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Use of a satellite climatology to assess forecasts of daily precipitation accumulations over both land and sea with the SEEPS score

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Assessing model behaviour for precipitation accumulations can be challenging, especially at the higher resolutions which are the norm in today's global modelling systems. Using station observations for verification of these forecasts means there are potentially issues with representativeness as well as the likely double penalty effects. The Stable Equitable Error in Probability Space (SEEPS) score was developed at ECMWF (Rodwell et al., 2010) in order to monitor forecast precipitation and be useful for diagnosing model errors whilst accounting for local climatological effects. It uses three categories; dry, light and heavy (which are each defined according to the local climatology) to produce a score at a point, correcting for the observation density in the vicinity. These point scores can then be aggregated over a geographical area to provide a measure of model skill in that area for that date and time. Since most station observations are over land, it is difficult to construct a picture of how our models are performing over the oceans. To try and address this, we have constructed a climatology suitable for use with the SEEPS score from the gridded TRMM 3B42 satellite product, using 17 years' worth of data. We have used this alongside current satellite observations of precipitation (the GPM IMERG near real-time product) to evaluate daily precipitation behaviour in the operational global forecast system at the Met Office and compare it to that in a potential model upgrade over a 6-month period in 2018-2019. The characteristics of the new climatologies have been investigated and compared to those from the SYNOP observations. We compare the resulting verification scores to the those from the existing SEEPS methodology (using station gauge accumulations from across the SYNOP network) and look at differences in score behaviour over land and sea.