**Case Study: Loon Assimilation**

A33Q-2934 - Global Assimilation of Loon Stratospheric Balloon Observations and their Trajecories Relative to Tropical Waves

**BACKGROUND:** Equatorial Waves

- **Rossby Waves:** Nonzero equatorial meridional wind
- **Trapped within ~10° of the equator**
- **Planetary scale in zonal direction**
- **Periods of a few days**
- **Propagate vertically and zonally**
- **Large wave activity associated with westerly winds.**
- **Equatorial cross section showing vertically structure: Loon Trajectories**

**Phase and Group Velocities**

- **Phase Velocity:** to the West
- **Group Velocity:** to the East
- **Wind vectors show different meridional wind conditions**
- **Wind can be used to influence Loon trajectories.**
- **Rossby waves vertical shear of meridional and zonal characterizes equatorial wave motions.**

**Example: Wave Trapping**

- **The Rossby waves vertical shear**
- **Can be used to influence Loon trajectories.**
- **The Quasi-Biennial Oscillation (QBO) in the east**
- **QBO Westerlies**

**Assimilation of Loon balloon trajectories can improve better analysis of these equatorial waves.**

**RESULTS:**

- **Abnormal low vertical wind shear**
- **Wind shear allowed Loon trajectories to be moved.**
- **Universal correction on vertical wind shear**
- **Loons can be guided in equatorial cross section.**
- **Connectivity to remote areas.**
- **Decrease in error associated with the tropics.**

**Future NASA plans call for increased vertical resolution in the stratosphere enabling assimilation of Loon balloon observations.**

- **Several Loons were assimilated in the tropics during June 2014.**
- **Several Loons were assimilated in August 2014.**
- **A33Q-2934 assimilated three months (June 2014) of the Loon balloon winds into the NASA GEOS control global data assimilation system (DAS).**
- **Several Loons were assimilated in August 2014 produced by including the Loon balloons into the DAS.**

- **Controlling a global meteorological forecast model with observations**
- **Loon: designed to extend Internet connectivity to remote areas.**
- **Loon is a network of stratospheric balloons, Loon is a network of stratospheric balloons, Loon is a network of stratospheric balloons, Loon is a network of stratospheric balloons.**

**NASA GSFC, National Aeronautics and Space Administration**


- **https://gmao.gsfc.nasa.gov/assimilation of Loon stratospheric balloon observations.**