Title:	Incorporating heat stress treatment into the DO 3 SE phenology function for PBW550 wheat (Triticum aestivum)
Authors:	R, Adarsh
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Abstract:	Modelling of leaf-level stomatal conductance (g sto) with the help of observed or modelled meteorological parameters and environmental response functions has been introduced as a new way to conduct ozone (O 3) damage to vegetation and calculate triticum aestivum yield loss based on the absorbed O 3 phytotoxic dose (POD) but has not been used in India so far. With the help of environmental response functions and the yield data of relay seeding experiments for the triticum aestivum cultivar PBW550 we explore the impact of meteorological parameters and ozone stress on wheat yields. The cultivar was directly obtained from breeders and was sown on 1 st and 15 th November as well as on 1 st December in 2018. Harvest occurred in April 2018 and April 2019, respectively. We subsequently use meteorological observations and ozone measurements obtained at the Central Atmospheric Chemistry facility of IISER Mohali in Punjab, India phenology observations and a large number of yield related parameters to estimate how adverse meteorological conditions and ozone exposure during different growth stages of the plant impact plant growth and yield. To this end we parametrise the DO 3 SE model for PB550 with the help of stomatal conductance measurements during the growing season. We also develop an improved phenology function which allows incorporation of the effects of heat stress on leaf phenology into the DO 3 SE model in a manner which is consistent with the treatment of the heat stress in crop models. We find, that contrary to the present practice in the ozone-crop yield loss community, wheat yield is not only affected by environmental stress and ozone exposure during the flowering and grain filling stage of the plant, but also when the growth phase changes from vegetative to reproductive (tillering to heading). This stage is equally important for the final yield as the number of active tillers per plant and the length of the head is determined during these growth stages. Unlike flowering and grain filling this developmental period is rarely affected by heat stress, making ozone the most important stressor affecting plant growth during this crucial phase. In the light of these findings we revisit the ozone accumulation window currently recommended for assessing ozone related crop yield losses in Triticum aestivum.
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