**NASA DEVELOP National Program**

****NASA Langley Research Center

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**Northwest US Agriculture II**

*Evaluating Suitability for Apple Cultivation Based on Accumulated Chill Hours*

*in Washington State from 2003 – 2065*

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**Abstract**

Washington is the top apple-producing state in the United States, contributing over half of the nation’s apples. Washington’s climate is ideal for apple growth, but as climate fluctuates, concerns are rising over the continued suitability of the region for apple cultivation. Apple trees require 400 to 1000 hours between 1.4 and 12.5° C, known as chill hours, to break dormancy and homogenously bloom in the spring. Accumulated chill hours was identified as a key factor contributing to the success of apples, which may change due to climate fluctuations. Thus, understanding how climate change may affect chill hours will provide growers with insight as to how their orchards may eventually be affected. Connections to the apple growers in Washington were established through a partnership with the United States Department of Agriculture - Agriculture Research Service (USDA-ARS). Data for 2003 to 2013 were acquired from NASA Earth observations measured by Aqua and Terra Moderate Resolution Imaging Spectroradiometer (MODIS). Accumulated chill hours were calculated for 2003 to 2013 using the Land Surface Temperature product. Future climate model air temperature forecasts from the Coupled Model Intercomparison Project phase 5 (CMIP5) were used to project accumulated chill hours to 2065. Resultant maps of current and forecasted accumulated chill hours benefit orchard managers by detailing regions that are currently optimal for apple production and how those regions will shift with forecasted changes in climate.