



## **GPS RO sensing of Boundary Layer Height within Southern Ocean Cyclones**

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The COSMIC constellation of GPS RO satellites has been used extensively over the previous few years to generate climatologies of boundary layer height (BLH). These satellites use high precision clocks to measure the time it takes for a signal to be transmitted through the atmosphere. From the time measurements, the angle of refraction of the signal can be calculated and then used in turn to calculate atmospheric refractivity. Boundary layer heights can then be determined by identifying sharp gradients in the refractivity profile. The results of this approach have been compared with radiosonde data and show a high level of agreement. By using this technique, we also generated a BLH climatology which was then used to analyse how the height of the boundary layer varies within the specific meteorological context of Southern Ocean cyclones.

Analysis of the BLH behaviour over cyclones was primarily based upon generating cyclone composites. This is done by averaging together measurements in a cyclone relative framework to generate a representative cyclone. This technique allows a direct examination of the mean state, however it is also valuable for further analysis such as splitting the composite into regions and analysing the distribution of values over each of these sub-regions.

We also investigated the relationship between boundary layer height and surface variables. There is a particularly strong negative relationship between sea ice concentration and boundary layer height. The reasons for this phenomenon are not entirely clear but appear to be at least partially related to changes in the surface sensible heat flux. The effects of other surface variables such as air temperature, sea surface temperature and wind speeds were relatively minor.