apparently North and South America are one continent, but Europe and Asia are not.
3. In a number of Eastern European countries, there are also six: North America, South America, Eurasia, Africa, Australia, and Antarctica. This puts all of Russia on a single continent shared with Portugal, but North and South America separate continents.
4. In some classifications, there are only five: America, Eurasia, Africa, Oceania, and Antarctica. This has the advantage that both America and Eurasia are treated consistently, although Australia has somehow acquired a large collection of islands.
5. The Olympic rings famously represent five inhabited “continents”: Africa, America, Asia, Europe, and Oceania. Antarctica is presumably disqualified for insufficient participation.

There is no single formal geological threshold separating an island from a continent; the distinction combines size, crustal character, geological coherence, and separation from other continental masses. Continents are very large, coherent regions composed predominantly of thick, relatively buoyant continental crust, whereas islands may simply be portions of crust that rise above sea level. Hawaii, for example, is not a continent because the Hawaiian Islands are comparatively tiny volcanic edifices built upon oceanic crust of the Pacific Plate; they do not represent an exposed portion of a large body of continental crust. Japan, on the other hand, while largely volcanic, forms part of the complex system of island arcs and continental margins bordering eastern Asia and is therefore naturally associated with Eurasia. Much the same is true of the Philippines and the majority of the islands of the Indonesian archipelago, which form part of the tectonically complicated but geographically continuous island systems surrounding Southeast Asia. These islands need not themselves

consist entirely of continental crust to belong to a continent; continental affiliation does not require every island to be a miniature continent. Greenland is quite different: it consists overwhelmingly of continental crust, but is conventionally regarded as an island belonging to North America. Although oceanic crust occurs between Greenland and Baffin Island in Baffin Bay and parts of Davis Strait, the separation is geologically incomplete: farther north, Greenland and Ellesmere Island are separated by the comparatively narrow Nares Strait and remain parts of the same broad North American continental framework. Zealandia¹ presents the opposite case. Although approximately 94% submerged, it is enormous, geologically coherent, and predominantly continental crust, while being separated from Australia by substantial areas of oceanic crust. Thus, being surrounded by water does not by itself make something an island rather than a continent; the nature, extent, geological coherence, and degree of separation of the underlying continental crust matter at least as much as whether that crust happens to protrude above sea level.

If we initially restrict our definition of a continent to sufficiently large blocks of continental crust separated from one another by substantial regions of oceanic crust, whether or not that continental crust happens to lie above sea level, we appear to be left with only five continents:

America, Eurafroasia, Australia, Zealandia, and Antarctica.

The numerous islands lying elsewhere in the world's oceans may, for the moment, remain unassigned; their continental affiliations will be dealt with subsequently.

Here *Eurafroasia* (your-AFF-fri-KAZE-zee-uh) is the perfectly reasonable name for the single continuous continental mass conventionally divided into Europe, Africa, and Asia². The fact that nobody else appears to use this obviously superior name need not concern us.

Unfortunately, this classification seems awkward. North and South America are connected only by the narrow Isthmus of Panama, while Africa and Eurasia are connected only by the Isthmus of Suez. More importantly, these narrow connections occur approximately where major tectonic regions meet. We may therefore improve the definition by considering continents to be large contiguous land masses, but allowing a narrow land connection to divide two continents when it also corresponds approximately to a significant tectonic boundary. Islands can then be assigned according to the tectonic plate or crustal block with which they are geologically associated.

¹See Nick Mortimer *et al.*, "Zealandia: Earth's Hidden Continent," *GSA Today* 27(3) (2017): pp.27–35.

²While the Suez Canal is technically at sea level, a human-constructed trench can no more separate a continent into two than human-constructed islands can establish a country's claim over what are currently international waters. Note that the Suez Canal literally turns Africa (or Eurasia) into an island. The Panama Canal is different: its central waters are elevated above sea level and ultimately drain in opposite directions toward the Caribbean Sea and the Pacific Ocean. Hydrologically, it therefore resembles two rivers flowing away from a common watershed more than a strait connecting two oceans.

Thus, after several hundred years of unnecessary disagreement, the continents can finally be established as:

North America, South America, Eurasia, Africa, Australia, Zealandia, and Antarctica.

This has several pleasing consequences. Europe is no longer a continent, which resolves the longstanding difficulty of explaining why a large peninsula on the western end of Eurasia should count as a continent while India and Arabia do not. India and Arabia, despite occupying distinct tectonic plates, remain parts of Eurasia because they are firmly attached to the Eurasian land mass. The existence of a tectonic plate is therefore not, by itself, sufficient grounds for continental independence.

Greenland, being geologically associated with the North American Plate, belongs to North America. Madagascar is part of the Somali Plate, which in turn is associated with the African continental region.

The Mediterranean proves surprisingly cooperative. Corsica, Sardinia, Sicily, the Balearic and Aegean islands, Crete, and Cyprus will be considered Eurasian, while Malta is African. Crete and Cyprus occupy sufficiently complicated tectonic boundary regions that further investigation is strongly discouraged. Malta, however, is comfortably situated on the African side and consequently becomes an African country, regardless of what the European Union may have to say about the matter.

New Zealand, on the other hand, receives a substantial promotion. It is the principal exposed portion of Zealandia, a largely submerged mass of continental crust separated from Australia by oceanic floor. Consequently, New Zealand is not merely a collection of islands southeast of Australia: it is the most conspicuous part of one of the world's seven continents. Most of it, however, has simply chosen to remain underwater.

This otherwise satisfactory rule produces several minor administrative consequences. The various islands of the Azores must now be distributed among three continents, despite the inconvenience that Portugal regards them as a single archipelago. Jan Mayen, despite being Norwegian, becomes North American, while Ascension Island, Saint Helena, and Tristan da Cunha become African. Saint Peter and Saint Paul Archipelago remains South American, although only just. Iceland alone refuses to cooperate: the North American–Eurasian plate boundary runs directly through it, and it must therefore be regarded as belonging to both continents. Fortunately, continental affiliation has never required the consent of the inhabitants. This is not a defect in the classification; it is Iceland's fault for being built directly on a plate boundary.

The islands of the Caribbean Plate will be considered part of North America. Although the Caribbean Plate is distinct from the North American Plate, it includes a substantial portion of Central America and is connected to the North American landmass through a broad and continuous region between El Salvador and Honduras on the Caribbean Plate and Guatemala on the North American Plate. This connection is considerably more substantial than the narrow connection between Panama and South America that we have already accepted as a continental boundary. Thus, just as the Indian and Arabian plates remain part of Eurasia,

the Caribbean Plate is assigned to North America, and its islands consequently become North American as well. This also avoids the unfortunate necessity of creating a Caribbean continent consisting largely of hundreds of islands, some of which lie inconveniently close to, or directly across, the boundaries between the Caribbean, North American, and South American plates.

Now, under this classification, most of the islands of the Caribbean fall within North America, but there are some less obvious cases along the southern margin of the Caribbean. Tobago, Margarita, Coche, Cubagua, Aruba, Bonaire, Curaçao, and several of the smaller Venezuelan islands lie within the complicated boundary region between the Caribbean and South American plates. Under the present system, islands associated primarily with the Caribbean tectonic region will be considered North American, while islands clearly situated on the South American continental margin will remain South American.

Trinidad, like Iceland, inconveniently lies across the boundary between our North and South American regions, although in Trinidad's case the tectonic boundary is considerably more ambiguous. Geographically, there is a remarkably persuasive case for South America: Venezuela is plainly visible across the Gulf of Paria, whereas Grenada, the next major island to the north, is not. Geology having failed to provide a satisfactory ruling, we must therefore appeal to a higher authority. Given that Caribbean festivals throughout the world would be virtually inconceivable without Trinidadian steelpan music, Trinidad will courteously be assigned to the Caribbean and hence to the North American Continent. Continental affiliation cannot, after all, be determined entirely without reference to tourism and culture.

The Panama Plate will likewise remain North American. Although its connection to South America might at first appear comparable, the plate boundary with the Caribbean Plate crosses the isthmus diagonally, thereby giving the Caribbean Plate, and therefore the North American connection a longer frontage. Continental classification can apparently come down to elementary geometry.

One could, of course, define a "Central American" continent consisting principally of the Caribbean and Panama plates. This initially seems attractive, but creates more problems than it solves. Such a continent would include essentially all of El Salvador, Honduras, Nicaragua, Costa Rica, and Panama, together with Jamaica and much of the Caribbean. Unfortunately, many of the Caribbean islands lie inconveniently along the boundary with the North American Plate, while Mexico, Guatemala, and Belize—all normally associated with Central America, at least geographically or culturally—would remain firmly on the North American Plate. We would therefore have created a Central American continent that excludes a substantial portion of what people ordinarily mean by Central America while simultaneously including numerous Caribbean islands that are not ordinarily described as Central American. This is not an improvement. Central America is consequently best left as a geographical and political region within North America rather than promoted to continental status. Not every useful geographical name requires its own continent.

There remains the minor problem of deciding precisely where our continental boundaries should cross the two narrow land bridges. The Suez Canal provides an attractively obvious boundary between Africa and Eurasia, but unfortunately has the administrative disadvantage

of leaving Egypt on two continents. Since this would inevitably generate generations of irritating geography trivia questions, we will instead place the boundary along the Egyptian border with Israel, thereby assigning the whole of the Sinai Peninsula to Africa. A continent need not make additional work for schoolchildren merely to accommodate a canal.

A similar principle will be applied in the Americas. Rather than attempting to trace the geologically complicated boundary between the North and South American regions through the Isthmus of Panama, we will simply adopt the international border between Panama and Colombia. Panama is therefore entirely North American and Colombia entirely South American. This arrangement has the considerable advantage that passports, customs officials, and continents will all agree on precisely where one country ends and the next begins.

These modest administrative adjustments appear to eliminate the tiresome category of countries occupying two continents, at least when detached islands and overseas territories are ignored. Even Türkiye, traditionally divided between Europe and Asia, is now entirely Eurasian and may finally dispense with the distinction. Unfortunately, Iceland refuses to cooperate. The boundary between the North American and Eurasian tectonic regions runs directly through the country, and there is no conveniently situated international border onto which we can transfer it. Iceland must therefore remain simultaneously North American and Eurasian. Indonesia likewise proves troublesome: most of the archipelago is Eurasian, while western New Guinea lies on the Australian continental mass and is therefore Australian. Indonesia consequently remains genuinely transcontinental despite our best administrative efforts. Every classification requires at least one or two interesting examination questions.

The Scotia Plate presents another potential difficulty, but fortunately part of its northern boundary reaches the southern extremity of South America, and the associated region is most naturally treated as South American. The Scotia Plate and its islands will therefore be assigned to South America. This has the additional advantage of preventing the creation of yet another geographical category merely to accommodate South Georgia and a scattering of extremely cold islands.

A similar procedure can be applied to the islands of the Indian Ocean. Madagascar, the Comoros, Seychelles, Mascarenes, and associated western Indian Ocean islands will be considered African, while Sri Lanka, the Maldives, Chagos Archipelago, and other islands associated with the Indian Plate will be considered Eurasian, India having already been incorporated into Eurasia. Christmas Island and the Cocos (Keeling) Islands, lying on the Australian Plate, are naturally Australian, while islands associated with the Antarctic Plate are Antarctic. As usual, the arrangement becomes less satisfactory near plate boundaries. The Kerguelen Islands are Antarctic under a strictly tectonic classification despite being French, while the nearby Heard and McDonald Islands, despite being Australian territory, suffer the same Antarctic fate. The Rodrigues region approaches the complicated junction of the African, Indian and Australian plate systems, although Rodrigues itself can safely remain African. Fortunately, unlike Iceland, no substantial Indian Ocean island appears to have had the foresight to position itself neatly across a major spreading ridge, so no island need simultaneously belong to two continents.

In the Arctic Ocean, we will make one exception. Islands belonging to Canada and the United States will be considered North American, while islands belonging to Russia and Norway will be considered Eurasian. Greenland, being both geographically and tectonically associated with North America, conveniently requires no special ruling. The complicated continuation of the North American–Eurasian plate boundary into northeastern Siberia will likewise be ignored, as assigning portions of Russia and Japan to North America would constitute an unacceptable triumph of geology over common sense. This is, admittedly, an exception to the preceding rules, but it is the exception that proves the rule, or at least the exception that prevents the rule from becoming ridiculous.

Like the Arctic Ocean, the Bering Sea causes some difficulty. Fortunately, almost all of the islands within the sea are American, and thus can remain comfortably within North America. The principal difficulty is the Commander (Komandorski) Islands. Geologically, however, these appear to form the westernmost extension of the Aleutian island arc and can therefore be assigned firmly to the North America continent, despite the inconvenience of their being Russian. Fortunately, the sale of Alaska by Tsar Alexander II to the United States in 1867 almost entirely solved this problem for us, stopping just before the ideal point.

Then, there remains the rest of the Pacific. At first it might appear reasonable to place all islands of the oceanic Pacific plates into a common region. On further consideration, however, this is unnecessarily destructive. The Nazca Plate is intimately associated with the western margin of South America and will therefore be considered, together with Rapa Nui (Easter Island), South American; the Cocos Plate similarly attaches itself to Central America and will be considered North American; and the Philippine Sea Plate, being bounded on its western side by the great island arcs of East and Southeast Asia, together with the Amur and Okhotsk Plates (as well as many others) will be assigned to Eurasia. The Juan de Fuca Plate may also remain North American, although it contributes essentially no islands and therefore has no reason to object. But what about the Hawaiian, Marshall, Phoenix, Cook, Pitcairn, Samoan, and Line Islands; French Polynesia; Minamitorishima; and Wake Island? Are these simply to be assigned to whichever continent happens to be closest, or, even more arbitrarily, to the continent with which they are politically associated?

I therefore propose a special geographical region: *Pacifica*. It is not a continent, because most of it is inconveniently made of ocean. More importantly, it is now remarkably easy to define: *Pacifica* consists of the islands of the Pacific Plate. Unlike the neighbouring Nazca, Cocos, Philippine Sea, and Juan de Fuca plates, the Pacific Plate has failed to attach itself convincingly to any continent and must therefore make do with a designation of its own.

The establishment of *Pacifica* consequently proves much less disruptive than initially feared. The Galápagos and Juan Fernández Islands remain South American because the Nazca Plate has been assigned to South America, while Cocos Island remains North American through the Cocos Plate. Hawaii, however, is unquestionably *Pacifican*. The United States therefore becomes one of the few countries with territory in *Pacifica*, an honour it shares with a collection of countries whose islands have had the geological misfortune of being carried around by the Pacific Plate.

Pacifica is also more pleasing than arbitrarily dividing the islands of the Pacific Plate between Asia, the artificially defined region of Oceania—which we have already split into two continents, Australia and Zealandia—and North America. Hawaii, in particular, has traditionally been assigned to North America principally because it happens to belong to the United States, despite lying thousands of kilometres from the North American continent in the middle of the Pacific Plate. Under the present classification, Hawaii may finally stop pretending to be North American and assume its natural position near the center of Pacifica. Similarly, Midway Atoll, which is closer to Japan than to the North American mainland, will no longer be required to share a continent with Greenland, Bermuda, and Barbados.

There are a few issues with Pacifica: specifically, part of New Zealand, part of California, much of the Baja California Peninsula, and a small portion of the Alaska–Yukon orogenic system near the international border lie on the Pacific Plate. However, none of these will be admitted to Pacifica. New Zealand is firmly part of the Zealandian continental mass, while California and Baja California remain physically attached to North America. The small offending portion of the Alaska–Yukon orogenic system may likewise remain North American; continental boundaries need not be redrawn merely because a tectonic plate has failed to remain within its assigned jurisdiction. Pacifica was created to provide a home for otherwise homeless Pacific islands, not to acquire pieces of existing continents. The Pacific Plate is therefore reminded that possession does not necessarily imply continental affiliation.

Next, we come to terminology. The term “plate” is unnecessarily dry and, more importantly, fails to describe the geographical divisions that have now naturally emerged within our continents. We will therefore expand the existing use of the term *subcontinent*. India is already commonly described as the “Indian Subcontinent”, so there is ample precedent and no reasonable grounds for stopping there. We may consequently speak of the Indian, Arabian, Somalian, Caribbean, and Panamanian Subcontinents, each representing a geographically or tectonically distinct portion of a larger continent. Thus, the Indian and Arabian Subcontinents forms part of Eurasia, the Somalian Subcontinent forms part of Africa, and the Caribbean and Panamanian Subcontinents form parts of North America. This terminology has the considerable advantage that “Arabian Subcontinent” sounds like a place one might actually visit, whereas “Arabian Plate” sounds like something one might order at a restaurant. We could possibly speak of the North American Subcontinent of Eurasia, but this might offend Russian sensibilities concerning the intrusion of foreign geographical entities into Russian territory, a principle whose application to neighbouring countries has admittedly been somewhat less consistent. Tectonic plates may, of course, continue to exist for the convenience of geologists, but there is no longer any reason to burden geography students. Geologists wishing to retain the old terminology may do so within their own departments.

Next, it is an appropriate time to discuss Zealandia. *Prima facie*, New Zealand appears to be simply a collection of islands off the coast of Australia, and much of Zealandia and Australia now lie on the same Australian Plate, although New Zealand itself straddles the boundary between the Australian and Pacific plates. Tectonic plates, however, are not continents. Australia and Zealandia are two distinct masses of continental crust separated by the oceanic crust of the Tasman Sea. That oceanic crust was formed by seafloor spreading as Zealandia separated from Australia tens of millions of years ago; the spreading has since ceased, leaving

the two continental masses largely riding together on the same tectonic plate. Thus, a single tectonic plate may contain more than one continent, just as a single continent—Eurasia being the obvious example—may contain portions of several tectonic plates.

Zealandia is therefore not being promoted to continental status merely because New Zealand happens to be a sufficiently important collection of islands, nor because of its more recent fame as the setting for *The Hobbit* and *The Lord of the Rings* films. It is a distinct and coherent mass of continental crust, of which only approximately one sixteenth has had the geographical good fortune to remain above water. This distinguishes it from the other large islands considered above. Greenland remains geologically associated with the North American continental mass; Madagascar with the African continental system and, in our terminology, the Somalian Subcontinent; Sri Lanka with the Indian Subcontinent; Japan, the Philippines, and most of Indonesia with the Eurasian continental system; the Falkland Islands with South America; and New Guinea with Australia. Zealandia, by contrast, is separated from Australia by substantial oceanic crust and constitutes a continental mass in its own right. Thus, although New Zealand has historically been grouped with either Australia or the rather unsatisfactory catch-all of Oceania, Zealandia deserves, by any reasonable geological interpretation of a continent, a distinct identity of its own.

If there were any realistic chance of this classification being adopted, I would additionally propose three minor improvements: *Eurasica*, *Australica*, and *Zealandica*. At the very least, Papua New Guinea would no longer be part of a continent that has the same name as the much larger neighbouring country that used to administer it. Oddly enough, the name would likely have a different pronunciation as well: aw-STRAY-lee-uh versus aw-STRAWL-li-kuh.

We therefore arrive at seven continents and one miscellaneous region:

North America,
South America,
Eurasica,
Africa,
Australica,
Zealandica,
Antarctica, and
Pacifica (*the Pacific Plate's consolation prize*).

This classification is geographically consistent, geologically defensible provided that no geologist examines it too closely, and, most importantly, different from every existing system. It therefore has all the necessary qualifications to become an international standard. Additionally, and finally, with a few modifications and the expulsion of Europe (or Europa), all eight now end in the letter “-ica” (besides, *Europica* sounds odd); this alone should settle any remaining objections.

A Trivia

Thus, children will be expected to memorize the following exceptions and special cases as trivia:

1. Iceland spans two continents, North America and Eurasia, while Indonesia has substantial territory in both Eurasia and Australia. Türkiye, however, no longer does.
2. The United States occupies North America but also possesses islands in Pacifica, most notably Hawaii and Midway Atoll.
3. Russia is Eurasian, with the exception of the Commander Islands, which are in the North American Continent. Russia also contains the North-American Subcontinent of Eurasia, a terminology that is unlikely to be well received in Moscow.
4. Japan remains almost entirely Eurasian but occupies portions of the North-American Subcontinent and has one island, Minamitorishima, in Pacifica.
5. New Guinea is part of the Australian Continent. Consequently, Indonesia spans the Eurasian and Australian Continents, while Papua New Guinea achieves the unusual distinction of being an Australian country that is not Australia.
6. Trinidad is situated within the boundary between North and South America but is placed, for cultural reasons, within the Caribbean Plate and therefore North America.
7. Portugal occupies three continents without having acquired any additional territory: continental Portugal is Eurasian, Madeira is part of Africa, while the Azores inconveniently distribute Portuguese territory among Eurasia, Africa, and North America.
8. Denmark occupies Eurasia and North America by virtue of Greenland. Denmark is therefore a transcontinental country, although most maps of Denmark have traditionally neglected to mention this accomplishment.
9. Norway occupies three continents: Eurasia through Norway and Svalbard, North America through Jan Mayen, and Africa through Bouvet Island. This seems excessive for a country that appears on most maps to be entirely in Europe.
10. Australia occupies Australia, naturally, but also Zealandia through Norfolk Island, and Antarctica through Heard Island and the McDonald Islands.
11. France has done particularly well. Metropolitan France provides Eurasia; French Guiana provides South America; Saint Pierre and Miquelon provide North America; Réunion and Mayotte provide Africa; New Caledonia provides Zealandia; French Polynesia provides Pacifica; and the French southern islands provide Antarctica. France therefore possesses territory in six of the seven continents, as well as Pacifica. It has somehow missed only Australia.
12. The “European” Union (mostly due to France) reaches everywhere except Australia: Saint Pierre and Miquelon, various Caribbean islands, and Greenland in North America; French Guiana in South America; Europe in Eurasia; Canaries Islands, Ceuta,

Melilla Réunion, Mayotte, and Madeira in Africa; New Caledonia in Zealandia; Kerguelen and other southern islands in Antarctica; and French Polynesia in Pacifica.

13. The remaining British territories are similarly scattered. Britain retains territory in North America through Bermuda and the Caribbean; South America through the Falkland Islands, South Georgia, and the South Sandwich Islands; Eurasia through the Sovereign Base Areas on Cyprus; Africa through Saint Helena, Ascension, and Tristan da Cunha; and Pacifica through Pitcairn. Britain therefore manages four of the seven continents plus Pacifica, but has failed to secure Australia, Zealandia, or Antarctica.
14. Now that Europe has been relieved of its responsibilities as a continent, the name need not go to waste. We may simply redefine “Europe” to mean the European Union. This has the considerable advantage of finally settling the centuries-old question of whether Russia is European: it is not, having failed both to complete the necessary paperwork and to meet certain inconvenient requirements concerning corruption, democracy, individual rights, and political freedoms. Switzerland, Norway, and the United Kingdom will continue to be Eurasian but will no longer be European; every geographical reform requires sacrifices. The British have at least had the courtesy to make this particular reclassification themselves. Thus, notwithstanding the considerable efforts of Peter the Great to persuade everyone otherwise, Russia may finally and unambiguously be declared non-European. Three centuries of debate have been resolved by changing the definition.
15. Zealandia, despite being approximately 94% submerged, manages to contain territory belonging to three countries: New Zealand, France through New Caledonia, and Australia through Norfolk Island. This gives Zealandia a surprisingly respectable international community for a continent that is mostly underwater.
16. The Indian Ocean produces some particularly unhelpful results. Diego Garcia, despite lying south of the equator in the middle of the Indian Ocean, is Eurasian because it lies on the Indian Plate, while the French Kerguelen Islands and Australia’s Heard and McDonald Islands are Antarctic.
17. The Caribbean remains North American despite occupying its own tectonic plate. Consequently, countries such as Cuba, Jamaica, Haiti, and the Dominican Republic remain North American without requiring the invention of an eighth continent composed principally of islands.
18. Finally, Pacifica contains the islands of the Pacific Plate rather than an arbitrary collection of “Pacific islands”. Hawaii and Midway are therefore Pacifican, while the Galápagos remain South American, Cocos Island remains North American, and islands of the Philippine Sea plate remain Eurasian. Political ownership is neither necessary nor sufficient for determining continental affiliation, except when we have already decided that it is.