Continents, oceans, plate tectonics and missing extraterrestrial civilizations.

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The record of Earth's biogeodynamical evolution suggests the development of advanced life on rocky planets is controlled by the long-term coexistence of continents, oceans and plate tectonics (COPT). Life on Earth evolved in the oceans before multicellular organisms developed, which had to evolve on subaerial continents to become intelligent technology-building species, capable of exploring fire and electricity and creating active communicative civilizations (ACCs). Plate tectonics accelerated this evolution by drastically increasing biological speciation rates due to rapid creation/destruction of habitats, enhanced nutrient supply, climate amelioration and sustained moderate environmental stresses. We propose a focus for exoplanetary exploration towards finding COPT planets, which are deemed likely to host advanced life forms, and thence intelligent life and communicating civilizations (ACCs). According to our calculations, the estimated probability of COPT planets is very small (<0.003-0.2% of terrestrial planets in the habitable zone) but they will likely have distinct signatures compared to either uninhabited or solely microbial worlds.