SEBAL FOR WATER PRODUCTIVITY OF WHEAT IN YAQUI, MEXICO: A CASE STUDY

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Objective of the study
Due to a fast growing world population the pressure on water resources is increasing. In the future less water will be available for agriculture production, while on the other hand, food production must be increased to feed the growing population. It is inevitable that the production per unit water consumed, the water productivity (WP), must be increased to meet this challenge. Water productivity is defined for this purpose as the total marketable grain yield ($Y_{grain}$) divided by the total seasonal evapotranspiration ($ET_{seas}$). Spatial information on water use and water productivity will play a vital role for water managers to assess where scarce water resources are wasted. Currently, information on WP is often only available from experiments on a single point, which is limited to the local (environmental) conditions and specific soil, crop and water management. The combination of remote sensing and the SEBAL algorithm gives quantified spatial information on yield, water use and WP. The purpose of this paper is to show the conceptual framework and to it with field measurements. Also a comparison between irrigated systems in Mexico, Pakistan, China, Egypt, India is made.

Materials and Methods
The SEBAL model was applied for the Yaqui irrigation district during the 1999-2000 winter seasons. Yaqui is dominated by wheat during the winter season (more than 80 per cent of the total irrigated area) and is characterized by a homogeneous growing season. Thirteen NOAA-AVHRR images were used to calculate 10-daily and seasonal ET and biomass production for pixels of 1x1 km. These results were downscaled to field level with high resolution SEBAL generated ET and biomass production of three Landsat images (path/row 34/41), acquired on January 25, February 26 and April 24.

An energy balance flux campaign was held at the same time, including eddy correlation and scintollemeter measurements. Wheat yield data has been collected from farmer’s fields.