

Chasing the Silver Dragon

Michael Berry, September 2014

One of the world-famous physics attractions in our Bristol area is the tidal bore on the river Severn – a stately wave that steepens and grows as the tide advances towards Gloucester. There are a few similar tidal bores in the world. I have just been privileged to see the largest, near Hangzhou in south-east China, on the Qiantang river whose mouth opens out towards Shanghai. Locals call it the Silver Dragon.



Where the bore is

My host Huan Zhou is a physicist from Chongqing, a thousand miles to the west. Hangzhou is his home city. His generous arrangements involved finding a local 'fixer' who booked our hotels and meals, and selected prime locations to view the bore. We saw it six times: by day and by night over three days. It is a major tourist attraction; local media estimated that on the day of the biggest bore more than a hundred thousand people lined the banks to watch it, and at prime locations we had to buy tickets to reach the river bank. I saw no non-Chinese people.

As with our Severn bore, you hear the low roar of the wave before you see it,. The Qiantang river is almost 3km wide, so the wave is louder

than ours, and the roar is audible a full 20 minutes before you first glimpse the bore as a thin white line in the distance



Bore in the distance

A great shout goes up as the bore rushes by as an angry wave



Silver Dragon rushing by



Angry wave

Several artificial long walls jut out perpendicular to the river bank. From these, you can get a good view of the people lining the banks, and see the scale of the wave as it passes, and boats suspended safely above the river.



People above the bore

More dramatically, you can see the wave approaching head-on.



The angry wave approaches

And as the bore crashed into the wall directly in front of us, it generated a huge reflected wave that was amplified as it receded against the still-advancing tide.



Reflected wave receding

At night, there were fewer people, and, because of the way sound refracts differently when the ground is colder, the roar could be heard even earlier. On the last night, we chased the bore for tens of kilometres, until 3am, The fixer chose a final viewing location where the bore crashed against another wall. As we parked, seconds before the bore arrived, police rushed alongside on motorbikes, screaming at us to shift the car, and ourselves, several tens of metres away. With my English mistrust of authority, I thought they were being unnecessarily officious. But they were right, because the reflected wave smashed through the protective chain-link fence, and would have drenched us and the car and probably knocked us over.

With the 12hr50min interval between bores, and long drives between viewings, our sleep patterns were disrupted, leaving us permanently exhausted. Our discomfort was somewhat ameliorated by the luxurious hotels chosen by the fixer. One deserves mention as an attraction in itself. It is spectacularly located on the Qiantang river as it opens out into its estuary: in the middle of a bridge spanning the river, claimed to be the world's longest over clear water – nearly 40km.

Any visit to China is memorable gastronomically: each meal contains at least one dish never tasted before, and one (usually not the same one) containing ingredients impossible to identify. This time, the high point (though you might disagree), was wine that had been stewing in a vast jar containing a snake (dead drunk initially, perhaps, but now just dead)

A question for physicists: What is the difference between chopsticks (C) and the toilet (T) in an upmarket Chinese hotel? Answer: to use C effectively, the optimal action uses only one degree of freedom. But exploring all the facilities offered by T would involve at least twelve degrees of freedom; I will not go into details.