

Episode 17: Origin and evolution of Oceans

Research & Write-up :
Dr.T V Venkateswaran

Character	Audio
	<i>background sound: moving car, car horn etc</i>
Manav	... how far we have to go... I am just dying to see the sea
Suryaprakash	... Oh ... this is the 100 th time you have asked this question...have patience my dear son..
Driver	Sir.. we are nearing Panaji.. you want to go to Miramar ... or to take you to a quite beach just ahead..
Suryaprakash	..mm... Miramar would be very crowded... milling with people.. go to quite place... we can take rest for some time... it has been tiring journey
Manav	But Suryaprakash I want to go to Miramar.. everyone says it is very nice...Even Lalu told me that I should visit Miramar; he says it is very very beautiful..
Suryaprakash	Oh oh.. again ... Why do you have to repeat that we will indeed go to Miramar but meanwhile we can sit in a quite place... enjoy the beach... water...
Manav	... I have never seen a sea... Suryaprakash will there be lost of water in the beach.. will it be bigger than our Swarna lake...how deep will it be... can you swim across ...
Sristi	Questions questions... this Manav just asks questions questions.. Can't you keep quite for some time and watch the nice secneary around.. why are you harping on the sea.. sea always
Vasudha	Ahre... Manv is small kid, indeed he will be eagar and exited... why don't you understand.. Manav, I am also dying to see the sea... I have never seen a sea in my life.. I have seen it only in films, or photograph..
Vivek	Oh Dear manav... poor thing.. you are asking if the sea will be as big as lake in your town...(ha ha ha)... it is bigger many times over.
Sristi	(giggles) it is big.. as big as our town.. you know
Manav	(cross) It can be that big... don't' tease me
Driver	(Laughing) You think it is big as your town.. TWON... There are some seas that are bigger than India..mmm. INDIA
Manav, Sristi and Vivek	(Gasps) What
Suryaprakash	What is this... you children... don't you understand what you study?... Sristi you tell me.. what proportion of Earth surface is water.. I mean oceans and seas...
Sristi	Well.. let me recall
Manav	(interceding) ... I know I know... water is almost two thrird... only one third is lad.

Sristi	mm.. well.. I read that water covers about 70% of earth's surface and most of it is distributed between five large ocean basins.
Vivek	That is right.. if 70% of world is water...I mean surface... then you can imagine how big it should be...in fact if you stand on this Goa beach and see the west... you will see water ... water.. water.. the water in the western side extent all the way to Africa
Vasudha	Yeah.. I have seen it in the Map
Suryaprakash	... That is the point... we have seen it in map, we have read about it still when we actually see it we will find it mind boggling. Unreal.. such a big water body... in fact I came to Goa when I was in school... I still vividly recall the immensity of sea.. it is still in my eye..
Driver	Sir ... can I park here ...you can walk down ...there you see the beach..
	(sounds of car breaking to stop.. door opening etc)

	<i>Background – sound of sea waves; yelling of children , chatter – Seashore</i>
Vasudha	Manav don't run... take care... the waves look menacing.
Suryaprakash	Oh ... don't be too protective... let the kids enjoy.. however manav and sristi you have to be careful.. do not venture too much inside the sea. Stay near the shore. Vivek keep an eye on the kids.. I am tired walking and so too is Vasudha we are going to sit here...
vivek	dont' worry .. i will keep an eye. Hey kids... remove your chappals.. leave them near Vasudha... lets go to water
Manav & Sristi	Yeh , lets go fast
	music to indicate lapse of time
Vasudha	Manav .. sristi.. comeover lets have some thing to bite
Suryaprakash	you can go back and enjoy the waves... but first come over have some water and the nice pakoda ..
Vivek	let's sit.. manav dont dust the sand... the beach sand will go off by itself.. you do nothave to dust yourself..
Vasudha	sirsti come here sit by me
Sristi	Vasudha call the driver uncle too.. lets give him too some tea and pakoda
Suryaprakash	ahre Joseph.. come over here... sit with us.. have this chai and pakoda..you should also be tired.. after many hours of driving
Joseph	thanks sir.. i will take tea..mame your pakoda is very nice and tasty thanks
manav	Suryaprakash i have some more questions... you know...
sristi	i was just thinking why our doubting Thomas has not come up with any questions till now..
manav	sristi dont tease me...
vivek	that's ok sristi... Manav shoot your question..
Suryaprakash	i know you want to ask how big the sea is..
manav	oh Suryaprakash.. i have seen it with my own eye... water extending all

	on all direction till the horizon..
sirist	Then what ...
vivek	don't hurry sristi.. lets hear him
Manav	... you know ... this may sound silly... what i want to know is how come there are seas... i mean where did all this water come from..
Sristi	Wow...that is interesting question..i never thought about it
Joseph	Sir according to bible God created Earth and heaven in seven days and the oceans were created on the third day..
Suryaprakash	as far as i know oceans were there always.. see came here long time ago..about 40 years ago.. the sea was still there (laughs)
Manav	Suryaprakash don't tease me.. i am serious... was there sea always..
Vasudha	think baby think.. you have read that once upon a time there was no earth... therefore there should have been a time when there was no ocean... sea..
Suryaprakash	That is right... in nature things are always being and becoming.. evolving..
Sristi	Suryaprakash.. i understand that... but still manav question is relevant. .when did ocean came into being.. where was all these water before that.. and why ocean only in Goa and why there is no ocean in our town?
Vivek	not all questions at a time sristi..you are like question express
Suryaprakash	well you know scientist say that Earth was formed about 4600 million years ago.. from the accretion disc surrounding our proto sun.
Manav	that i know we had discussed about this earlier...particles and small pebbles in the disc gathered together to form boulder and they grow in size to become proto planets and proto planets coalesced into planets one of which was out earth
Vasudha	my pyara pyara brigh boy.. good..
vivek	that's good one manav.. i did not expect that you will recall all these
Sristi	i too remember our discussion... vivek.. you told that the great heat produced during the formation of early earth mean that the entire planet was molten.. more dense materials sank to the centre and the lighter ones floated on the surface.. as the planet gradually cooled these lighter surface material formed thin crust
Suryaprakash	That is correct... see when earth cooled there as a time when there was high volcanic activity unabated.. molten lava was erupting from beneath the surface releasing water vapour and other gases..
Vivek	this water vapor and gases created the atmosphere of earth... before this time there was no appreciable atmosphere for earth..
Manav	how long ago this happened
Vivek	about 4000 million years ago.. that is about 600 million years after the formation of earth
Suryaprakash	in fact about 4000 million years ago our atmosphere was dominated by water vapor
Sristi	today our atmosphere is dominated by nitrogen
Vivek	that is correct.. at that time it was water vapour that was dominant in

	our atmosphere...as earth cooled these water vapour precipitated as rain..
Manav	you mean there was a time when earth witnessed torrential unremitting rain all day and night
Suryaprakash	that is correct. scientist in our Birbal Sahani institute have discovered fossil impression of early rain.. you know that?
Vivek	Water vapour began to condense as Earth started to cool. The condensed water vapour precipitated as rain. Streams developed into rivers and low lying areas were filled with water turned into oceans and seas.
Sristi	That sounds interesting.. but how do we know all these
Vivek	We have some evidence. have you heard about sedimentary rocks.
Manav	Se...de...men...tary..? what is that
Sristi	Sedimentary means rocks formed due to sediments... see if you mix silt, sand, sand grains with water and leave it for some time what will happen
Manav	Obvious.. the silt, sand and so on will settle at the bottom..OH this is what is called sedimentation... isn't it?
Sristi	That's right...but what has this to do with oceans..
Vivek	Well let me give a clue... scientists have found that the oldest sedimentary rocks – formed by action of water- is about 3800 million years ago. what do you make of it?
Manav	I GOT IT... Well you said that oceans were formed about 4000 million years ago.. oldest sedimentary rock is about 3800 years ago.. THERE IS SOME THING ..
Suryaprakash	These sedimentary rocks suggest that early seas formed indeed about 3800 million years ago... early water bodies should have formed at that time...
Srist	WOW.. So this sea is really 4000 million years..
Manav	WoW.
Suryaprakash	Ok Ok OK... time is up... See Joseph has gone to sleep...we have forgotten time.. it is late.. get up get up
Manav & Srist	Suryaprakash, Suryaprakash.. let s paly for some more time..
Vasudha	Manav , sristi... you can come to beach tomorrow.. have you forgotten we have to visit Dr Suresh' house
Vivek	Who is Dr Suresh
Suryaprakash	Well.. Dr Suresh works in National Institute Oceanography... you know his wife Priya is also a scientist..
Vasudha	Joseph.. Joseph.. wake up.. we will have to leave..

	Clutter of plates, sipping sound, eating and chewing sounds
Suresh	Well Suryaprakashji... i am glad you have been able to make to Goa this time.
Suryaprakash	Dr Suresh bhai, what to do.. the work is really killing... not easy to find time..

Priya	Why dont you try this chicken cafrel .. it is one of Goan delicacy... it is really nice
Vasudha	Thank you Priya... it is really very nice.. i am enjoying.
Sristi	Priya aunti.. i will also like to have some more.. it is mouth watering
Suresh	Vivek... you were mentioning about your discussion at the seashore today..
Vivek	yes uncle... we were discussing about when did ocean originate and wherefrom the water came ..
Priya	interesting... it is one of the hotly studied topic today... you know that
Suryaprakash	is that so.. we know that from the molten earth the water vapour escaped into atmosphere which in turn precipitated in to rain filling the low lying basins..
Suresh	Yeah Yeah... that's what most books describe.. but do you know that there is a radical hypothesis of how so much water came to earth?
Priya	The purans talk of Bahirath doing Tapas to bring the Ganges from Heaven.. in fact one can say in a manner of poetic metaphor that Water on earth came from heavens..
Vivek	WHAT... Heavens?
Sristi.& Manav	Aunty...but what about the early earth.. volcanic activity and all that..
Priya	well.. some scientist show in early earth environment there could have been no water.. neither in liquid form nor in gases form
Suresh	See ... in the Early stages the temperature of Earth would have been so high that water vapour if formed would disassociate..
Vivek	you mean due to heat water molecule will separate into hydrogen and oxygen
Priya	That's right... it would have not been possible for water to be trapped inside earth to come out through volcanic activity in the first place
Manav	I am bushed. Then how did all these water come? Wherefrom
Priya	I told you from heavens!
Sristi	Heavens
Suresh	Priya ... enough don't tease the kids.. Yes kids from Heavens... but not in the way purans and myths talk about... but by comets
Ramaya	Yes ... some scientist claim that comets are the water carriers of our solar system. When most planets, particularly inner planets formed they were so hot water could not be possible in its molecular state. However as comets were formed in outer region called Orth cloud.. it can retain its water content..
Suresh	You know that almost 50% of comets are ice.. that is water...?
Vivek	Yeah. i did not think of that at all. Comets contain more than 50% water
Srist	OK Comets have water.. so what.. how did it reach earth
Suresh	In the early days of solar system... that is Earth's infantile stage.. there was so many proto planets, rocks, comets that there was constant bombardment in each and every planet.
Priya	In fact the craters that you see in moon or mercury were caused by such bombardments... slowly such stray objects were wither pushed out of

	solar system in to Orth cloud Kuiper belt and so on or had crashed into planets
Sursh	About 3.9 billion years ago the bombardment tapered off.. we hardly have such spectacular impacts nowadays
Sristi	Uncle.. uncle i remember the shoemaker levy impact on Jupiter during 1994.
Priya	You are an intelligent girl sristi... yes shoemaker levey impact is one rare event of such impact.. but they were more pronounced more often in early days of earth..
Vivek	Ok OK.. i gather that you say that in early days of earth there were many many millions of impacts of comets.. these comets had water and that is how Earth obtained its water.. is that what you say
Suresh	Well.. sort of. But i am not saying comets bright water only in bygone days.. 20 snow comets weighing 20 to 40 tons each that crash into the Earth's atmosphere every minute. They bring 45000 tons of water every day!
Priya	In fact this is one of the hot theory of how oceans were formed.
Manav	Then what happens to the other claim ... water vapour escaped from Earth's interior and so on
Sristi	How can scientist change their view like this
Priya	(laughs) well kids.. that is how science is..with new evidence we change our views.. we do not stick to one view just because we have said it earlier... if one hypothesis is found to be untenable from latter research.. it is only scientific to modify ones view
Suresh	It is not to say that there are no one who still hold that water vapour escaped from the Earth's interior.. There are indeed many scientist who still hold that view and provide supporting evidence too.
Suryaprakash	Oh You mean there are two contending theories... there are some evidences for both..
Priya	Yes that is it
Suresh	Ok OK we seem to be concentrating on our discussion.. let us also keep an eye over the dinner.. Vivek.. would you like some more of Prawn curry... this one is very good ; made with coconut ...
	Music

Priya	Joseph take this turn... we have to climb the road to reach Aguada fort
Manav	Is it a very big fort aunty?
Sristi	Is the fort large one
Priya	Well.. sristi...and manav.. a fort this one is rather small... not at all big. See it is strategically based on a cliff looking over the entrance to Mandovi river and Goa. In those days this helped to spot the enemy ship even before it reached close to the port.. actually Aquada was a watering point... it has a very large tank where water was stored and given to ships leaving for high seas..
Vivek	aqua means water .. is that why this one is named Aquada?
Suresh	Well said Vivek

Joseph	madame are we to take this turn..
Priya	Yes Yes... other way will take you to Helipad
Suryaprakash	Wow we have reached the fort.. look nice ..
Vasudha	Oh look at the rocks used to build this fort... they look very different..
Suresh	yeah... these are igneous rock
Sristi	Igneous rock? They are formed due to heat .. isn't it? Like Volcano.. but this place look so tame and placid.. where are the volcanoes that produced these rocks
Suresh	Well done Srist... that is a good point. These rocks indeed originated in volcanic activity.. but not of recent origin .. may be about 65 million years ago... there was a great volcanic activity in this part of Indian peninsula... called deccan volcanism.
Priya	You know that at that time India was not in the place it is today.. India was in mid Indian ocean.. there was no Himalayas at that time.
Manav	What there was no Himalayas? India in mid Indian Ocean? ... i can't understand
Sristi	You mean to say India was not part of Asia? How can that be?
Vivek	I know that would have to do with continental drift... is that right Suresh uncle?
Priya	Yes Vivek... it is to do with Continental drift
Manav	You mean to say not only India but other continents were also not in their rightful place?
Suresh	Rightful place? ha ha ha... All continents float..
Vivek	I have read about this... Continents float on molten mantel and hence they move here and there
Priya	Actually it is not continents.. though people though originally that ... it is actually plates...
Sristi	Plates... what plates
Suresh	Actually all the upper crust of Earth is divided into 13 major plates... and a number of smaller plates. All these plates float on the partly molten layer of the mantel beneath.
Priya	You know some of these plates carry continents and ocean. where as some are purely oceanic... for example Pacific plate has no continent..
Manav	WoW...
Vivek	I remember that i read somewhere that continental crust are about 30-40 km thick ... but oceanic crust are only about 6 km deep. – land mass- less dense Denser. Thinner plate- ocean floor- as it sinks- only 6 km thick
Priya	True... but one important thing is continental crust is less dense than oceanic crust..
Manav	What... This is unbelievable... you say that land is less dense than water
Priya	I do not mean that... what i said is the crust that holds continents are less dense than the crust that hold ocean..
Sristi	But how can that be
Suresh	look at this... if the ocean crust were really less dense then it should

	float up and if the continental crust is denser than it should sink in.. right
Sristi	Yes.. look right
Priya	Then continental crust should be low lying than oceanic crust as both of them float on molten mantel
Manav	I understand... if ocean crust were denser then it cannot be low lying and water cannot accumulate in it... it will not become ocean... right..
Priya	You got it. Actually this difference in density accounts for the oceans themselves. Despite being thinner, the denser oceanic crust floats lower in the liquid rock of the mantel than the lighter continental crust. Water flows by gravity to the lower areas thus creating the oceans.
Sristi	let us imagine that egg is earth.. say the shell of a egg is cracked... like the plates.. these plates float on the liquid molten rock mantel.. like say the yolk of the egg... is that right?
Suresh	Wonderful...
Vasudha	Sristi... that is a good one..
Suryaprakash	Well said my sweety
Sristi	Ok Ok Ok ... but my question is.. all these cracked plates can remain fixed on the surface of the egg.. above the yolk.. but how can some thing move over... like India being in Mid Indian ocean then moving to its current position.
Vivek	Wow i never thought about it. Yeah. I can accept that there are plates and they float on the surface of earth.. and the denser ones sink and therefore there are ocean.. but how can continent drift? Each plate will be enclosed by other plates and each will hold other firmly
Suresh	mmm.. interesting...
Priya	Well ... nature is full of surprises.. I told ocean floor are only about 6 km thick.. right
Vivek	Yeah..
Priya	Molten rock would want to expand.. come out.. right.. like steam in the pressure cooker..
Srist	Ok
Suresh	Look at Earth as a gigantic pressure cooker.. with a lid... that is the crust. But crust is cracked.. now where all you will expect steam to come out
Vivek	in a chain weakest link will break first
Priya	Yes...Fluid rock of the mantel causes a current like a river current. This current rises up and molten rock break through the crust at the mid-oceanic plates where the crust is very thin. These places where molten rock seeps through are called mid –oceanic ridge..
Suresh	Mid oceanic ridges cross all the major oceans except North Pacific. These ridges are about 45000 km.. they are the largest geological structure on Earth.. Himalayas will dwarf before them
Vivek	I see... now i get it.. As the molten rocks flow out at mid oceanic ridges ocean floor should spread and expand. This will push the continents
Priya	Yes.

Srist	Priya aunty.. If the ocean floor constantly expand and spread.. the whole earth should expand..
Priya	Well.. As the ocean floor spreads it would push the plates surrounding that oceanic plate... Earth would be expanding unless somewhere material is forced back to mantle.. actually as oceanic plate collide with continental plate, the heavier oceanic plate moves beneath the continental plate .. called subduction. Indian plate is going under the Eurasian plate.. that is how Himalayas originated in the first place. Even now due to this subduction Himalayas grow taller every year by few cms.
Manav	Well just a clarification.. do all the continents move at the same speed?
Suresh	Continents move at the same rate as the plates are moving apart. It is not same all over. Atlantic plate moves very slow at 2 cm/year however the Pacific moves 18 cm /year.
Vasudha	Well well.. forget about the continental movement for some time... it is time we move from Aguada fort to Vagtor beach. let us go

Joseph	Sir we have reached your guest house... (Car breaks. sound of opening of door, closing)
Suryaprakash	Thanks Joseph.. we will meet at 9 am tomorrow .. we can go Divar island
Joseph	Ok sir.. i will come at 9 am sharp
Vasudha	Sristi ... just go to canteen and find if we can get some tea
Vivek	Yes.. i am dying for a cup of tea
Manav	I want something to munch
Suryaprakash	Ok before we go to our room lets all go to canteen and have a cup of tea
Vasudha	I will go to room and join you latter... you people carry on
	Sound of walking... arrangement of chair etc
Sristi	Suryaprakash... they have tea and also some thing called achappam
Manav	Achappam.. what is that
Vivek	is some local snack.. why not we try it
Suryaprakash	Ok Srist.. get that and also tell them to prepare tea
Manav	Vivek... have you finished the book Suresh uncle gave you?
Suryaprakash	What book
Vivek	It is a book on ocean.. Vigyan Prasar has published it.. There is information of ocean floor spreading... continental drift and so on..
Manav	Any thing interesting you read in that book
Vivek	The book is really interesting... You know it was a Dutch map maker named Abraham Ortelius who guessed that there is some connection between continents. This was way back in 1596.. The map maker saw that the West African coast and European coast could fit snugly against the coast of Americas on the Atlantic side. Like a giant jig saw puzzle.
Manav	What jig-saw puzzle?

Sristi	Vivek biya was saying that you can fit Europe and Africa along with the coast of America ... like you fix pieces in jig-saw puzzles
Suryaprakash	See this map... can you see the coast of Europe.. Africa and the shape of Americas... suppose you cut the continents and try to join them they will fit each other...
Vivek	Yes.. not that easily... of course.. At the time of Ortelius this was just a curious fact... it was one German scientist named Alfered Wegner observed this and hypothesised that all the continents should have been together at one point of time and proposed the hypothesis of continental drift in 1912.
Sristi	Vivek bhiya ... you are the one who always say that one should not believe what just looks plausible... the coast line looking to fit each other may be just an accidental feature..
Vivek	Yes, yes.. actually Wagner did not base his claim only on the apparent concordance between the seacoasts. He in fact collected number of evidences
Manav	Evidences.. What kind of evidences are possible...
Vivek	For one coal deposits were similar in West Africa and Eastern coast of south America
Manav	What if coal deposits were similar.. how does that point out that once upon a time both the Western coast of Africa and Eastern coast of south America were connected
Suryaprakash	Well.. Manav... how are coal formed in the first place?
Sristi	Suryaprakash i will tell.. Once upon a time there was a large forest... the forest , trees, bushes and so on were trapped underneath and due to pressure the organic material became coal.
Vivek	So if coal from both site were similar imply
Sristi	Both places should have same kind of plants.. trees...
Suryaprakash	You see Indian Elephant is different from African, because they both evolved separately; Kangaroo is found only in Australia because it is separated from other land mass. If Western African coast and Eastern coast of South America have similar types of coal means once upon a time they should have been having same kind of plants..
Vivek	that means they were likely together as one single land mass. Further fossils of now extinct Mesosaurus are found in West coast of Southern Africa and East coast of South America once again giving credence to the hypothesis that once upon a time they were joined together.
Suryaprakash	At the time of Wagner it was more of a guess work... they were not aware the mechanism of sea floor spreading and so on... of course we know more today... how sea floor spreads that due to that how continental crust move ...
Sristi	Well .. vivek.. do you remember Priya aunty said that about 65 million years ago India was in the mid Indian ocean or some thing like that..
Vivek	Yes.. India was below equator... in the southern hemisphere.. as a separate island- continent .. right in the middle of Indian ocean
Manav	Ok That would have been interesting isn't it. But where was India

	before that
Vivek	Ok let me show you this page.. see this picture
Sristi	Oh all the continents are together
Manav	What is this name... Pan... ji... it is like Panjim...
Sristi	Panjim Nahi bhai.. it is Pangaea...Look how south America is edged along with Western Africa, how Europe and North America are fitting together.. Look at India wedged along the Eastern coast of Africa... You mean to say there was only one continent that time
Vivek	Yes.. That's what scientist hypothesise ... This super continent is called Pangaea.. Almost all the land mass... certainly all the continents were together at that time...
Manav	Well this picture says that Pangaea was there about 225 million years ago
Sristi	Look this As there was only one supper continent there was only one sea- I mean ocean. Super ocean...
Manav	p..a..n..tha..lassa
Vivek	Well it is panthalassa. Take a careful look, nestling between Africa and Eurasia can you see a tropical sea... small one..
Srist	Yes Tethys sea
Vivek	Tethys sea was a shallow tropical ocean...
Manav	We know this spuer contient split into various contients like South America, Eurasia, and so on... What ahappened to the Oceans.. I mean Tethys sea and is panthalassa ocean?
Suryaprakash	Panthalassa was actually predecessor to Pacific ocean ... that is Panthalassa became what today is Pacific ocean.. as regards the Tethys sea... it is under Himalayas !
Vivek	What was once the Tethys Sea has now become the Black sea, Caspian sea and Aral Seas. Most of the floor of the Tethys Ocean disappeared. We only know the Tethys existed because geologists found fossils of ocean creatures in rocks in the Himalayas.
Srist	So what was once panthalassa ocean has resulted in all the remaining oceans?
Vivek	You can't say that because Atlantic ocean emerged ... as Pangaea broke apart...that was about 220 million years ago
Suryaprakash	North America broke apart from fused continent of south America and Africa .. the line of separation marked the beginning of the mid Atlantic ridge. As the split widened two giant continents were formed- Laurasia and Gondwanaland. See here, ... this map... you can see the details... Laurasia contained Americas and Eurasia and the second continent named Gondwanaland containing South America Africa, India, Australia and Antarctica. That was the arrangement then
Manav	Ok So this map is the next stage in the evolution of continents... mmm.. Ok this map depicts Earth as it was during 130 million years ago.
Sristi	Yes yes... See the Gondwanaland is breaking up in this stage.. America and Africa has moved northeas... Oh Oh Oh just take a look at this

	point of time India has separated from Gondwanaland and is seen separately moving north... you can also see that South America and Africa has split.. and you can also see the Southern Atlantic ocean.
Vivek	See the next picture... The Tethys sea is gradually closed by northward movement of Africa and what we know as southern Europe.. India is in mid Indian ocean.. Himalayas are yet to form... This is about 65 million years ago
Sristi	This is what Priya aunty said right...
Manav	Yes..i can see that India on either side of Equator ..
Suryaprakash	Yes after this.. in the last 65 million years.. India has moved and reached Aisa.. creating Himalayas.. Indian ocean is born by creation of mid Indian ocean ridge.. Due to this ridge Australia and Antarctica is separated...
Vivek	You know even today Australia is moving north.. after many many millions of years it will join Asia...
Chaiwala	Sir your tea is ready. So are the Achappam please take it sir
Suryaprakash	Vivek can you please go and get it
Manav	mmm.. yammy... the achappam is really nice
Suryaprakash	Sristi please take your tea.. I wonder where is you Vasudha... she is taking too long
Sristi	Well.. well.. seeing these series of pictures I can notice that as Atlantic ocean enlarged, remains of panthalassa that is today's pacific shrank –
Suryaprakash	In fact Pacific is still shrinking to this day...
Manav	WoW.. The great Pacific will shrink like pool one day..mmm..
Suryaprakash	Forget about Pacific... if you do not concentrate on achappam... it will soon vanish.. see how Sristi is attacking it.. Manav I think it is better we concentrate on our tea and achappam...
	(laughter)... music.. end