Quadtree-adaptive tsunami modelling

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Tsunamis are a typical multiscale phenomenon. Their accurate description and modelling requires the resolution of spatial scales ranging from thousands of kilometres (oceanic basins) down to tens of metres (wave fronts, local topographic effects). Tsunamis are also highly dynamic so that the distribution of these spatial scales varies quickly in time. I will show how mesh-adaptive methods based on quadtree discretisations can efficiently and accurately capture this wide range of scales. I will also discuss how the physical scaling properties of tsunamis (as described for example by their fractal dimension) are directly related to the computational cost required for their description, and how fine-grain adaptive methods can exploit these properties to lead to order-of-magnitude gains in computational speed.