



Department of Atmospheric and Oceanic Sciences

# Earth System & Space Science Poster Conference

Friday, December 9, 2022

Please join us for the keynote seminar of the Earth System & Space Science (ESSS) poster conference, which will be held in **SEEC C120 on Friday, December 9 at 10:30–11:30AM**. This year's keynote speaker will be **Dr. Maria Rugenstein** of Colorado State University, whose talk is entitled “The pattern effect: Re-defining radiative feedbacks and assessing their relevance for near-term projections”.

**Title:**

*“The pattern effect: Re-defining radiative feedbacks and assessing their relevance for near-term projections*

**Abstract:**

*Recent research has highlighted that radiative feedbacks — and thus climate sensitivity — are not constant in time but depend sensitively on sea surface temperature patterns (“pattern effect”). I will discuss two implications of this realization:*

*First, there has been an explosion of feedback definitions and methods to estimate equilibrium climate sensitivity. I will contrast three flavors of radiative feedbacks—equilibrium, effective, and differential feedbacks—and discuss their physical interpretation and applications. I show that their values can differ by more than  $1\text{Wm}^{-2}\text{K}^{-1}$  and their implied climate sensitivity can differ by several degrees. This highlights the need for using coherent feedback definitions throughout the community.*

*Second, I will discuss the relevance of the pattern effect for climate change projections. Given that coupled climate models cannot recreate the observed pattern of surface warming and top of the atmosphere radiation imbalances, we should doubt the surface warming pattern evolution in projections. I will introduce “surface warming pattern scenarios” which correct for known model biases. This new “pattern uncertainty” is as relevant as the uncertainty caused by scenarios, model differences, and internal variability throughout the 21st century and generally increases uncertainty. However, I will argue that it may also constrain near-term projections and may lead to high warming rates if the current patterns of Equatorial and Southern Ocean warming will change.*

**About the ESSS Poster Conference**

This free conference highlights work by students and postdoctoral scientists conducting research in Earth System & Planetary Science and Space Physics & Engineering. Participants and visitors from CU departments and research institutes, as well as other Front Range schools and organizations, are encouraged to participate. Please email the ESSS Poster Conference Chairs, Dr. Kris Karnauskas ([Kristopher.karnauskas@colorado.edu](mailto:Kristopher.karnauskas@colorado.edu)) and Dr. Sara Sanchez ([sara.sanchez@colorado.edu](mailto:sara.sanchez@colorado.edu)).