MONITORING AND CONTROL LABORATORIES

Xylem Environmental Global Dealer Workshop
New Orleans 2025

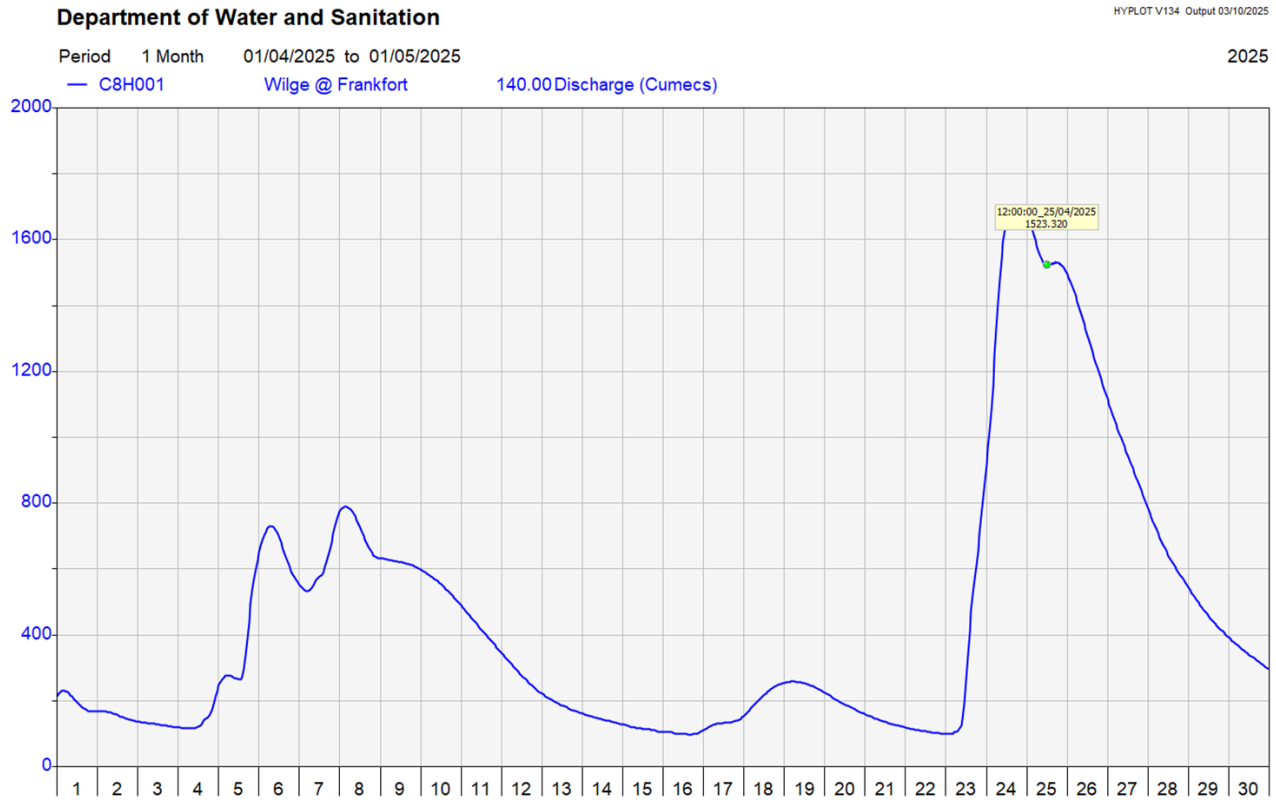
PRESENTED BY PETER WIGZELL

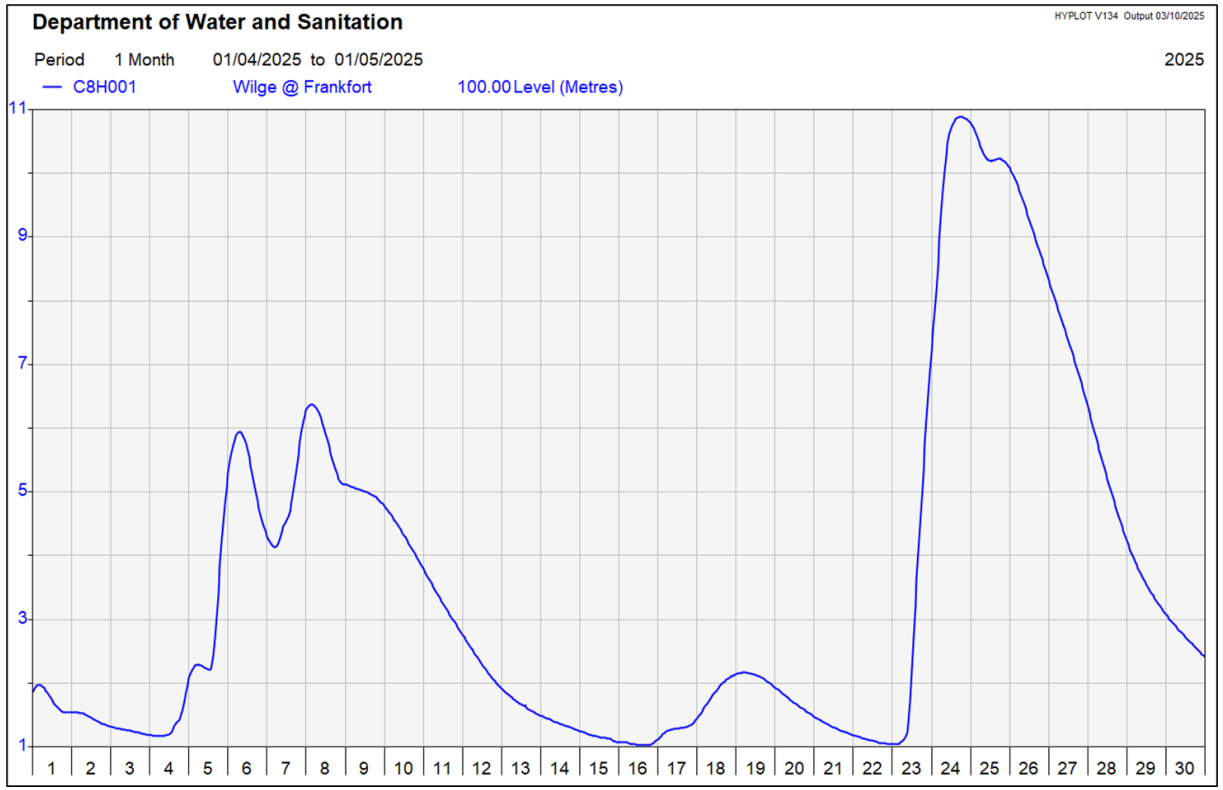
WITH A LOT OF HELP FROM MY FRIENDS

SONTEK M9 AND SURFBEE FLOW SEEKER

SOMMER RQ30

2025 FLOODS SOUTH AFRICA





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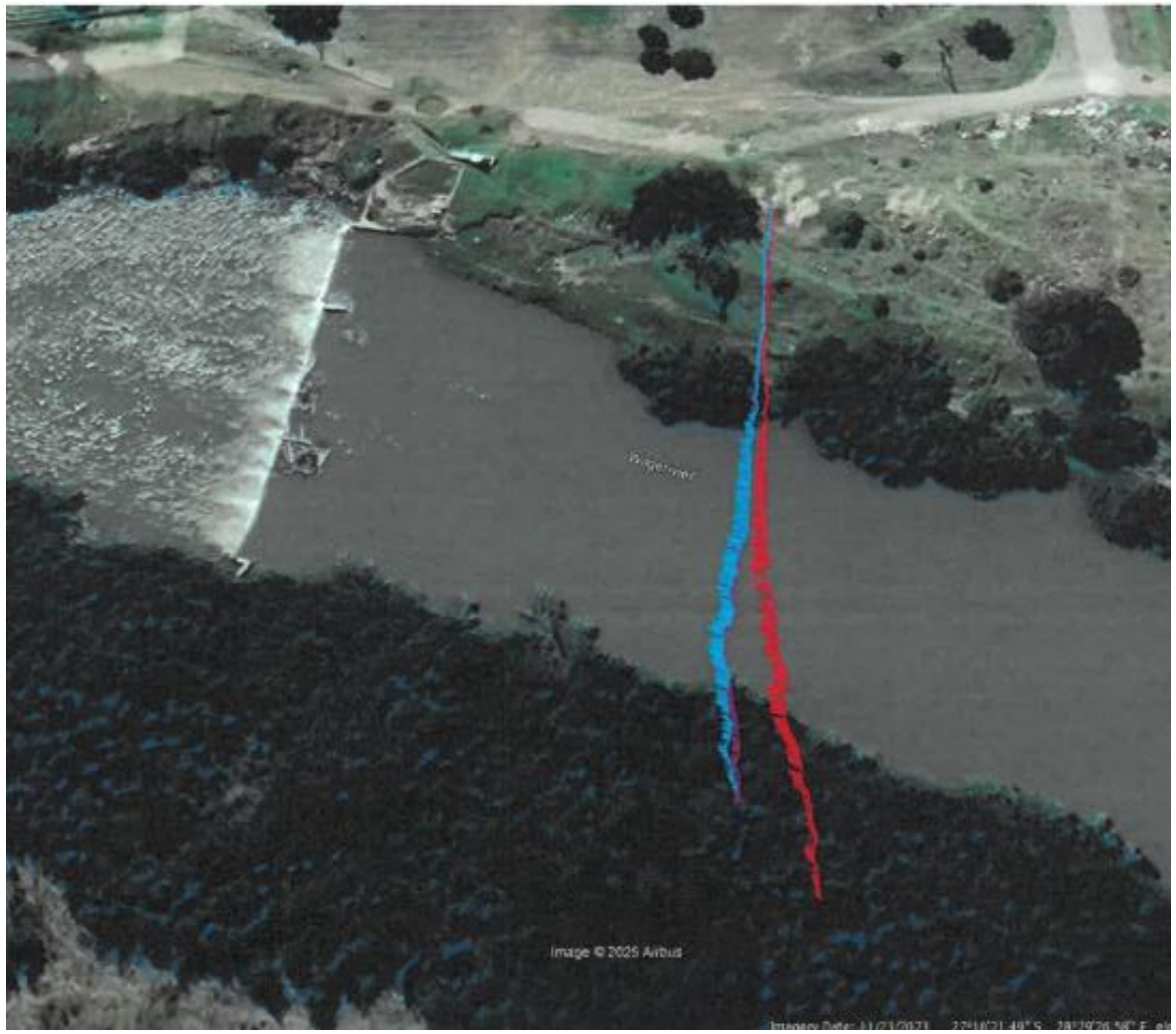

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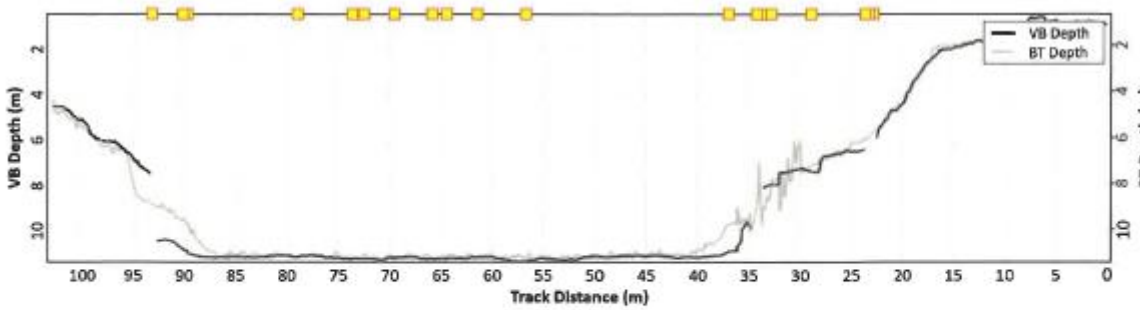
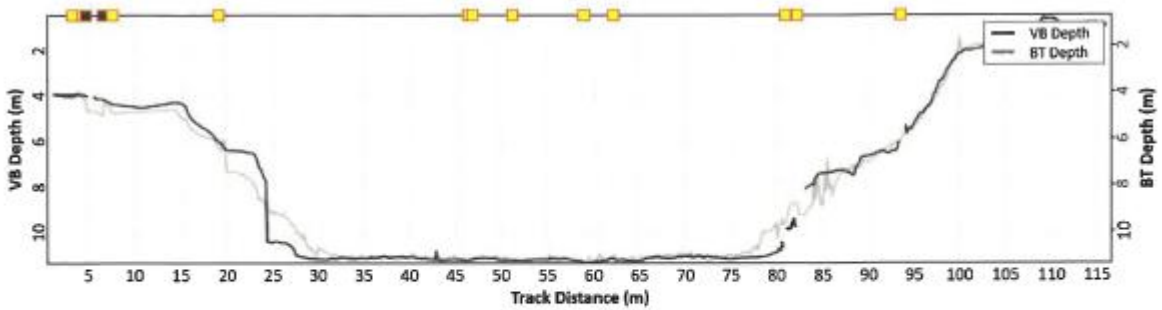
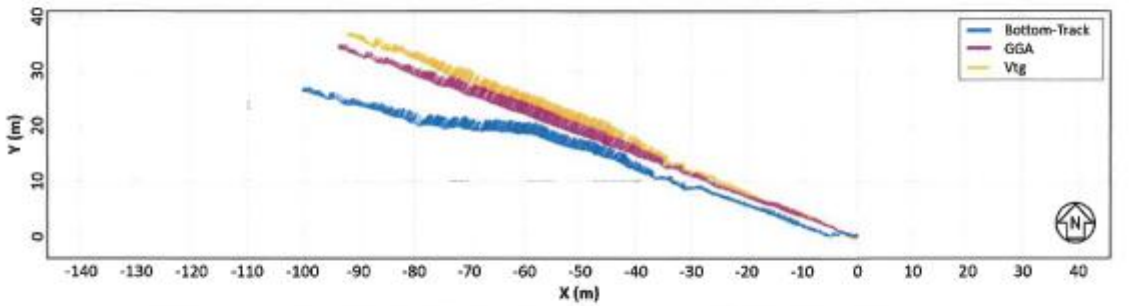
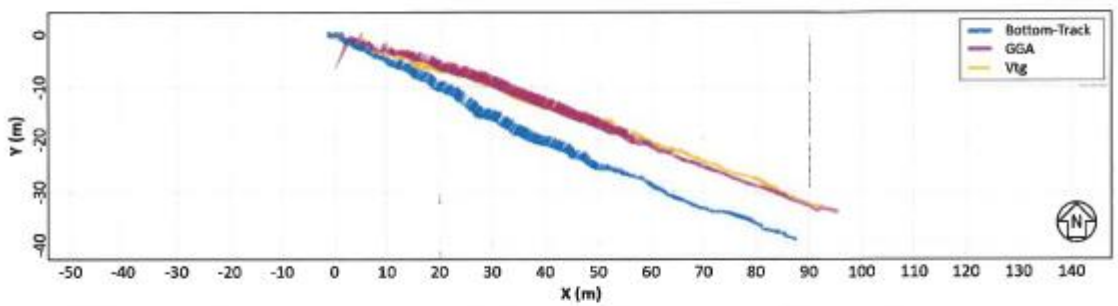
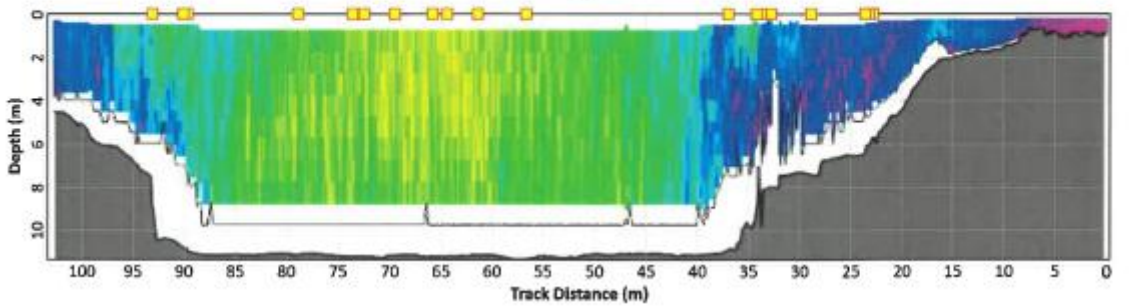
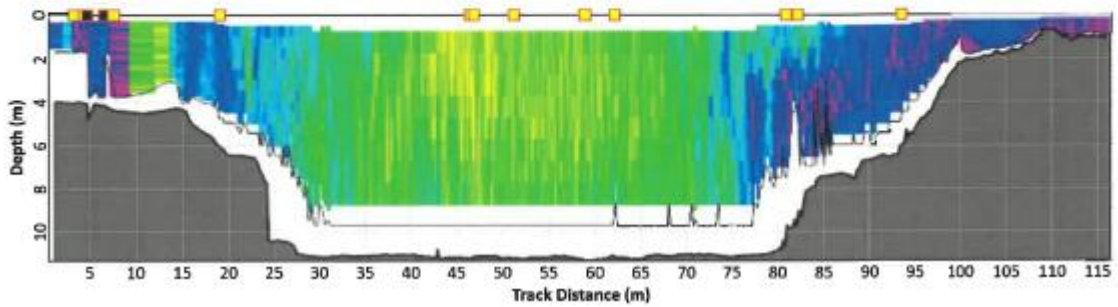












Discharge Measurement Summary

Date Measured: 2025-04-25

Site Information

Site Name	Wilge at Frankfort
Station Number	C8H001
Location	Frankfort
Gauge Height	

Measurement Information

Operator	DWS FS
Vessel	Surfbee M9
Measurement Number	1

System Information

Instrument Type	RS
Instrument Sub-Type	M9
Serial Number	3752
Firmware Version	4.10

System Setup

Transducer Depth (m)	0.062
Screening Distance (m)	0
Salinity (PSS-78)	0
Magnetic Declination (deg)	-22.3*

Units

Distance	m
Velocity	m/s
Area	m^2
Discharge	m^3/s
Temperature	°C

Discharge Calculation Settings

Track Reference	GGA	Left Method	Slope
Depth Reference	Vertical Beam	Right Method	Slope
Coordinate System	ENU	Top Fit Type	Constant
Moving Bed Correction	None	Bottom Fit Type	No Slip

Discharge Results

Width (m)	122.686
Area (m^2)	816.803
	11
Mean Depth (m)	6.658
Mean Speed (m/s)	1.6788
Total Q (m^3/s)	1370.45
	67
Max Depth (m)	11.315
Max Speed (m/s)	4.8177

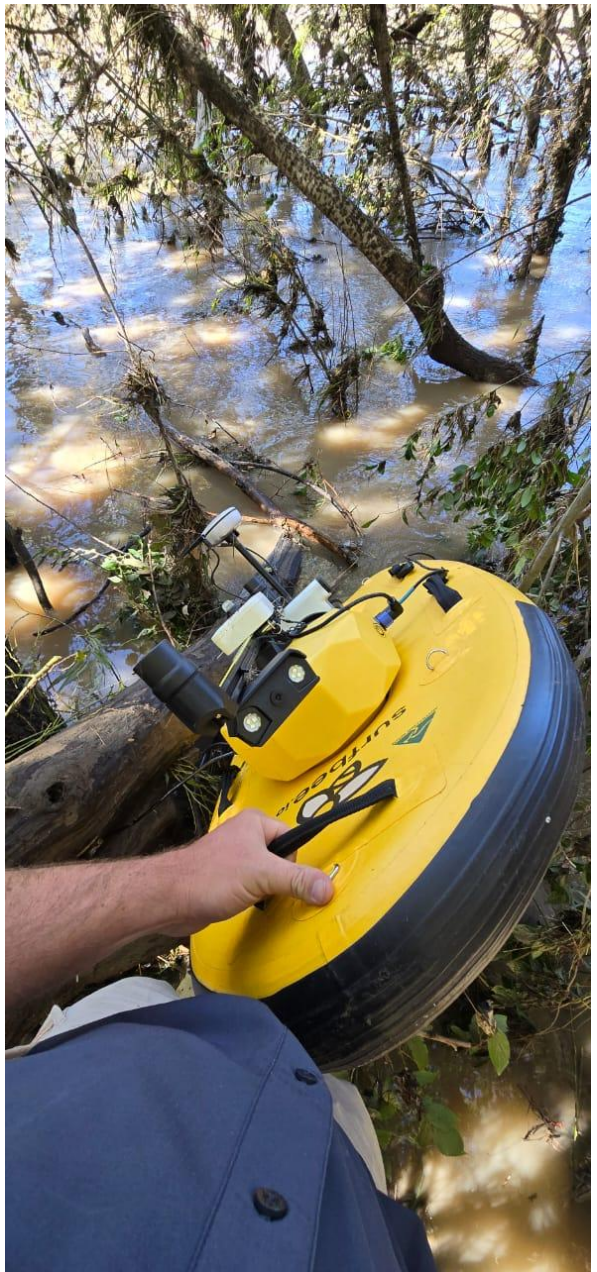
Measurement Results

Tr #			Duration	Track Distance (m)	DMG (m)	Width (m)	Area (m^2)	Boat Speed (m/s)	Mean Speed (m/s)	Left Q (m^3/s)	Right Q (m^3/s)	Top Q (m^3/s)	Bottom Q (m^3/s)	Middle Q (m^3/s)	Total Q (m^3/s)	Total Q Corrected (m^3/s)	% Measured
01	L	12:25:30	00:09:31	116.38	96.055	121.055	822.68643	0.2038	1.622	4.9103	1.5735	87.1728	205.0934	1035.6711	1334.421		77.61
02	R	12:35:13	00:09:10	104.541	98.96	123.96	829.06958	0.1901	1.6877	14.9103	0.5289	90.2235	218.6992	1074.8438	1399.2057		76.82
03	L	12:44:33	00:06:57	158.116	97.129	122.129	780.20683	0.3792	1.7488	14.2524	0	88.4044	205.9503	1054.8726	1364.4597		77.31
04	R	12:57:06	00:09:29	105.783	98.603	123.603	835.24959	0.1859	1.6567	18.8536	0.8105	89.6501	210.9118	1063.5145	1383.7404		76.86
Mean				121.205	97.686	122.686	816.80311	0.2397	1.6788	13.2257	0.7282	88.8627	210.4137	1057.2255	1370.4567	0	77.15
Std Dev				21.802	1.166	1.166	21.59074	0.0808	0.0466	5.1154	0.5682	1.1786	5.2249	14.3186	24.1738	0	0.33
COV				0.180	0.012	0.010	0.026	0.337	0.028	0.387	0.780	0.013	0.025	0.014	0.018	0.000	0.004

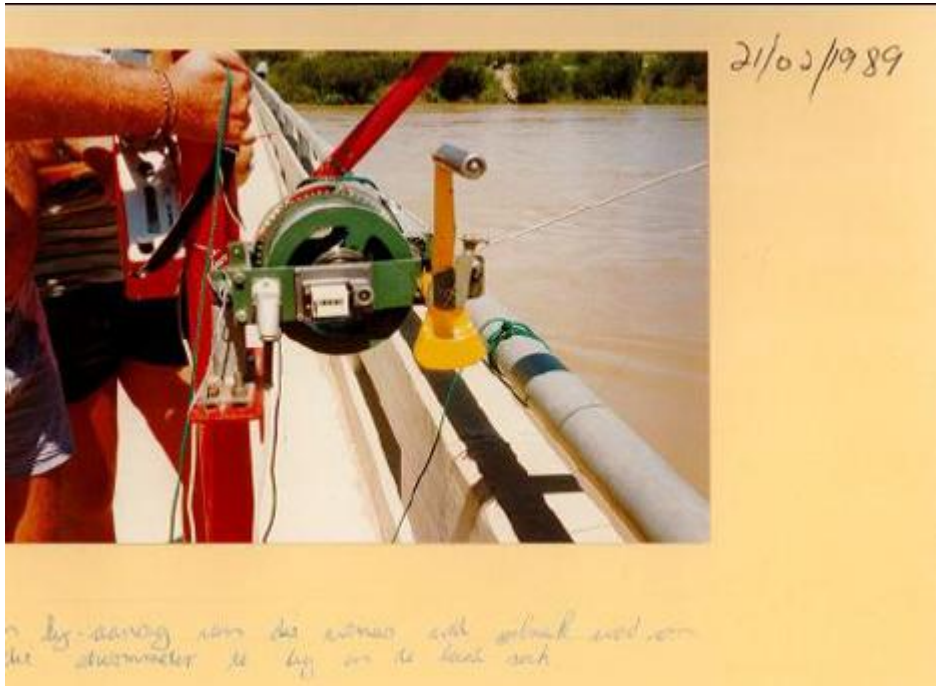
SEARCH AND RECOVERY

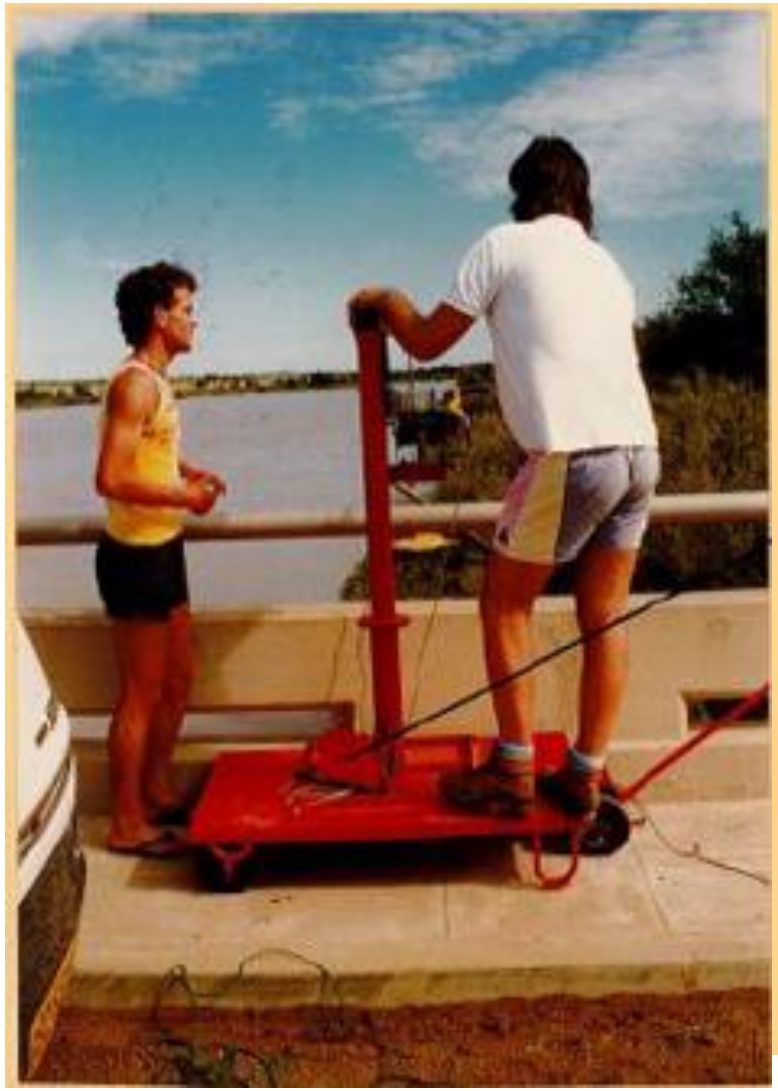
THE AFTERMATH

THREE DAYS LATER AND THE BEE REEMERGES ALMOST UNSCATHED



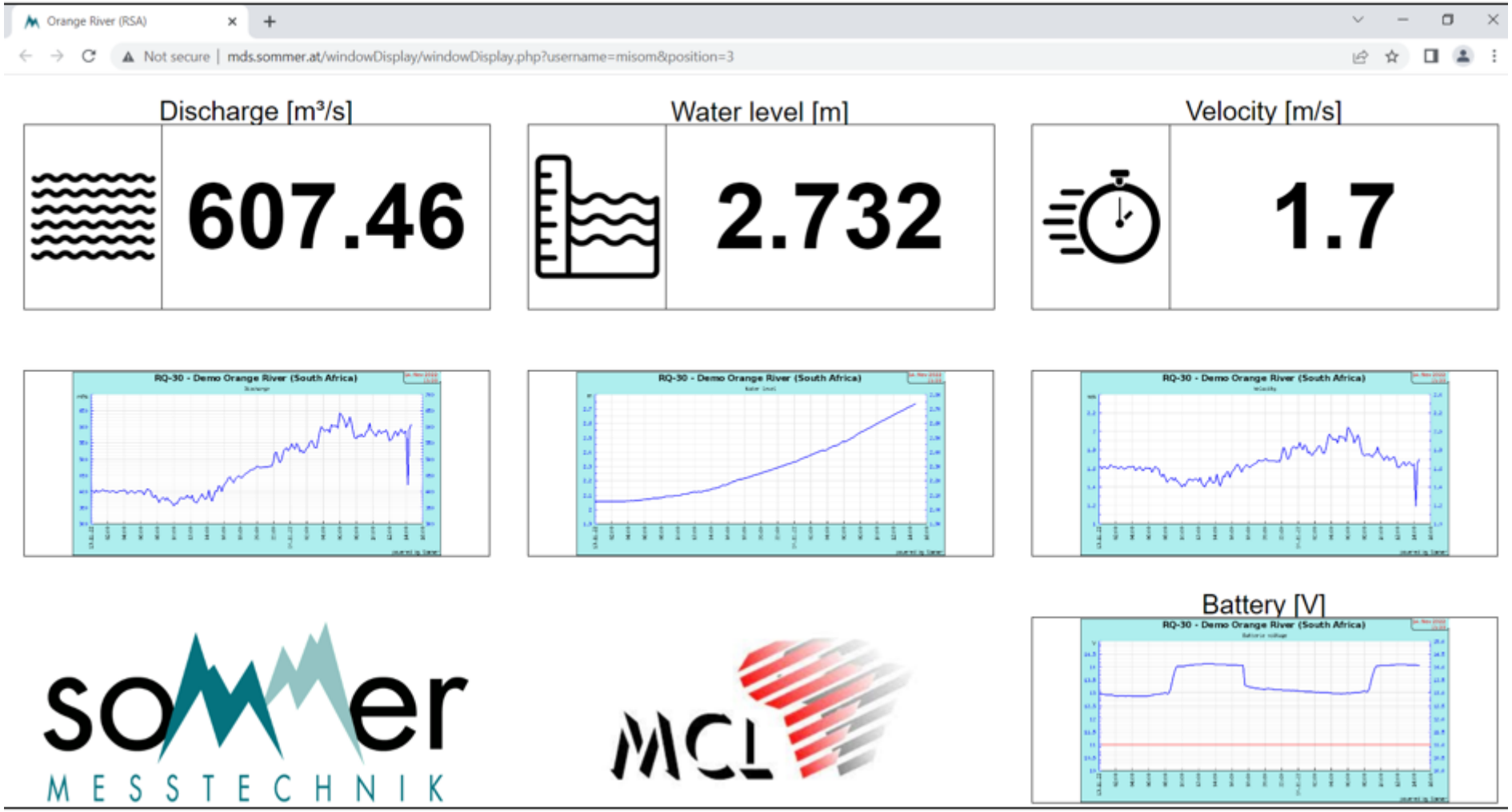
AND WHILE ALL THAT WAS GOING ON….





IF ONLY THEY KNEW WHAT WAS COMING IN THE 21ST CENTURY.

SOMMER MDS LIVE WEB DATA



GRAPHS OF THE RQ DATA

Discharge Measurement Summary

Date Measured: Tuesday, February 28, 2023

Site Information	
Site Name	Orange River at Fluitjieskraal
Station Number	D3H016
Location	Upstream of the bridge

Measurement Information	
Party	FS01
Boat/Motor	Trimaran
Meas. Number	001

System Information	
System Type	RS-M9
Serial Number	765
Firmware Version	4.10
Software Version	4.0

System Setup	
Transducer Depth (m)	0.10
Screening Distance (m)	0.26
Salinity (ppt)	0.0
Magnetic Declination (deg)	-23.5

Units	
Distance	m
Velocity	m/s
Area	m2
Discharge	m3/s
Temperature	degC

Discharge Calculation Settings			
Track Reference	GPS-GGA	Left Method	Sloped Bank
Depth Reference	Vertical Beam	Right Method	Sloped Bank
Coordinate System	ENU	Top Fit Type	Power Fit
		Bottom Fit Type	Power Fit
		Start Gauge Height (m)	0.00
		End Gauge Height (m)	0.00

Discharge Results	
Width (m)	214.723
Area (m2)	835.358
Mean Speed (m/s)	1.594
Total Q (m3/s)	1,331.748
Maximum Measured Depth	4.486
Maximum Measured Speed	2.479

Measurement Results

Tr #		Time	Duration	Temp.	Distance Track	DMG	Width	Area	Mean Vel Boat	Water	Discharge Left	Right	Top	Middle	Bottom	Total	MBTotal	% Measured
1	L	3:37:14 PM	0:06:30	23.8	217.25	201.67	214.675	827.661	0.557	1.608	3.73	1.36	167.72	977.76	180.17	1,330.738	--	73.5
2	R	3:43:52 PM	0:10:01	23.5	226.72	201.79	214.789	837.095	0.377	1.607	3.67	1.50	168.66	983.14	188.02	1,344.992	--	73.1
3	L	3:54:02 PM	0:07:00	23.4	214.78	201.65	214.652	832.245	0.511	1.589	3.41	1.64	166.23	971.29	179.98	1,322.553	--	73.4
4	R	4:01:37 PM	0:11:41	23.2	251.02	201.11	214.114	833.772	0.358	1.611	3.63	1.73	169.38	983.42	184.87	1,343.031	--	73.2
5	L	4:13:54 PM	0:06:46	23.2	209.03	201.97	214.966	840.755	0.515	1.579	3.54	1.02	165.25	977.59	180.41	1,327.809	--	73.6
6	R	4:20:45 PM	0:07:28	23.1	220.21	202.14	215.142	840.619	0.492	1.572	3.41	1.37	165.17	970.81	180.61	1,321.367	--	73.5
		Mean		23.4	223.17	201.72	214.723	835.358	0.468	1.594	3.56	1.44	167.07	977.33	182.35	1,331.748	0.000	73.4
		Std Dev		0.2	13.56	0.32	0.321	4.677	0.074	0.015	0.13	0.23	1.63	5.00	3.05	9.233	0.000	0.2
		COV		0.0	0.061	0.002	0.001	0.006	0.158	0.009	0.035	0.160	0.010	0.005	0.017	0.007	0.000	0.002

Exposure Time: 0:49:26

Tr1=20230228153713.riv; Tr2=20230228154352.riv; Tr3=20230228155402.riv; Tr4=20230228160136.riv; Tr5=20230228161353.riv; Tr6=20230228162045.riv;

ADCP

RQ-30

	Water level m	Velocity m/s	Quality (SNR) -	Discharge mÂ³/s	Area mÂ²	Learned velocity m/s	Learned dischar. mÂ³/s	Opposite direct. %	Self check -	Batterie voltage V	Solar voltage V	CSQ -
28/02/2023 15:36	4.463	1.97	57.85	1283.52	758.11	1.98	1292.32	11	4	13.92	18.09	22.4
28/02/2023 15:48	4.459	1.91	57.75	1245.58	756.89	1.98	1289.38	8	4	13.92	18.17	23.5
28/02/2023 16:00	4.459	1.96	48.75	1273.74	757.1	1.98	1287.91	27	4	13.5	13.91	23.3
28/02/2023 16:12	4.455	1.86	35.6	1204.24	756.49	1.98	1285.9	140	4	13.92	16.58	22.2
28/02/2023 16:24	4.453	1.45	49.85	938.05	755.88	1.97	1277.57	24	4	13.92	17.35	22.4
Average	4.4578	1.83	49.96	1189.026	756.894	1.978	1286.616	42	4	13.836	16.82	22.76

Result

ADCP: 1331.748 m³/s

RQ-30 (measured): 1189.026 m³/s Difference: 142.7 m³/s ➔ **10.7%**

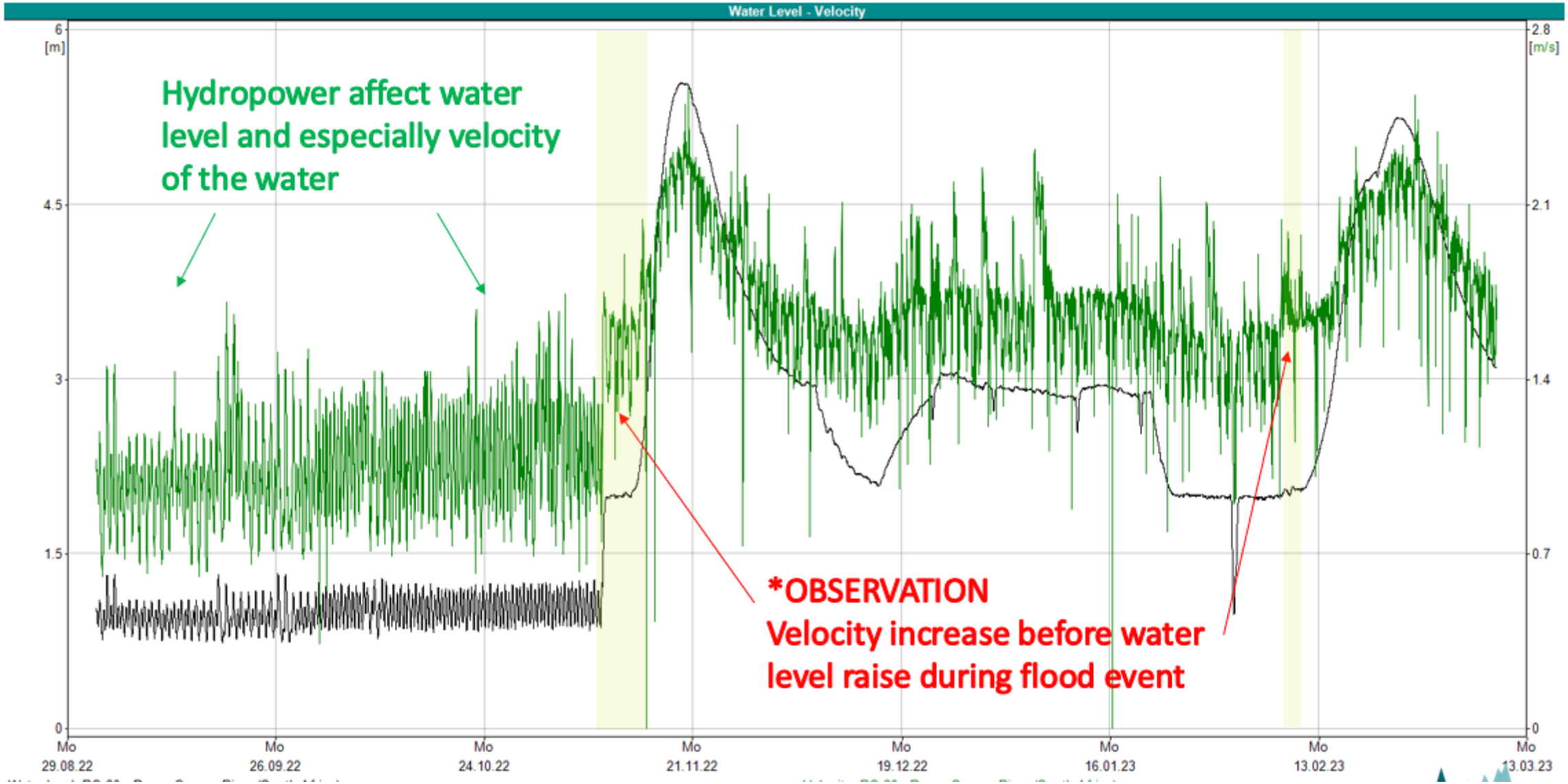
RQ-30 (learned): 1286.616 m³/s Difference : 45.1 m³/s ➔ **3.4%**

RATED STATION VS M9 ADCP VS RQ30 RADAR

Peak discharge and percentage difference vs D3H012								
D3H012: Discharge (m^3/s)	RQ30: Discharge (m^3/s)	Difference (%)	RQ30: Learned Discharge (m^3/s)	Difference (%)	ADCP: Discharge (m^3/s)	Difference (%)	ADCP: Discharge (m^3/s)	Difference (%)
918.872	1,201.99	24%	1,105.23	17%	1,160.524	21%	1,169.247	21%

D3H016 – Vluytjeskraal: RQ30 discharge and percentage difference vs ADCP				
ADCP: Discharge (m^3/s)	RQ30: Discharge (m^3/s)	Difference (%)	RQ30: Learned Discharge (m^3/s)	Difference (%)
1,160.524	1,201.99	3%		
1,169.247			1,105.23	-6%

WHAT WE HAVE LEARNED FROM REAL LIFE EXPERIENCE



*** As confirmed by NOAA research, RQ-30 can detect floods earlier compared to water level stations:** https://eos.org/editors-vox/in-pursuit-of-flash-flood-data

THANK YOU