Analysis of Fraction Skill Score properties for a displaced rainband in a rectangular domain

Gregor Skok

Faculty of Mathematics and Physics, University of Ljubljana

Fraction Skill Score (FSS) is a recently developed and popular metric used for precipitation verification. Although many studies have used FSS for precipitation verification there are almost no studies focusing on FSS properties. In fact the properties of FSS are not yet fully understood, especially regarding the effects of differently shaped precipitation areas and the positions of these areas in relation of the domain borders. A compact analytical expression for FSS is derived for a case with a single displaced rainband in a rectangular domain. The existence of analytical solution is used to determine some properties of FSS which might also be applicable in other cases. The position of the borders perpendicular to the rainband orientation does not influence the FSS value while the position of the other two borders does influence the FSS value in a complex way - moving a border closer to the rainbands can either increase or decrease the FSS value depending on the location of the borders. FSS is shown to be a monotonically increasing function of the neighborhood size (regardless of the position of the borders). If displacement that is half the neighborhood size is used to define a "useful" FSS value then the useful criteria is somewhat different than presented in the original FSS paper.