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In 2024, Europe experienced precipitation levels that were generally above the climatological mean, with ~30% of the continental land area showing annual totals exceeding long-term averages. We examine the precipitation anomalies from GLDAS NOAH across Europe in 2024 and observe a clear and pronounced longitudinal gradient. Western Europe experienced one of its wettest years with widespread positive precipitation anomalies. Conversely, eastern Europe is characterized by predominantly negative precipitation anomalies. Notably, eastern Ukraine and portions of southwestern Russia experienced their driest year since 2000. We also analyze the evapotranspiration (ET) data from GLDAS NOAH and observe that the east-west contrast is not as pronounced in ET. We use the GRACE-FO mascon solutions from JPL, CSR and GSFC to show that the clear east-west contrast in precipitation is translated into a similar spatial pattern in

Terrestrial water Storage (TWS) change. Moreover, the temporal evolution of basin-averaged GRACE-FO TWS over western Europe clearly reveals a wet summer condition unlike previous years. To better understand this exceptional hydrologic condition, we further investigate the water budget equation for eastern and western Europe, and also analyze the spatio-temporal behavior of soil moisture and snow water equivalent (from GLDAS NOAH). The latter enables

us to detect the water storage component mostly impacted by this exceptional hydrologic condition. GRACE-FO observations of TWS provide a unique dataset for understanding and quantifying this east-west contrast in Europe's hydrologic conditions, which can be used for water resources management purposes.

Meeting homepage

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