

TITLES 'THE EDGE'	10.00.00	TITLE SOUND IN
	10.00.20	MUSIC IN
	10.00.21	FEMALE NARRATOR The most fundamental scientific question of all time, how were the planets and our solar system formed?
	10.00.30	Vital clues can be found in meteorites which contain information stored for millions of years.
	10.00.39	At the Open University in Milton Keynes Britain, a meteorite expert from the Earth Sciences Department Doctor Phil Bland, believes he might be on the trail of discovering a new large meteorite impact crater. His trail began several years ago when in 1992 an American scientist Professor Peter Schultz, published a paper in nature magazine, Schultz had discovered a unique series of crater like features in Argentina, in the features he found fused rock and soil, evidence of a meteorite impact,
	10.00.56	Schultz concluded that a meteorite must have entered the earths atmosphere at a low angle and then skipped across the surface like a bouncing bomb, gouging out the craters and depositing material in them.
	10.01.16	

	10.01.33	British scientist Doctor Phil Bland, is now challenging Schultz's theory, he thinks that the elongated craters have been caused by nothing more than wind erosion, exposing meteorite material which he believes has been deposited not from a bouncing meteorite but from a separate single impact,
	10.01.51	MUSIC OUT to prove his theory he must now find the original impact crater hidden in the Argentinean pampas.
	10.01.58	MUSIC IN
TITLE THE MAN WHO FOUND WHAT FELL TO EARTH	10.01.59 10.02.02	FEMALE NARRATOR Ten years after Schultz first published his theory, Phil is returning to Argentina. If Phil is right the crater he hopes to find will be buried and well preserved, it would be a significant find in meteorite exploration.
	10.02.19	CHANGE IN MUSIC
	10.02.27	FEMALE NARRATOR Phil arrives in the small town of Rio Cuarto in the heart of Argentina, he has just ten days to gather enough evidence to prove his theory is more likely than Schultz's. Whilst in Argentina Phil will be helped by Brazilian scientist Carlos Roberto De Souza.

	10.02.45	<p>MUSIC OUT</p> <p>By Argentinean Geophysicist Doctor Luchio Pinotti, local Geologist Hugo Shiavo, Geomorphologist Jorge Coniglio and Geology student David Schonwant.</p>
	<p>10.02.58</p> <p>10.03.12</p> <p>10.03.29</p> <p>10.03.49</p>	<p>PHIL BLAND</p> <p>In 1992 Peter Schultz who's a professor at Brown University in the states um published a paper in Nature which described a whole bunch of elongated scars in the pampas, these things and he thought that they were made by the low angle impact of an asteroid that came in and hit and bounced as it, as it was slowing down. We started to discuss it with some of the local Argentinean Geologists and for a long, long time they thought that these features were actually made by the wind, as you can see today, all the winds blowing that way and all these things are oriented in this region, North South. We found meteorites in these, in these features and it's interesting that, that the ages since the meteorites been on earth is much, much longer than the time that the features have been here, which didn't make any sense to us because those meteorites would have been taken away by, by an impact. So I started to think that although these features are really interesting er they,</p>

	10.03.54	they couldn't really be made by an impact in the way that, that Peter Schultz had thought.
	10.03.58	FEMALE NARRATOR Phil's challenge is not only proving that Schultz's features are just wind erosions but that the meteorite material found in them has come from a separate single impact elsewhere in the pampas.
	10.04.12	FEMALE NARRATOR Phil starts his journey at the university of Rio Cuarto, to meet local Geologist Hugo Shiavo, an expert in the area's wind directions.
	10.04.21	PHIL BLAND And see what he has to say.
		MALE About the wind
		PHIL BLAND Yeah about the direction of those things and if it's the wind, wind features...
	10.04.31	MALE Hello
		HUGO Hello

		MALE How are you,
		HUGO Obrigado.
	10.04.35	PHIL BLAND Hello Hugo. Nice to see you mate, excellent. So what we want to do is er, is see, is get some idea for why the direction of these elongate features changes through the region, why there is so many different directions. In the North we have, in the North South, in the South, and in the South they curve more like North
		HUGO Yes
	10.04.59	PHIL BLAND East , South West, is that similar to the wind direction in these wind area's, does it also change?
	10.05.07	HUGO Um the compound direction is um, is er, is change
		PHIL BLAND OK, OK.

	10.06.13	with some of the local scientists Phil visits one of the erosion features to collect samples of glass and meteorite material.
	10.06.19	PHIL BLAND What have you got in the box, what is in the tin?
		HUGO Tamis
		PHIL BLAND Oh sandwiches
		MALE Tamis
		PHIL BLAND Tamis , oh Tamis Ok, OK of course, ah Ok excellent.
	10.06.30	PHIL BLAND I guess the idea is that, that somewhere in the pampas there's been a really big impact and that's splashed glass all over the whole region, over a huge region, and the best place now to find that glass is in places where the winds blown all the soil away cause then we can just walk around and see it.
		PHIL BLAND

	10.06.47	Yes that's another bit.
	10.06.50	PHIL BLAND Glass is, is fused rock and it's mostly made of the target that the asteroid hits so in this case most of the glass is actually just soil, um meteorite is, is actually rock from space so that's part of, part of some planet or asteroid that we get that falls to earth.
	10.07.14	PHIL BLAND I think that's a meteorite, it's got Hey guys, I think this is a meteorite. It's kind of heavy.
	10.07.36	FEMALE NARRATOR Although relatively easy to find glass in the features, Phil's theory of the single large impact would mean that the glass would have been scattered for hundreds of kilometres all over the pampas, Phil must now try to locate glass as far South as possible in order to back up his theory.
	10.07.52	PHIL BLAND So I'm going to go down South and look for some of the glass and the reason I'm doing this is because there's a colleague of mine called Natasha Artemieva in Russian and, and she's got a great way of kind of visualising what happens when an impact hits the earth, and where all the glass goes, so

	<p>10.08.09</p> <p>10.08.26</p>	<p>we want to do that because then we can hopefully you know get a sort of confirm that this might a place where the, where the impact happened. So this is what happens when a 500 meter object hits the earth so this thing comes shooting down, that's the top middle layer of soil and then hard rock underneath, this is all glass that's kind of shooting out the other side, so you can see you get this huge plume of stuff that come pilling out and that's like real turbulence thing and this can go a hell of a long way, so we just wanna find out where that goes.</p>
	<p>10.08.43</p>	<p>MUSIC IN</p>
	<p>10.08.47</p>	<p>FEMALE NARRATOR Phil is heading South, if his theory is correct the meteorite will have thrown glass hundreds of kilometres and finding the glass will back up his theory of a single large impact. He drives 400 kilometres into the heart of the pampas.</p>
	<p>10.09.03</p> <p>10.09.10</p>	<p>PHIL BLAND Now if our theory is correct then, then we'd expect to find this glass er from the impact over a huge region MUSIC OUT Um, not you know, not just confine to near the crater but over hundreds of kilometres er so we, we want to look</p>

	10.09.19	around and try and map out just how far that is.
	10.09.39	Doing this is going to give us a feeling for how far the glass has gone and how big the crater is, so we're just looking for little bits of glass and, and all it is, is just like this stuff just soil that's been melted and kind of fused so, it'll be, they'll probably be about button sized and just a kind of fused bubbly er bubbly little rock but it won't have minerals in it, it's like, like glass on your window but it won't be clear you know it'll be green or, or brown or something like that.
	10.10.06	MUSIC IN
	10.10.09	FEMALE NARRATOR No luck here but it's crucial that Phil finds glass this far South if his theory of the single impact is correct. He continues to look around the area, digging, sieving, searching until at last.
	10.10.26	PHIL BLAND I think this is a bit of glass. Looks bubbly and it's kind of greenish, um but I can't see very well because I'm, I'm very short sighted so, but I think it's glass.
	10.10.41	FEMALE NARRATOR As ever in the scientific world the more

	10.10.47	evidence the better, so still not satisfied Phil continues searching.
	10.10.50	PHIL BLAND So I think I found a bit of glass, er that's been washed out of this, this kind of cliff here, this is a lot like the stuff we find up North, so that's, that's really great, I'm chuffed.
	10.11.06	FEMALE NARRATOR Finding glass this far South if further evidence of the single large impact, Phil's problem now is locating the crater, which in all probability will be buried under several meters of soil.
	10.11.18	MUSIC OUT
	10.11.18 10.11.38	PHIL BLAND So the problem that we've got is that the whole thing is, is buried under all this soil so I mean if the crater was, was in like perfect shape, it'll look something like that, so you'd have, you'd have like the rim coming down like that, then a flat base and maybe a central peak in the middle where it's bounced and a little er you know raised rim at either end, now because we've got, we've got all this soil that's filled all of that in, it's like 50 odd meters deep, so the, it could be that we're really unlucky and it's just filled the whole thing in, and in which

	10.11.54	case we're never going to see it, but if it's, if it's a bit thinner then we might get we might get a kind of
		MALE Yeah
		PHIL BLAND Something like that
	10.12.02	FEMALE NARRATOR Spotting the crater from the ground is obviously going to be difficult, but Roberto has taken 3D satellite images of the area which enables him to see the topography of the land.
	10.12.12	ROBERTO Right, here are the lakes
		PHIL BLAND OK
	10.12.16	ROBERTO And um the structure is like, you see this round structure here
		PHIL BLAND Oh right OK, OK you'd like that
		ROBERTO These radial patterns

		PHIL BLAND Yeah
	10.12.24	ROBERTO Coming out of a spot
		PHIL BLAND Right in there yeah
		ROBERTO It seems to be a high point
		PHIL BLAND Oh that's a high thing
		ROBERTO Yeah
	10.12.29	PHIL BLAND Really oh wow, are you sure...you think that's a high
		ROBERTO Yeah
		PHIL BLAND Cause the, oh OK, OK
	10.12.34	FEMALE NARRATOR They are able to pin point an area which looks to be the likely spot for the hidden crater.

	10.12.39	PHIL BLAND So if that is a high bit in the middle and the, around it is low then that would be really nice.
	10.12.46	ROBERTO It's a, it's a little high, it's not that high
		PHIL BLAND OK. How big is the high bit you reckon?
	10.12.53	ROBERTO Well it's very tiny actually
		PHIL BLAND Really,
		ROBERTO Around this black dots
		PHIL BLAND Oh really, wow
		ROBERTO And then everything just goes radial
	10.13.00	PHIL BLAND And is it, is this around it low?
		ROBERTO That's right

	10.13.03	PHIL BLAND That's lower than the surrounding plane
		ROBERTO That's lower than the plane
	10.13.07	PHIL BLAND So what I mean is, is it, is it like that and ...
		ROBERTO That's right
		PHIL BLAND Really
		ROBERTO Precisely
		PHIL BLAND Wow. OK, OK that's really nice.
	10.13.16	FEMALE NARRATOR Believing they have pin pointed the possible location of the crater the next task is to study the underlying rock structure of the target area and in effect see beneath the surface and map out the crater.
	10.13.30	Phil has brought a gravitometer with him, this will enable them to record specific gravity around the area of the

	10.13.38	crater, but first Phil must set the equipment to Argentina's local gravity.
	10.13.42	PHIL BLAND When a crater is made on a planet, you've effectively taken out a, a chunk of the, the surface of that planet, of that, of that crust and that changes the gravity underneath it, you'll actually have a little bit less matter, so a little bit less gravity.
	10.13.56 10.14.14	PHIL BLAND We found it, oh thank god for that, that's brilliant. So now the official gravity in Rio Cuarto is 2950 point [chuckles] 2, 28. that's good. I mean the nice thing is that it'll let us, we can work out what's going on under, under the soil so we can see the crater, if it is a crater, at least we'll be able to say that much.
	10.14.26	FEMALE NARRATOR Meanwhile Roberto again using satellite images has found another interesting aspect.
	10.14.31	PHIL BLAND Can I have a look
	10.14.32	FEMALE NARRATOR There are under ground streams flowing

		towards the centre of the feature indicating radial draining an encouraging sign of a buried crater.
		PHIL BLAND and ROBERTO CHATTING
	10.14.47	FEMALE NARRATOR Phil, Roberto and the team of Argentinean scientist all gather at the sight they now believe hides the buried crater, but there's some bad news.
	10.14.57	SPANISH
	10.15.12	PHIL BLAND So we can't walk, but we can do the road
	10.15.14	SPANISH
	10.15.17	FEMALE You can do the periphery of the farm but you can't go into the farm because of foot and mouth
	10.15.22 10.15.24 10.15.38	PHIL BLAND Right OK, OK. Er well that's, so we can do, we can do the road, we can stay on the roads OK. Just means no, no walk, you know, but that's not, that's not bad. So it turns out that the farmer doesn't

	10.15.41	want us to go on his land because he's very worried about foot and mouth, er so what we're going to have to do, so it's a bit of a pain because last night we were all excited and we got a bit pumped up about coming out here today and getting into the middle of it, um but really you know chances of us finding anything like a rock are probably slim so it's not a nightmare so we can do a lot of work here today along the road, maybe go a little exploring in the cars so it's
	10.15.56	MUSIC IN
	10.16.06	A pain but it's not you know the end of the world.
	10.16.09	PHIL BLAND So if you just record the position, keep track so maybe that's post one, two three
		MALE Right
	10.16.16	PHIL BLAND Er West and then one, two, three
		MALE I have like a few pens, make a tiny little mark
	10.16.22	PHIL BLAND OK mate yeah, but keep, as long as

	10.17.39	gathered by Phil, Roberto and the team could provide compelling evidence of their theory but first all the data will need to be fed into a computer for analysis. Despite the disappointment of not getting to the exact centre of the crater local farmer Adolpho makes amends by providing the team with a well earned supper.
	10.17.56	[all talking together]
	10.18.16	FEMALE NARRATOR It's been a good days work, but only tomorrow will they know the results of their labour.
	10.18.26	MUSIC OUT
	10.18.32	PHIL BLAND So you've got the one
		ROBERTO This is like West to East
		PHIL BLAND Right
		ROBERTO Section
		PHIL BLAND OK

	10.18.37	ROBERTO Which is like the most er detailed
		PHIL BLAND Which we, we did a bit when I was there
	10.18.42	ROBERTO Together that's right. So you know, double check it, data, everything very consistent
		PHIL BLAND That's lovely
	10.18.51	ROBERTO And then, there were some on the next section which is the North
		PHIL BLAND So going right, from going up from the South side
	10.19.00	ROBERTO South to North, that's right
		PHIL BLAND Up the centre of it
	10.19.04	ROBERTO So we have like one section this way and another section this way.

		PHIL BLAND Nice one mate
	10.19.07	ROBERTO So it's almost like having a 3D
		PHIL BLAND Yeah
		ROBERTO Variation
		PHIL BLAND Right
	10.19.11	ROBERTO And the other one, is pretty good as well
		PHIL BLAND Yeah it is, yeah
		ROBERTO I really like this one
	10.19.16	PHIL BLAND That's nice. So let me see that's um, so at 2000 it's 3412-2, 34122, it's, go back to the other one again, sorry, nice, it's nice that's there's a, I like that there's a magnetic dip as well

	10.19.34	ROBERTO That's right there's, there are variations which is
		PHIL BLAND Yeah
		ROBERTO That's the way
		PHIL BLAND Yeah
		ROBERTO That data works
	10.19.39	PHIL BLAND That's cool man, this is great, and it's a bit more definite I mean, instead of just like this might be more or less magnetic rock we've got, this is, this is a hole in the ground kind of thing. When you see it somewhere else you think that's nice.
		ROBERTO I'm quite happy
	10.19.55	PHIL BLAND Yeah I think it's really nice mate, I mean that's way beyond what I thought we'd get.

		Right lets go and see the other boys.
	10.20.09	FEMALE NARRATOR Roberto then translates the computer data for the rest of the team.
	10.20.13	ROBERTO This is the place where we did the section, approximate elevation along the section, would be something like you know, metres, distance, we have er a high at the boarder of the feature and as we come close to the centre, a low a little bump, another low, and a higher, so that's elevation data.
		PHIL BLAND Yeah I like that
	10.20.45	ROBERTO Gravity data is something like er a low, get's higher and higher as we go outside of the feature.
	10.20.57	PHIL BLAND Ok so that's going now, it's going from the inside
		ROBERTO Inside, this is like the centre.
	10.21.03	PHIL BLAND OK to the outside

		ROBERTO OK and it gets lower
		PHIL BLAND That gets lower
	10.21.08	ROBERTO Something like that line data, meaning that er there is something more magnetic in the centre rather than outside the feature and so this is like a cross section through the whole feature, like this feature here
		PHIL BLAND All the way across
		ROBERTO All the way across
		PHIL BLAND Cool
	10.21.29	ROBERTO And you know there is this little bump here [PHIL BLAND – yeah] is that what you would expect?
	10.21.34	PHIL BLAND It's interesting in a crater, on that, of that size on earth er it's big enough so the rocks kind of behave like um, like

	10.21.45	plastic or liquid for a moment so the thing hits and they bounce and kind of rebound in the middle so you can often get a peak in the middle of a crater, but if it's that big, if it's like 10 or 12 kilometres
		ROBERTO That's right, very interesting
		PHIL BLAND It's nice yeah
	10.21.59	ROBERTO. Um I believe we have got you know a nice list of evidence that um there's something special in this place here, so I'm not sure what you think about it
	10.22.11	PHIL BLAND No I think you're right I mean this is, this is what we'd, this is what we'd see if, if it was a crater [ROBERTO – yeah] so it means that it's a place that we're going to have to come back to and do a lot more work
		ROBERTO Sure
	10.22.23	MUSIC IN

	10.22.25	FEMALE NARRATOR It's Phil's last day in Argentina, still unable to walk to the crater because of the foot and mouth, Phil and Roberto have hired a plane to fly them over the area, will yesterdays encouraging data, now translate into something more tangible.
	10.22.40	PHIL BLAND Going up in the air and, and getting a, a look from, from, from much higher up is great because then we can really see much more detail on the topography and get a feeling for where that buried crater might be.
	10.22.55	PHIL BLAND You can really see the rim of it, just amazing
	10.23.00	[Phil and Roberto in the plane]
	10.23.12	PHIL BLAND This is much, much better than being able to walk in mate yes this is great. Thumbs up yeah that's really nice, we can see a bump in the middle, er so that's, that's just what we wanted to see So it's just exactly what came out of Roberto's stuff and now we've confirmed it on the ground well now from the air.

	10.23.55	MUSIC OUT
	10.23.57	PHIL BLAND This trip has really been a great success, I mean not only have we um, everyone's been really helpful and the team has worked really well but we've found really everything that we could hoped to have, to find, we've found a meteorite on the first day, er we found bits of glass, we found glass way down South and Berto and Jorge have done a great job with the gravity and actually got a hint that, that we might be, that we might have a buried crater er so it's been really exciting, it's been a great trip. So the next step really requires a lot more effort, a lot more time a lot more people and a lot of money so the nice thing is now that we've got enough information
	10.24.08	
	10.24.25	
	10.24.35	MUSIC IN so we can actually make a case to try and justify er spending that time and money on, on really seeing is this the buried crater.
	10.24.47	FEMALE NARRATOR The trip is by no means conclusive but the team of British, Brazilian and Argentinean scientist have certainly gathered enough evidence to justify further exploration and to warrant a little celebration.

	10.25.03	PHIL BLAND Hello, so Ola, er gra...thank you, thank you for everyone's help [ROBERTO OK] so I hope everyone's had a good, a good experience, a good time, a good time
	10.25.17	ROBERTO Spanish
		PHIL BLAND Thank you
	10.25.26	FEMALE NARRATOR Phil will need to return to Argentina to carry out extensive tests on the area, including drilling the rock that he now believes to be a new impact crater discovery, if he's right the buried crater should be well preserved and will a significant find that will help scientist world wide to a better understanding of major meteorite impacts.
RUN CREDITS	10.25.54	
Narrator Alex Fraser Graphics Tim Kitchen Composer Crush Music		

<p>Dubbing Mixer Robin Ward</p> <p>Technical Assistant Mohsin Bhatti</p> <p>Production Manager Clare Welch</p> <p>Executive Producer Maverick Television Martin Head</p> <p>Editor Francois Gandolfi</p> <p>Assistant Producer Emma Tutty</p> <p>Produced and Directed by Niall Fraser</p> <p>Series Editor Ron Blythe</p>		
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	10.26.23	MUSIC OUT
BLACK SCREEN	10.26.40	