POLAR RADIANT ENERGY IN THE FAR-INFRARED EXPERIMENT (PREFIRE)

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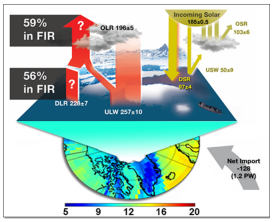

Much of the Far-infrared radiation (FIR) emitted by the earth surface is trapped primarily by the insulating greenhouse effect. At the poles, the greenhouse effect is minimized by the nominal cold and dry atmospheric state. This is how a significant amount of absorbed solar energy is vented back to space, acting like a thermostat. Under these conditions, the effects of surface emissivity become disproportionately large and have a significant impact on the radiative balance. Earth system models have consistently under-estimated the rapid warming occurring in the Arctic, perhaps due to poor assumptions about the nature of far-infrared spectral emissions.

The Polar Radiant Energy in the Far-InfraRed Experiment (PREFIRE) is a NASA Earth Ventures mission, currently in formulation, that would test the hypothesis that time-varying errors in FIR surface emissivity and atmospheric greenhouse effects bias the modeled energy balance that under-estimates Arctic warming. This presentation covers the processes involved in the energy balance, and how spectrally resolved measurements provide the means to extract critical information. We also discuss the instrument difficulties associated with remote measurements across the far-infrared, emphasizing the differing challenges associated with earth science vs. astrophysics. Finally, we provide an overview of the planned PREFIRE mission and how it would address these challenges.