The Red River Basin is approximately 124,000 km² with about 80% of the basin within the U.S. border, while the remaining 20% lies within Manitoba, Canada (Red River Basin Commission, 2011). On the U.S. side, the RBB borders eastern North Dakota and western Minnesota, and 18 Minnesota counties and 22 North Dakota counties lie either entirely or partially in the basin (Red River Basin Commission, 2011). Agricultural economy is important and vibrant in the basin, 90% of the land use is for agricultural production (Red River Basin Decision Information Network, online). One-third of the basin’s population is approximately 247,000 people reside in Grand Forks-East Grand Forks and Fargo-Moorhead where jobs, education, financial and medical services and agribusiness are located, and the population and metropolitan size has increased in recent years (Red River Basin Commission, 2011; U.S. Census Bureau, 2015). The recent oil boom has witnessed rapid population growth and escalating housing demand in these metropolitan areas that have historically suffered from recurrent flooding events.

NASA Satellite-enhanced Snowmelt Flood Prediction Product

The NASA satellite-enhanced snowmelt flood predictions make use of NASA satellite instruments to improve flood predictions in the Red River basin of the North. These new sensor stems can monitor the amount of snow and soil water stored above and within the soil surface anywhere in the Red River basin. This information is sent to the trusted forecasters at the River Forecast Center who will use this information to make improved snowmelt flood predictions.

Through the use of NASA satellites and recent advancements in satellite technologies, flood forecasters are now able to receive satellite-transmitted signals that provide real time snow and soil water information for the entire Red River basin. This service has not been available to the River Forecast Center previously, which has led forecasters to rely on information from emergency managers and local weather stations that did not cover the entire river basin, was not adequate, or simply could not be made available when and where it was most needed.

Examples of the products delivered to the River Forecast Center are the snow water equivalent (SWE), soil moisture content and the onset of snowmelt throughout the basin. SWE is the depth of water that would result if one melted the entire snowpack instantly. This satellite service will provide the flood forecaster with up-to-date snow and soil information anywhere in the basin.

An example of this service is shown in the figure above which displays the maximum SWE across the Red River basin during this year’s spring season. The map also shows SWE information from field (dots) and airplane surveys (lines). Airplane and field surveys require a substantial amount of personnel and favorable weather conditions that can make them costly and dangerous. The satellite information covers the entire basin every day no matter the weather conditions.

Integration of this new satellite information into the river forecast model will improve snowmelt flood predictions in real-time operations. Improved flood predictions can reduce the loss of life and property damage for the citizens living in the Red River basin. Also, it uses resources more efficiently and reduces unnecessary cost.

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