Real Sociedad Española de Física
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FUNDACIÓN RAMÓN ARECES

FACULTAD DE CIENCIAS FÍSICAS

Conferencias de divulgación científica de la Real Sociedad Española de Física en colaboración con la Fundación Ramón Areces
Ciclo Hablemos de Física, Facultad de Ciencias Físicas (UCM)

Simple principles underpinning understanding of climate change

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Jueves 26 de abril 2018, 12.30h., Aula Magna Blas Cabrera
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Resumen

Understanding how Earth's climate changes in response to increasing concentrations of atmospheric carbon-dioxide is centred around two simple but related principles: one is that the atmospheric relative humidity remains constant with warming, the other is that the atmospheric circulation remains unchanged. I will explain how important pillars of our understanding of climate change derive from these principles, and why some of the most interesting and challenging problems in climate science are likely related to the ways in which reality may differ from these simple principles. Particularly in the tropics, possible instabilities, while unlikely to change the bigger picture, can have profound effects both on the impacts and pace of warming. Here I outline how advances in high-performance computing offer the opportunity to explore the stability of the tropical circulation under warming, and in doing so are opening a new chapter in climate science.