A cave looking over the Indian Ocean was the chosen home of early modern humans in South Africa. QUEST spoke to Curtis Marean to get the story.

Shellfish and colour early modern humans at the coast

The view from Pinnacle Point. Image: SIM

The ice ages began about 1.8 million years ago, during the Pleistocene epoch. This was a period that was marked by major changes in the Earth’s geology and climate. It was the time of many giant mammals such as the giant ground sloths, mammoths and mastodons and the sabre-toothed cat; it was also the time of their extinction.

But for early humans, or hominins, it was a time of transition to a fully modern human, when the species became cognitively complex and, as a result, more efficient hunters – which may have at least partly been the cause of the extinction of these mammals.

It was also a time of ice in the northern latitudes – large, long-lasting masses of ice, glaciers, were extensive. But this was not a time of continuous glaciation. It was marked by glacial and interglacial periods, but during the last 400 000 years glacial climate was dominant. During glacialls, the glacial ice expanded, but during the interglacials the climates were as warm as or warmer than those today.

What did this mean for Africa? During this period the modern continents were more or less where they are now. At the maximum extent, ice covered around 30% of the Earth’s surface – most of it in the northern hemisphere. Each glacial period tied up huge volumes of water in continental ice sheets – 1 500 – 3 000 m thick – causing drops in sea level of 100 m or more across the globe. During interglacials – which is where we are today – sea levels rose and some coastlines were drowned.

The south coast of South Africa showing the location of the major archaeological sites. The now submerged Agulhas bank is also shown.
In the southern hemisphere, Antarctica was ice-bound throughout the entire Pleistocene, as it had been during the preceding Pliocene. The Andes were covered by the Patagonian ice cap in the south. There were glaciers in New Zealand and Tasmania. The modern decaying glaciers of Mount Kenya, Kilimanjaro and the Ruwenzori Range in east and central Africa were larger. Glaciers were present in the mountains of Ethiopia and to the west in the Atlas mountains.

The climate of Africa changed drastically and most of Africa was drier during glacial climate. The Sahara was twice the size it is today, and most of southern Africa was drier. These harsh desert-like conditions almost certainly meant that the ranges of Homo became restricted, with isolated populations probably confined to more habitable areas, and coasts would have been particularly attractive.

**Early modern humans**

This probable isolation of early modern human populations has major implications for evolution and it was this that interested the interest of Curtis Marean, an archaeologist from Arizona State University. He has been studying early modern humans in South Africa since 1991, first on the west coast at Die Kelders and now near Mossel Bay on the south coast. He has recently theorised that during maximum glacial conditions there were only a handful of places in Africa that would have provided the conditions necessary to support human populations. A particularly long cold glacial stage occurred between about 195,000 and 130,000 years ago when studies of genetics and fossils show that the modern human lineage appeared. Surprisingly, the genetic studies show that all modern humans have very low genetic diversity, and some estimates suggest that everyone alive on the planet today is descended from a small population that lived in Africa. Marean thought that one potential refuge for this progenitor population would have been the southern coast of South Africa, where the rich coastal resources are found along with highly diverse geophyte plants (plants with bulbs and corms) in the Cape Floral Region.

So he looked for a cave that would have been close enough to the sea during the glacial maximum to have enough food and warmth, but that was high enough for its contents to have remained intact during the 5 m rise in sea levels that characterised the interglacial period about 123,000 years ago.

Peter Nilsson (then a postgraduate student at University of Cape Town) had found some caves at Pinnacle Point (near Mossel Bay), overlooking the Indian Ocean, and together they began a research project there in 1999. One cave in particular caught Marean’s attention - named PP13B. It was about 15 m above sea level in the 60 m sheer cliff face. Difficult to climb to, a local ostrich farmer, Ricky van Rensburg, built a wooden staircase down the cliff to the cave, and in 2000 they began excavations with a team from South Africa and the USA, co-funded by the National Research Foundation (RSA) and the National Science Foundation (USA).

**Marine resources and symbolic behaviour**

We know from genetic and fossil evidence that *Homo sapiens* (modern humans) arose in Africa between 200,000 and 100,000 years ago. At the time that Marean started his research, archaeologists hotly debated whether modern human behaviour first appeared 40,000 years ago in Europe, or much earlier in Africa. Evidence for symbolic behaviour is widely acknowledged by scientists to be a key indicator of modern human cognition.

The technological phase of the origin of modern humans is the Middle Stone Age (MSA), which appeared as early as 280,000 years ago. South Africa has the richest record of the MSA, but much of it dates to after 120,000 years ago. This is probably because most of these sites are below the level at which the sea would have washed out earlier deposits by high sea levels about 123,000 years ago.

In 2001 the team led by Christopher Henshilwood working at Blombos Cave showed that many indicators of modern human behaviour dated back.
These ‘beauty shells’ were not harvested for food because they were dead when collected as indicated by beach wear. They include helmet shells (the snails) and dog cockles (the bivalves). The shells were studied by Antonietta Jerandino. Image: SACH

to about 70 000 years ago - 30 000 years earlier than in Europe. This revolutionary result put all scientists’ eyes on South Africa. The new results from PP13B push that back a whopping 50 000 years to about 160 000 years ago!

**The importance of diet**

Why the relationship between coastal living and symbolic behaviour? When Marean and his colleagues excavated cave PP13B they found evidence that the early inhabitants collected molluscs (mussels and sea snails) and scavenged whales and seals along the shore. This evidence dated to 164 000 years ago, more than 40 000 years older than any previous evidence for coastal living.

For millions of years hominin diet was restricted to terrestrial plants and animals. The expansion to shellfish is one of the last additions of a new class of foods to the human diet before animals started to be domesticated towards the end of the Pleistocene.

People would not have settled along coastlines unless they had started to include shellfish and/or fish in their diet. Some researchers think that the addition of sea food was crucial to the coastal movement of populations out of Africa via the Red Sea coast and the early migration to Australia/New Guinea via coastal routes.

However, Marean’s excavations show that early modern humans lived along the coast in South Africa long before the postulated dates for these migrations – which were after 60 000 years ago.

So why shellfish and what is its importance? Marean and his colleagues think that shellfish and fish provided a critical source of food during the glacial maxima, when the surrounding land was extremely dry and unproductive. Much of South Africa may have been uninhabitable, with small populations concentrated on coastal platforms that are now submerged.

Shellfish can be a reliable and predictable source of food. The collective gathering of shellfish, rather than other forms of more mobile food, is associated with larger group sizes, more complex economic and social organisation, and with less mobile populations. And sea foods are nutritionally superb – they are particularly rich in omega-3 fatty acids, which are crucial to healthy brain growth. By 110 000 years ago we have strong evidence that people have in place a true ‘coastal adaptation’ in that their lives are based around the sea. For example, we find that they were collecting sea shells for their aesthetic value, and we know these are sea shells because they have beach wear (so were dead when collected) and are deep-living species still collected today for their beauty.

This coastal living in itself is likely to stimulate symbolic expression. Along with the early evidence for marine exploitation, PP13B also has worked ochre that was ground to produce powders, probably for body painting and possibly for colouring other organic materials such as wood and stone. The preference for reddish pigments was evident by 164 000 years ago, which is about 40 000 years earlier than found in other sites.

The importance of this research is that Marean and colleagues were able to identify a site in which sediments with artefacts survived the rise in sea levels that occurred when the ice receded – showing that the previous dates at which both seafood in the diet and certain aspects of symbolic behaviour were influenced by the availability of sites, rather than giving a true reflection of the appearance of early modern human behaviour. It is likely that many more sites from this crucial glacial phase lay underwater off the south coast. Only the intrepid diver, ready to face the great white shark and treacherous waters, is likely to encounter those scientifically precious remains.

Curtis Marean is an archaeologist at the Arizona State University in Tempe who studies early modern humans in South Africa. He is the Associate Director of the Institute of Human Origins at ASU, and specialises in human adaptability, evolution and diversity and societies and their natural environments. He also has a keen interest in conservation and biodiversity.