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THE RELATIONSHIP BETWEEN A SIMPLIFIED WATER BALANCE AND TOTAL SOIL WATER STORAGE IN SOUTH AMERICAN BASINS

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Global changes, as in land use and climate, impact the water balance, and managing this natural resource is key to obtain better crop yields and reduce waste. Improvements in environmental forecasting models are constant and every day they get more complex, still, even a simple model has its uses, like the water balance of Thornthwaite and Mather that represents in a minimalistic way how water interacts within the superficial soil layer, and although its simplicity it's used until today in practical applications. The simplifications include that the only way water enters into the system is through rainfall and exits, mostly through evapotranspiration. The meteorological data needed is only precipitation and temperature, the latter one is used to estimate the evapotranspiration. Although GRACE satellite measures the anomaly of the total water storage, this means all the water from the surface to the deepest aquifers, a relationship with the upper layer is expected. This study focused on data ranging from all GRACE mission, 2002 to 2017, on the major South American basins. The water balance used NOAA CPC precipitation and NCEP/NCAR temperature reanalysis data, soil water holding capacity comes from the most recent ISRIC database. The 2 biggest ones are the Amazon Basin with ~5.970.775 km2 and La Plata Basin with ~3.016.800 km2, both with huge significance in food and water safety and environmental concerns. For the Amazon Basin the model was able to represent well the dry periods, but underestimated the intensity of the wet periods, showing signs of saturated soil. The response between the upper layer to the aquifer had approximately 1 month of lag, providing a great decision support tool to help manage water stress, prior to a drought period. The model for La Plata basin represented well the variability until 2013, after that there's a clear signal of prolonged positive anomalies on the total water storage, on this basin the response between the upper layer to aquifer was immediate. In conclusion, the model showed important results when compared to remote sensing, even with its limitations, it can be used as a decision support tool to monitor and predict the soil water content. Climatempo's own farmers decision support tool AgroclimaPró is using the model with observed data and weather forecast to monitor and predict the soil water changes.