

# ***Interactive comment on “Ideas: a simple proposal to improve the contribution of IPCC WG1 to the assessment and communication of climate change risks” by Rowan T. Sutton***

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The comments relate to the meteorological significance of the high impact events which occur at the tail of the spectrum. For example, the 1607 (Julian calendar) flood or the 1703 cat 2 hurricane which destroyed much of the British navy at Chatham. These rare, but high impact events are described by process that cannot be "permitted" or climate models. Gadian et al (2018), doi: 10.1002/joc.5336 demonstrated that convectively permitting solutions capture more than 10 times the number of convectively parameterised results for a control period of (1989-1995) and further form a same period (2030-2036) underestimate their importance by a further 20%. This involves compar-

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ing simulations with convective epameteriatsion of < 12km resolution and convectively permitting solutions of < 3km resolution. This is mirrored on other processes such as longer dry spell durations etc.

Thus, I would go further than Kerry Emmanuel's comment (10th June 2018) which relates to the professionalism of the "meteorologist". It is more than a "strong professional obligation to estimate an portray the entire probability distribution ...but also the high end risk function , because of the outcome function is very high there". It is a moral issue required of meteorologists, who know they cannot model the extreme processes, not to emphasise and put effort into including or even primitively estimating the low frequency tail impacts. I agree that "policy makers need to know has a responsibility to know", but also also the climate modellers / meteorologists have a moral responsibility to provide estimates for which those making the appropriate estimations of impact. It is the small scale processes which are often important, even in maintaining large structures such as blocking anticyclones, and it is similarly disingenuous the meteorologists not to bring the importance of the tail and the fact that the climate modellers are unable to represent.

Sutton argues that it is "misguided" that WG1 has focused in the likely range. However, I also agree with Emmanuel, that it is "misguided" the climate modellers themselves have focused so much on the likely range, and the bulk of the distribution rather than the extremes in the tails. For a multitude of reasons the climate scientists have almost deliberately ignored the tail because they cannot understand what is happening there. However, I would again go further that in IPCC AR6 , a group of core, (mainly climate) scientists has been selected who are experts on the climate models which represent the bulk of the spectrum, with only a few selected who understand and are experts in the smaller scaled meso / micro scale meteorological, thermodynamical physics. If only a few are present who understand the tail, then WG1 is very unlikely to represent the risks

The "Tail Risk vs Alarmism" is always an argument proposed by the more conservative

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elements of the scientific establishments, and the peer review process where only the consensus is published and careers established. If the you are considering building a new fast breeder nuclear reactor on a coastal site, without adequate protection, because IPCC was too focused on the bulk of the spectrum, in an area where a flood in 1607 a meteorological event caused more than 10m of flooding and also where severe inundation has occurred in close proximity, then it is more than a matter of integrity. It is a moral act, for the meteorologists and WG1 to include these tail effects. Succumbing the charge being "alarmist" without making a stand, is an act of cowardice and dishonour, even if it does, and will, wreck ones career. Emmanuel's comment is correct that it makes scientists "skittish", but it is also an understatement. Climate modellers, which I am afraid includes many in the UK, and especially those scientists in WG1 and those who selected them, have a huge responsibility which history will hold them liable for if one of those events occur.

In summary, Sutton's argument that it is basically ignoring the tail is misguided although correct is a gross understatement and is no where near self critical enough. The tail end processes so eminently described by Emmanuel, are the ones that WG1 should be predominantly studying, but which I suggest will be unqualified to asses, and a direct consequence of the past decades of climate science in may national institutions , and the source of many careers.

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