**NASA DEVELOP National Program**

****NASA Langley Research Center

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**Short Title: Northwest U.S. Agriculture III**

**Updated Abstract**

Washington State produces 65% of the nation’s apples, adding 2.2 billion dollars to the nation’s economy. Washington’s warm, dry summers and cool, wet winters provide excellent conditions for apple growth. However, there is a strong likelihood that Washington’s suitability for apple farming could be altered by current and future climate change. Currently, the USDA determines which plant species will thrive in a particular location based on their Plant Hardiness Zone (PHZ) Map. Apples grow best when climate conditions match zones 5 and 6. By creating maps of current and projected PHZs, apple growers will be able to decide both if it would be beneficial to move apple orchards in the upcoming decades and where the most suitable conditions will be located. Using Aqua MODIS Land Surface Temperature (LST) from 2002 to 2015, minimum temperatures per day and month were extracted to create a present-day PHZ map. Additionally, future climate model air temperature forecasts from the Coupled Model Intercomparison Project phase 5 (CMIP5) for 2020 to 2100 were used to determine future PHZs. Growing Degree Days (GDD) were also calculated to create orchard suitability maps. Since the ability of apple trees to thrive is dependent on GDDs, PHZs, and average growing season temperature, these maps provide further insight into which regions of Washington State may be suitable for apple orchards in the future. Final maps of current and forecasted PHZs will allow stakeholders to identify regions that are currently optimal for apple production, and see how those regions may move with forecasted climate change.