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Talking about the physics of climate change, what we know and what extra could we do?

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Our world's climate is changing at an alarming rate. We as physicists and STEM practitioners have a responsibility to act by providing solutions to better understand how our planet works (IOP 2019-23 strategy, 2019). This requires rethinking our modes of social interaction and raises two communication challenges, so far neglected by our scientific community. Firstly, as climate change is a global effect, physicists are faced with the imperative to learn from and engage with each other beyond siloed specialisations in order to produce a coherent and integrated understanding of the earth system. Whilst a lot is known about the climate system (future warming implications are well established), there are also significant gaps in our knowledge as to how the physics of the climate system works, and in how society interprets this knowledge (IPCC, 2019). Better understanding of chaotic and turbulent dynamic phenomena, such as wave-based eigenmode phenomena, can enhance our predictive capacity. The changes to our climate are causing impacts which alter societal resilience. There is recognition of the need to develop sophisticated and complementary approaches: *"research is still often 'siloed' in physical modelling, ecosystem modelling, social sciences etc."*, *"Researchers who can cross boundaries between these disciplines will help accelerate research in the areas"* (IPCC, 2019; 6-62). Secondly, we as physicists need to ensure that the knowledge we produce helps the general audience understanding of what is at stake, and informs policy-makers in making appropriate decisions to create more resilience (ranging from local community planning to global level governance). This raises a challenge in regards to communication towards non-scientific audiences. We have access to a large knowledge base due to the sophistication of how we now collect, simulate and derive insight about our earth system. How we use this knowledge, and socially recognise the actors in the global community forms the way we as a physics community prioritise and influence decision choices. Unfortunately, the lack of focus on knowledge communication within the physics community hinders our capacity to fulfil these responsibilities. In this discussion, we introduce the idea of "discourse position" and show how a greater acknowledgement of the discursive dimensions of research can help physicists produce more innovative knowledge, broader engagement and therefore enhance the community understanding of the physics of the earth system. Indeed, scientific knowledge is produced through discourse. Therefore, a better understanding of the use of discourses and knowledge is part of how we identify and apprehend

their effects, and a necessary step to produce discourses and knowledge that help us to create a world consistent with our values and objectives (Alejandro, 2019). We explain here some social science concepts about scientific communication and discourse positions, to help inform the direction of current and future climate physics research.

IPCC, (2019): Summary for Policymakers.

IOP Strategy (2019), Unlocking the Future, Strategy 2019 – 2023.

Audrey Alejandro (2019), Western dominance in International Relations? The Internationalisation of IR in Brazil and India, London and New York: Routledge.