Moon's gravity alone cannot create the world's largest tides

January 20 2014, by Andrew Steele

How long can you stay there depends on practice and physics. Credit: elisfanclub

"Tide goes in, tide goes out… you can't explain that." So claimed US talkshow anchor Bill O'Reilly, in a baffling attempt to discredit atheism which became something of a YouTube sensation.

I have been on holiday to Brittany a few times and I was aware the tides there were enormous – but, when I looked into why, I discovered that the

reality is even more fascinating and complex than O'Reilly failed to grasp.

Tides around the world can range from almost nothing to over ten metres – so how can the Moon's gravity alone give rise to such a diversity of tides?

Well, it can't – at least, not on its own. The Moon's gravity is strong enough to cause Earth's oceans to oscillate, but it can't account for the the variety of tidal ranges observed. These variations are caused in large part by the physics of waves.

You can think of tides as enormous waves rolling around the circumference of the Earth. The interplay between these gargantuan oscillations, rebounding from continents and interacting with one-another, can allow for huge differences between local tides. The large tidal range in Brittany, for example, is due to a tidal resonance – the cumulative effect of adjacent tidal waves perfectly in sync. If you want to learn more, it's explained in this video:

Tides are also responsible for a host of excellent epiphenomena. For example, the Severn estuary in the UK plays host to the inaptly named Severn bore, which is anything but: a solitary two-metre-high shock wave which glides with an eerie smoothness for twenty miles up the river. Or there is Bodø in Norway, home of the world's largest tidal maelstrom, where the tide rushing through a narrow channel forms tumultuous whirlpools.

"Time and tide wait for no man", or so the saying goes – and there are few more potent everyday examples of the power and indifference of nature. The advance of a spring tide up the Plage Bonaparte (the beach featured in the video) has often left me in awe. And, occasionally, sprinting with armfuls of cricket stuff and deck chairs to avoid them

being claimed by the sea.

And if you want to experience the power of tides, I recommend standing in the sea and letting the tide rise up from your feet to your neck. Just make sure you know your physics – pick the biggest tide of the year on a beach with one of the world's largest tides – or you may find yourself waiting for quite some time.

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