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High frequency turbidity and discharge measurements in two freshwater agricultural streams in Illinois

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Metadata for Six Mile and Money Creeks water parameters data

Money Creek (181.07 km^2) and Six Mile Creek (109.96 km^2) watersheds are situated in Illinois, USA. Data collection stations are located on the bridges over the corresponding creek: 40°36'19.1"N 89°00'10.9"W (Six Mile Creek) and 40°36'19.1"N 88°53'54.4"W (Money Creek). Acquired data include turbidity, discharges, water level, water temperature and rain amount measurements, as well as moon phase information.

Table 1. General data description

Title of dataset	High frequency turbidity and discharge measurements in two freshwater agricultural streams in Illinois
Abstract	The study area encompasses the Money Creek and Six Mile Creek watersheds in Illinois, USA, which are used for corn and soybean production and drain into drinking water reservoirs for the City of Bloomington. Two study sites have stations that continuously measured stage, turbidity, water temperature, and precipitation amounts at 15-minute intervals from April 2016 to February 2023. This dataset contains the collected data.
Keywords	turbidity, discharge, water level, 15-min data, high-frequency measurements
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Usage Rights	Publicly available and free to use
Geographic region	McLean County, Illinois – Six Mile Creek (40°36'19.1"N 89°00'10.9"W) and Money Creek (40°36'19.1"N 88°53'54.4"W) survey stations
Geographic coverage	Coverage of the data set is bounded by station location
Temporal coverage	from 4-Apr-2016 to 16-Feb-2023 for Six Mile Creek and from 1-Jan-2017 to 16-Feb-2023 for Money Creek
General study design and relevant data	Money (MC) and Six Mile (SMC) Creeks are the main tributaries to Lake Bloomington and Evergreen Lake, which are public drinking water supplies for the City of Bloomington. Both lake watersheds fall within the Mackinaw River Hydrological Unit

	Code-8 basin (07130004), which is a tributary to the Illinois River. The Illinois River is one of the five main tributaries of the Mississippi River. Watersheds of Money and Six Mile Creeks basins are dominated, >75%, by row crop agriculture. Major crops that are cultivated are corn and soybean which each accounted for 38 to 41% of Money and Six Mile watersheds combined over the study period. Two study sites have stations that continuously measured stage, turbidity, water temperature, and precipitation amount on a 15-minute interval from April 2016 (SMC)/January 2017 (MC) to February 2023.
Laboratory, field, or other analytical methods	Both study sites have a SDI-12 Submersible Pressure Transducer and a DTS-12 turbidity sensor (Forest Technology Systems, Inc) installed. The DTS-12 sensor was sent in annually for calibration. It can capture an optical reading between 0 and 1,600 NTU with an accuracy of ± 2% of reading for 0-399 NTU range and an accuracy of ± 4% of reading for 400-1,600 NTU range at a 0.01 NTU resolution (FTS DTS-12 User Manual). The SDI-12 Submersible Pressure Transducer can capture pressure data between 0 and 274 m in the water column with an accuracy of ± 0.1% and can collect water temperature within ± 0.3°C (FTS SDI-12 User Manual). The SDI-12 Submersible Pressure Transducer and DTS-12 sensors collected turbidity, stage, and water temperature data continuously on a 15-minute interval from January 2017 to February 2023 at both creeks locations. The data are stored on an FTS Axiom data logger and transmitted to a lab computer via 4G wireless connection. Water discharge values (cub m • s^{-1}) were obtained from water level measurements using the following equation: discharge_cms = 5.2987 * level_m^2.1566 Moon phase data was acquired using the 'suncalc' package for R, which provides daily data on the illuminated fraction of the moon for the specified geographic location. These values were interpreted to determine the moon phases categorically based on the package manual, with slight modifications made to include values for new moon and full moon phases (Table 4).
Quality control	Turbidity sensor was annually sent to the manufacturer for calibration.

Table 2. Description of the variables (i.e., columns) in the "Six Mile_Money_Creeks_Data.csv" dataset

Column name	Definition	Units
datetime	Date and time info. Date-time format: mm/dd/yyyy hh:mm:ss	-
date	Date info. Date format: mm/dd/yyyy	-
year	Year info. Date format: yyyy	-
month	Month (numeric from 1 to 12)	-
site	Site location: smc = Six Mile Creek, mc = Money Creek	-
turbidity_ntu	Turbidity measurements	NTU
discharge_cms*	Discharge measurements	cub m per second
discharge_cfs	Discharge measurements	cub feet per second
w_temp_c	Water temperature	degrees Celsius
w_temp_f	Water temperature	degrees Fahrenheit
level_m	Water level	meters
level_ft	Water level	feet
rain_cumm_mm	Cumulative precipitation amount	mm
rain_cumm_in	Cumulative precipitation amount	inches

rain_15min_mm	15 minute precipitation amount data	mm
rain_15min_in	15 minute precipitation amount data	inches

*discharge_cms = 5.2987 * level_m^2.1566

Table 3. Description of the variables (i.e., columns) in the "Lunar_Phases.csv" dataset

Column name	Definition	Units
date	Date info. Data format: mm/dd/yyyy	-
fraction	Daily data for illuminated fraction of the moon. Varies from 0.0 (new moon) to 1.0 (full moon).	ratio
phase	Moon phase: numeric. Varies from 0.0 to 1.0, interpretation is described in the Table 4.	-
angle	Moon angle: numeric. Midpoint angle in radians of the illuminated limb of the moon reckoned eastward from the north point of the disk; the moon is waxing if the angle is negative, and waning if positive.	-
lunar.phase	Moon phase, categorical: names of four lunar phases.	-
lunar.phase2	Moon phase, categorical: names of six lunar phases including new moon and full moon.	-

Table 4. Moon phases images, names and associated values representing the illuminated fraction of the moon. Values vary from 0.0 (new moon) to 1.0 (full moon).

Pic[1]	phase	values
	new moon	0.95–1 & 0–0.05
	waxing crescent	0.05–0.25
	waxing gibbous	0.25–0.45
	full moon	0.45–0.55
	waning gibbous	0.55–0.75
	waning crescent	0.75–0.95

[1] Pictograms represent moon phases how they are seen in the Northern hemisphere, where Money and Six Mile Creeks are located