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Change in water discharge and sediment load on the Loess Plateau, China

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Over the past 50 years, a series of soil and water conservation measures have been implemented on the Loess Plateau, including biological, engineering, and agricultural measures. As a result, water discharge and sediment load on the plateau have undergone significant changes. In this study, we compared the water discharge and sediment load at more than 100 hydrological stations across the Loess Plateau during the period 2008–2016 (P2) with the water discharge and sediment load during the period 1971–1987 (P1), and detected the main sources of sediment in each of the two periods. We then performed an attribution analysis to quantify the influence of different factors on the changes in sediment load. We found the following results: (1) Water discharge was reduced by 22% in P2 compared with P1, whereas the sediment load was reduced by 74%. (2) Sediment resources are mainly concentrated between Toudaoguai and Tongguan stations: this region contributed more than 88% of the total sediment load at the terminal station (Huayuankou station) in both P1 and P2. (3) When considering only the changes in sediment concentration on the Loess Plateau, we conclude that the contribution of human activities was greater than 72%. This study provides a detailed description of the temporal and spatial variations in water and sediment across the Loess Plateau, providing a reliable reference for the future development of ecological soil and water conservation measures on the Loess Plateau.