

How the Southern Continents fit together – and how they came apart. Colin Reeves

Colin Reeves is a geophysicist who spent his career in Africa, India, Australia and the Americas, involved in geophysical surveys. He is now based in the Netherlands, and told us more about a key research interest – mapping Gondwana, the ancient supercontinent that contained several modern landmasses.

Colin started by explaining that the Earth is composed of three layers: the inner core, the mantle and the crust. The outer mantle and crust together form the rigid lithosphere.



The theory of plate tectonics describes the movements of the 10 tectonic plates comprising the lithosphere, all of which are travelling across the earth in relative motion to one another.

Earthquakes, volcanic activity and deep ocean trenches are largely confined to narrow zones along convergent plate boundaries, such as the 'Ring of Fire' around the Pacific Ocean, where one plate slides under another and crust is consumed. Oceanic crust is created along the mid-ocean ridges, where basaltic rocks from deep within the Earth well up and push the two halves of each plate apart as if on a conveyor belt, so creating oceanic crust. This means that all present-day oceans are relatively young, geologically speaking, and are constantly being rejuvenated.

Colin continued by explaining that 200 million years ago the landmass known as Gondwana, which had already been in existence for 250 million years and included all the present-day southern continents, started to break up. Ocean crust was created at incipient mid-oceanic ridges forming the oceans we see today. The continents of South America, Africa, Antarctica, India and Australia were carried away from one another at an average speed of 5cm per year to reach their current positions on the Earth's surface after many millions of years. They are still moving apart today and their progress can be measured with GPS.

Hundreds of years ago it was realised that the east coast of South America and the west coast of Africa are an almost perfect fit. By modelling the relative motions of the continents in reverse it has been possible to reconstruct the former Gondwana as if it were a gigantic jigsaw puzzle. Ancient geological features, such as mountain ranges and mineral belts, can be matched up across opposite sides of oceans.

At a recent major geological conference in London Colin received the award for the Best Oral Paper: 'Insight into the east coast of Africa from a new tectonic model of the early Indian Ocean'. The club presented him with their own 'award' for the best geological paper given at the club!