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## **The role of metal ion transport in the sporadic E layer occurrence in the Summer Southern Hemisphere**

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The first simulation on the sporadic E (Es) occurrence distribution at middle and low latitudes in the summer Southern Hemisphere is presented. The Es distribution in the summer Southern Hemisphere, which shows a salient decrease around Southern Africa, has been considered owing to the geomagnetic configuration. Herein, we conducted Es simulations for the summer southern middle and low latitudes and for the first time reproduced the Es distribution. The geomagnetic westward wind region around 100–105 km altitudes corresponds well to the Es distribution in the summer Southern Hemisphere. Dense metal ions, that is Es layers, tend to move vertically into the geomagnetic westward wind regions. Geomagnetic zonal winds tend to be eastward around Southern Africa, which causes the decrease of Es occurrences there. Es distributions are also affected by horizontal ion transport due to winds and partially by the vertical ion convergence at 120–130 km altitudes, where Es layers start to form. Metal ion transport is the primary cause of the EsOR distribution and the geomagnetic configuration is the secondary cause.