

Weekly Report – May 10, 2024
Cooperative Institute for Satellite Earth System Studies (CISESS)
NOAA/NESDIS/STAR

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PUBLICATIONS

Satellite Data Reveals the Breaching of Ukraine’s Kakhovka Dam

Citation: Yang, Qing, Xinyi Shen, Kang He, **Qingyuan Zhang**, Sean Helfrich, William Straka III, Josef M. Kellendorfer, and Emmanouil N. Anagnostou, 2024: Pre-failure operational anomalies of the Kakhovka Dam revealed by satellite data. *Commun. Earth Environ.*, **5**, 230, <https://doi.org/10.1038/s43247-024-01397-5>.

Summary: CISESS Scientist Qingyuan Zhang and members of the NOAA STAR Flood Team have published a paper entitled “Pre-failure operational anomalies of the Kakhovka Dam revealed by satellite data” in the journal *Communications Earth & Environment*. On 6 June 2023, the Kakhovka Dam in Ukraine experienced a catastrophic breach that led to the loss of life and substantial economic damage. Prior to this breach, supporting structures downstream of the spillway had shown signs of being compromised. The authors used multi-source satellite data, meteorological reanalysis, and dam design criteria to document the dam’s pre-failure conditions. Anomalous operation of the Kakhovka Dam began in November 2022, following the destruction of a bridge segment, which led to persistent overtopping from late April 2023 up to the catastrophic breach on 6 June 2023, contributing to the erosion of the spillway foundation. The findings presented in this paper highlight safety and risk-reduction measures pivotal in avoiding such scenarios. To help prevent future disasters, greater transparency in the design parameters of key water structures to enable risk management is advocated, concluding that remote sensing technology can help ensure water infrastructure safety. The Planet images in the accompanying figure illuminate spillway activation from 10 November 2022 to 4 June 2023.

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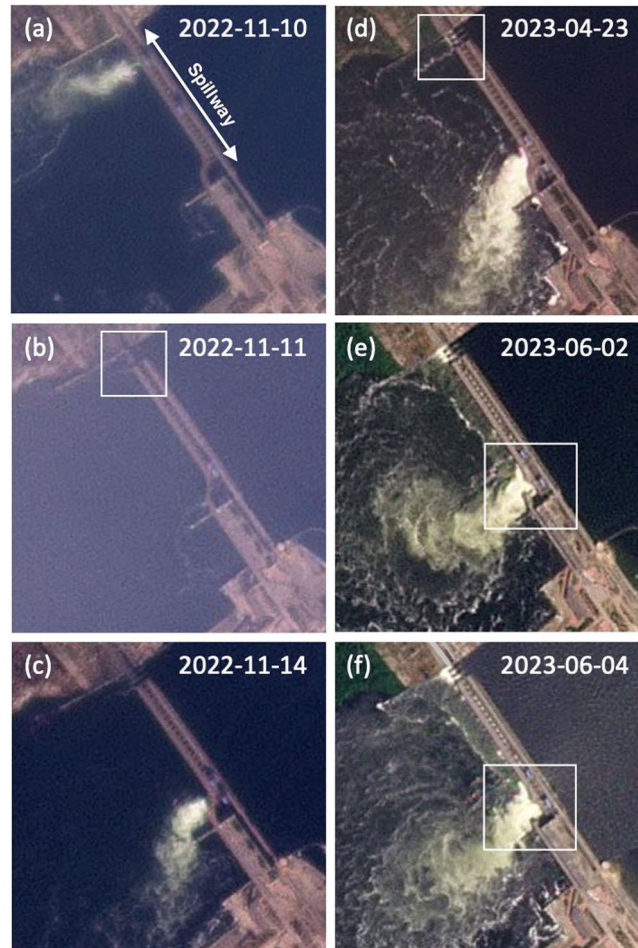


Figure: Monitoring of spillway activation on key dates illustrated through Planet images. (a) Before and (b) after bridge damage near the right bank of the spillway on 11 November 2022. (c) Small portion of the spillway activated on 14 November 2022. (d) The spillway structure started overtopping on 23 April 2023. (e) The bridge near the left bank began to show signs of compromise on 2 June 2023. (f) Additional parts were missing by 4 June 2023. The white polygons represent the focus areas of anomaly events. The white arrow in (a) indicates the extent of the spillway structure.

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