Using CESM-RESFire to Understand Climate–Fire–Ecosystem

Interactions and Their Implications for Decadal Climate Variability Northwest

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RESFire provides an improved treatment for CESM of many processes important to climate-fire - Agricultural waste burning REaci - Land use change REsac -ecosystem interactions (Zou et al., 2019); - Ignition/suppression RElcc (Anthro-**B**Efire pogenic) This improved modeling capability is useful for 1.0 2.0 -2.0 -1.0 0.0 1.0 2.0 understanding the role of fire in the climate system (Zou et al., 2020) with better future climate and fire projections (Zou 2000s: -0.82 W m⁻² et al., 2020); LONG-RANGE TRANSPORT 2050s: -1.31 W m⁻² Aerosol Indirect Effects Fire weather: Fire behavior: Aerosol Direct Effect ≻Lightning >Occurrence ➢Fuel moisture/aridity 2000s: -0.003 W m² Spread Vegetation dynamics: 2050s: 0.003 W m-27 ≻Intensity ➤Fuel availability Fuel type DEP(WET DEPOSITION DRY Climate Fire **CESM**-RESFire variability severity Biogeochemical Cycles Aerosol Deposition on Ice Surfaces Fire feedbacks: Climate responses: ≻Fire emissions (GHGs, Radiation budget 2000s: 0.19 W m⁻² aerosols, hydrocarbons 2000s: 0.04 W m⁻² ➢Biogeochemical cycle and NOx, etc.) 2050s: -0.29 W m⁻² ≻Hydrologic cycle 2050s: -0.006 W m⁻² ≻Land cover change >Atmospheric chemistry ~

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(Ward et al., 2012)