



## Understanding the properties of the Fraction Skill Score

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Fraction Skill Score (FSS) is a popular metric used for precipitation verification. The method is relatively simple to understand and easy to implement while simultaneously exhibits some very useful properties. However the properties of the FSS are not yet fully understood. As a result an analytical study was performed into the properties of the FSS for the case of randomly distributed precipitation which yielded a new form of the useful forecast criteria. A study of real forecast data was also performed using 8-years of European Centre for Medium-Range Weather Forecasts (ECMWF) model forecasts, out to a lead time of 9 days, over domains of differing sizes covering parts of Europe and North Africa. The FSS was examined using different strategies for dealing with the domain boundary and is compared with the analytical study. The findings give practical guidance on how to use the FSS. For most situations a FSS value of  $>0.5$  serves as a good indicator of a useful forecast. The choice of domain size for rainfall forecast verification should consider the typical spatial errors of the forecast. For a domain that is large compared to the typical spatial error, the boundaries have little adverse effect, but this is not the case if the spatial errors start to become comparable to the size of the domain. The evaluation of ECMWF forecasts reveals the extent of the spatial errors that emerge for medium range forecasts and show the value of verifying those forecasts using the FSS over an appropriately-sized region.