

Global Assimilation of X Project Loon Stratospheric Balloon Observations

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Project Loon has an overall goal of providing worldwide internet coverage using a network of long-duration super-pressure balloons. Since 2013, Loon has launched over 1600 balloons from multiple tropical and middle latitude locations. These GPS tracked balloon trajectories provide lower stratospheric wind information over the oceans and remote land areas where traditional radiosonde soundings are sparse, thus providing unique coverage of lower stratospheric winds. To fully investigate these Loon winds we: 1) compare the Loon winds to winds produced by a global data assimilation system (DAS: NASA GEOS) and 2) assimilate the Loon winds into the same comprehensive DAS. Results show that in middle latitudes the Loon winds and DAS winds agree well, and the Loon wind assimilation has only a minor impact on the forecasts. However, in the Tropics, there is often a substantial difference between the assimilated winds and the observed Loon winds, of 8 m/s or more in magnitude. In these cases, assimilating the Loon winds significantly improves the meteorological analyses and subsequently the forecasts of the Loon winds. By highlighting cases where the Loon and DAS winds differ, these results can lead to improved understanding of stratospheric winds, especially in the tropics, as well as aiding analyses of the representation of dynamical forcing mechanisms in the GEOS model.

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