

*Distinguished Speakers'*



# UEE Seminar Series

*Hosted by School of Urban & Environmental Engineering*

## **Polar amplification dominated by local forcing and feedbacks**

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The surface temperature response to greenhouse gas forcing displays a characteristic pattern of polar-amplified warming, particularly in the Northern Hemisphere. However, the causes of this polar amplification are still debated. Some studies highlight the importance of surface-albedo feedback, while others find larger contributions from longwave feedbacks, with changes in atmospheric and oceanic heat transport also thought to play a role. Here, we determine the causes of polar amplification using climate model simulations in which CO<sub>2</sub> forcing is prescribed in distinct geographical regions, with the linear sum of climate responses to regional forcing is replicating the response to global forcing. The degree of polar amplification depends strongly on the location of CO<sub>2</sub> forcing. In particular, polar amplification is found to be dominated by forcing in the polar regions, specifically through positive local lapse-rate feedback, with ice-albedo and Planck feedbacks playing subsidiary roles. Extra-polar forcing is further shown to be conducive to polar warming, but given that it induces a largely uniform warming pattern through enhanced poleward heat transport, it contributes little to polar amplification. Therefore, understanding polar amplification requires primarily a better insight into local forcing and feedbacks rather than extra-polar processes.



- **When :** 2019.03.21.(Thu) 11:00
- **Where:** Bldg.110(EB4), Room.1007
- **Host :** Prof. Kang, Sarah  
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