

Application Form
2006-2007 TWRI Mills Scholarship Program

- 1. Name of Student:** Anna Marie Nordfelt

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3. Description of Proposed Research:

The North American Monsoon (NAM) is associated with a pronounced increase in precipitation in July and August that affects portions of Arizona, New Mexico, Colorado, Utah, Nevada, and California. As much as 50% of annual precipitation falls during monsoon season and so local economies are heavily dependent on its occurrence (Lo and Clark 2002). Gaining a better understanding of the NAM is very important for the southwestern United States because the population in this region is growing rapidly and this is exerting a strain on the existing water supply system. The primary goal of this research is to gain a better understanding of the relationship between land surface conditions (e.g., snowfall/snow cover, and soil moisture) and the strength and timing of monsoonal precipitation. Previous research has suggested that there is an inverse relationship between snowcover and the strength of the NAM (Ellis and Hawkins 2001; Lo and Clark 2002). Above (below) average snowfalls in winter and spring across Colorado and the portions of the southwestern United States have been shown to be associated with a weaker (stronger) NAM. Gridded snow cover and soil moisture data will be used to develop statistical models that define the relationship between the onset, intensity, and duration of the NAM and antecedent soil moisture and snowfall conditions. It is hoped that these models will provide an improved method for predicting the strength and timing of the NAM three to six months prior to the monsoon season. This would allow for the region to better plan for water availability. If the amount of precipitation in a monsoon season could be predicted then it may be possible to preserve water supply depending on whether the season will be drier or wetter than average. By having a deeper knowledge of the hydrological cycle in the southwestern United States, I will also be able to explore similar relationships that occur within Texas. Although Texas may not experience the same correlations between snowcover and monsoon precipitation as the southwestern United States, soil moisture plays a significant role in Texas' droughts. I plan to advance this research and apply it to the climate of Texas to improve drought forecasts and water planning.

References:

Ellis, A. W. and T. W. Hawkins (2001). "An apparent atmospheric teleconnection between snow cover and the North American monsoon." Geophysical Research Letters **28**(13): 2653-2656.

Lo, F. and M. P. Clark (2002). "Relationships between spring snow mass and summer precipitation in the southwestern United States associated with the North American monsoon system." Journal of Climate **15**(11): 1378-1385.

4. Proposed Use of Funds:

If I were to receive this award then I would use the funds to pay for conferences at which I plan to present my research (including the Annual Meeting of the American Meteorological Society in January 2007), including travel, lodging, and food. Secondly, I would use the funds to pay for books. Any remaining funds would go towards computer updates and programs that are an integral part of my research.

5. Intended Career Path:

After earning my master's in geography, but specializing in climatology, there are many options available to me. One option is that I may choose to continue my education and obtain a PhD in climatology. By taking this route I can further develop my previous research and possibly even become a college professor, where I will teach students who will enter the work force with a greater understanding of Texas' climate and the importance of water planning. Another option I may pursue is to work for a state or federal agency, like the Texas Water Development Board. My greatest interest is to study climatology, specifically water resources and the impact our growing populations have on current water supply. As the population of the entire state of Texas, and its urban areas, is projected to grow at a phenomenal rate, it becomes increasingly more important to plan water availability. Since Texas is a state that is dramatically affected by drought, more precise forecasts will prove necessary as water has to be evenly distributed to every community in the state. By applying my previous research of feedbacks that affect the hydrological cycle in Texas, I will be able to produce these necessary forecasts.