

THE RELATIONSHIP BETWEEN STRATOSPHERIC GRAVITY WAVE POTENTIAL ENERGY AND TROPOSPHERIC PARAMETERS OVER SOUTH AMERICA INFERRED FROM COSMIC-2 AND METOP RADIO OCCULTATION MEASUREMENTS.

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The study shows the first direct and independent relationship between the stratospheric gravity wave (SGW) activities, the precipitable water vapour (PWV), the tropopause height (TPH), and the cold-point height (CPH) over South America from the COSMIC-2 and METOP radio occultation measurements during the year 2020 and 2021. The South American continent comprises the tropical region, the Andes mountain range, and the mid-latitude climates. The seasonal mean of the potential energy (E_p), the PWV, and the tropopause parameters height (TPH and CPH) were obtained to investigate the relationship between the SGW E_p and the tropospheric parameters (PWV, TPH, and CPH). A good correlation of variability was found between the precipitable water vapour (PWV) and the lower stratospheric gravity wave E_p in summer over the tropical region. In the tropical and subtropical winter. Our result showed a negative correlation between the PWV and the SGW E_p in the stratosphere. We found a direct link between the PWV and the gravity waves in the tropical region and an anti-correlation between the PWV and the gravity waves in the subtropical region. A significantly low water vapour ($PWV < 10$ mm) and relatively high gravity wave activity ($E_p > 8$ kJ/kg) around the Andes Mountains towards the East. The tropopause and the cold-point temperature showed an anti-correlation ($r > -0.6$) with SGW over the South American tropics. There is a negative or no correlation between the SGW E_p and tropospheric parameters in winter. The SGW activities in the tropical region showed an impact on the structure of the tropopause parameters which could as a result of the convective activity in this region. The SGW E_p climatology showed a less or no SGW activity was observed in the summer and a higher SGW activity in the winter in the subtropical regions, especially over the Andes mountain.