

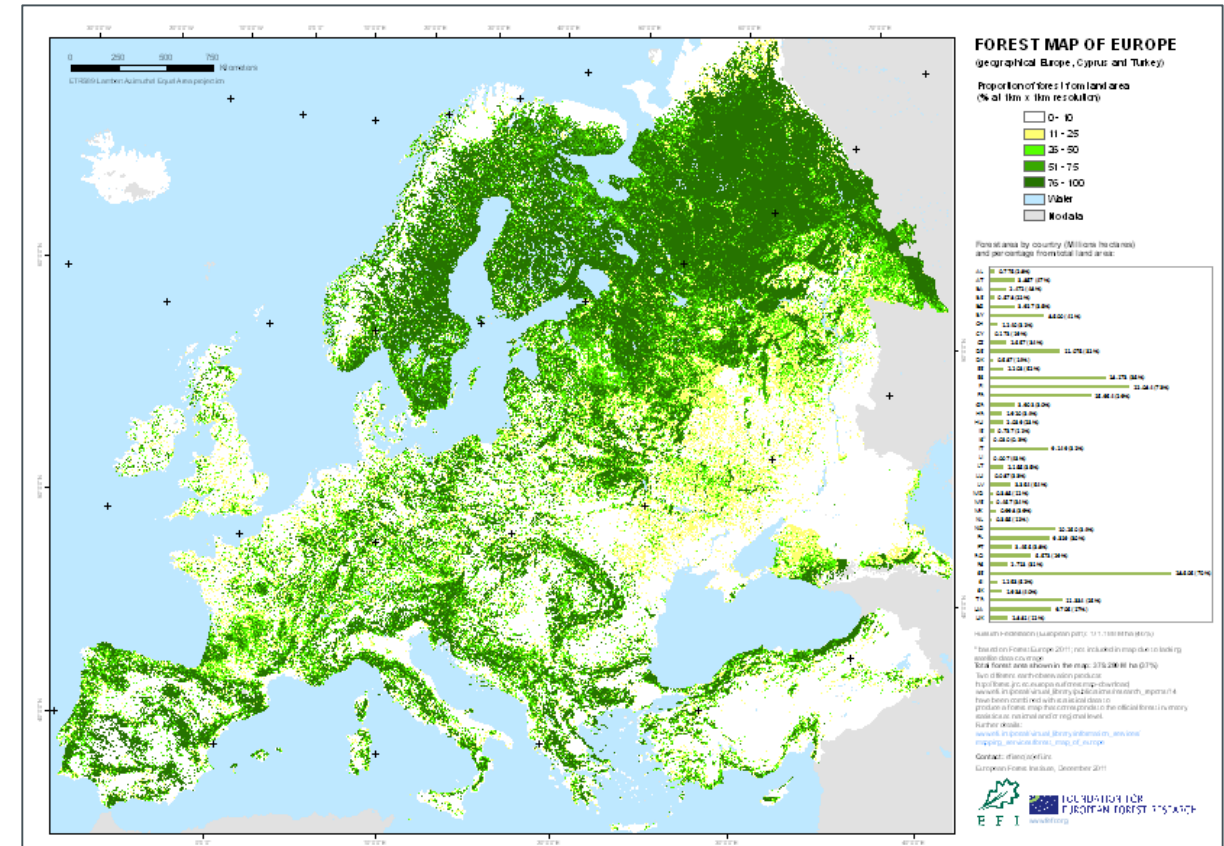
DETECTION OF FOREST WINDTHROW AREAS BY UNMANNED AIRCRAFT SYSTEM WITH RTK

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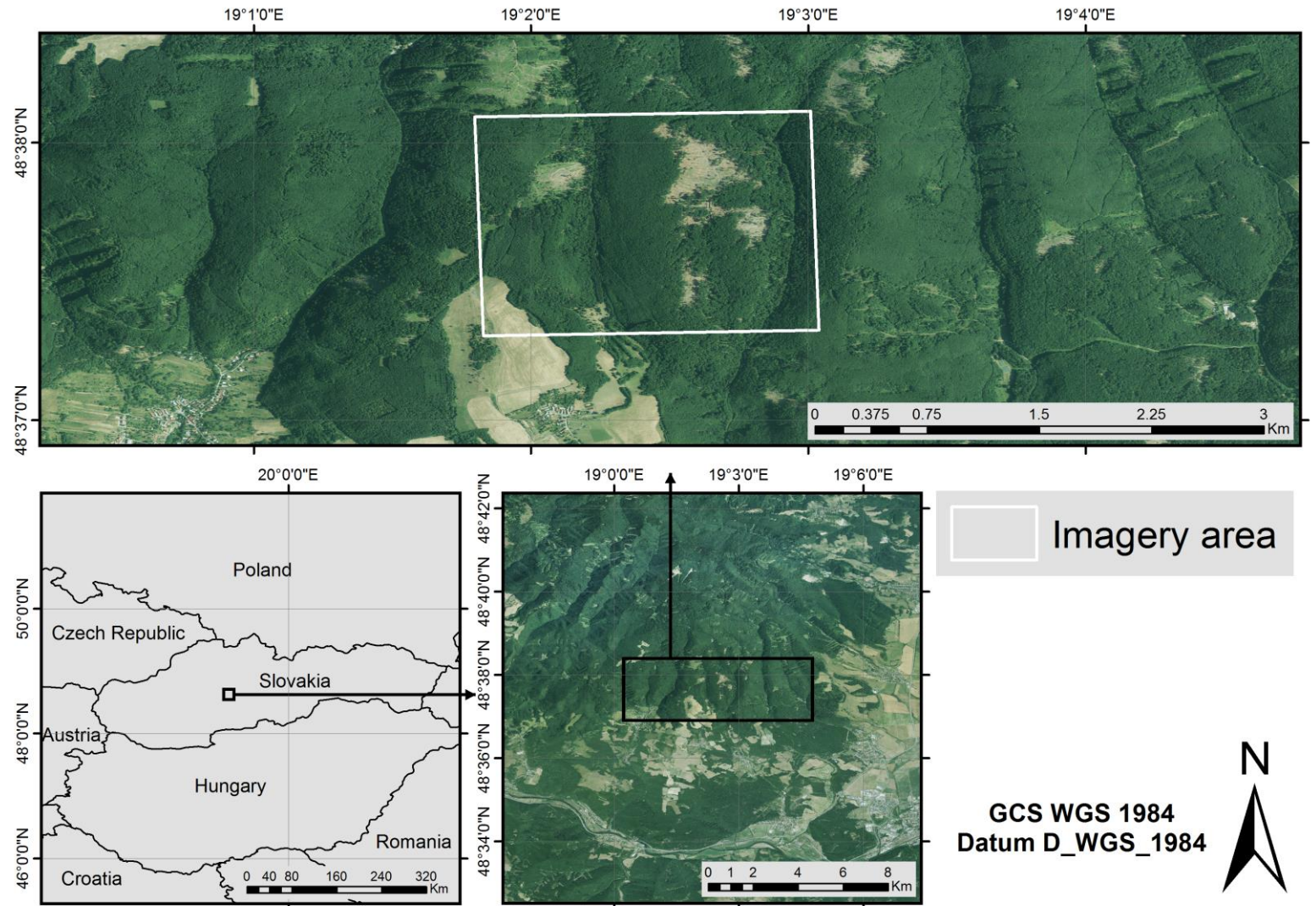
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INTRODUCTION



UAS WINDTHROW

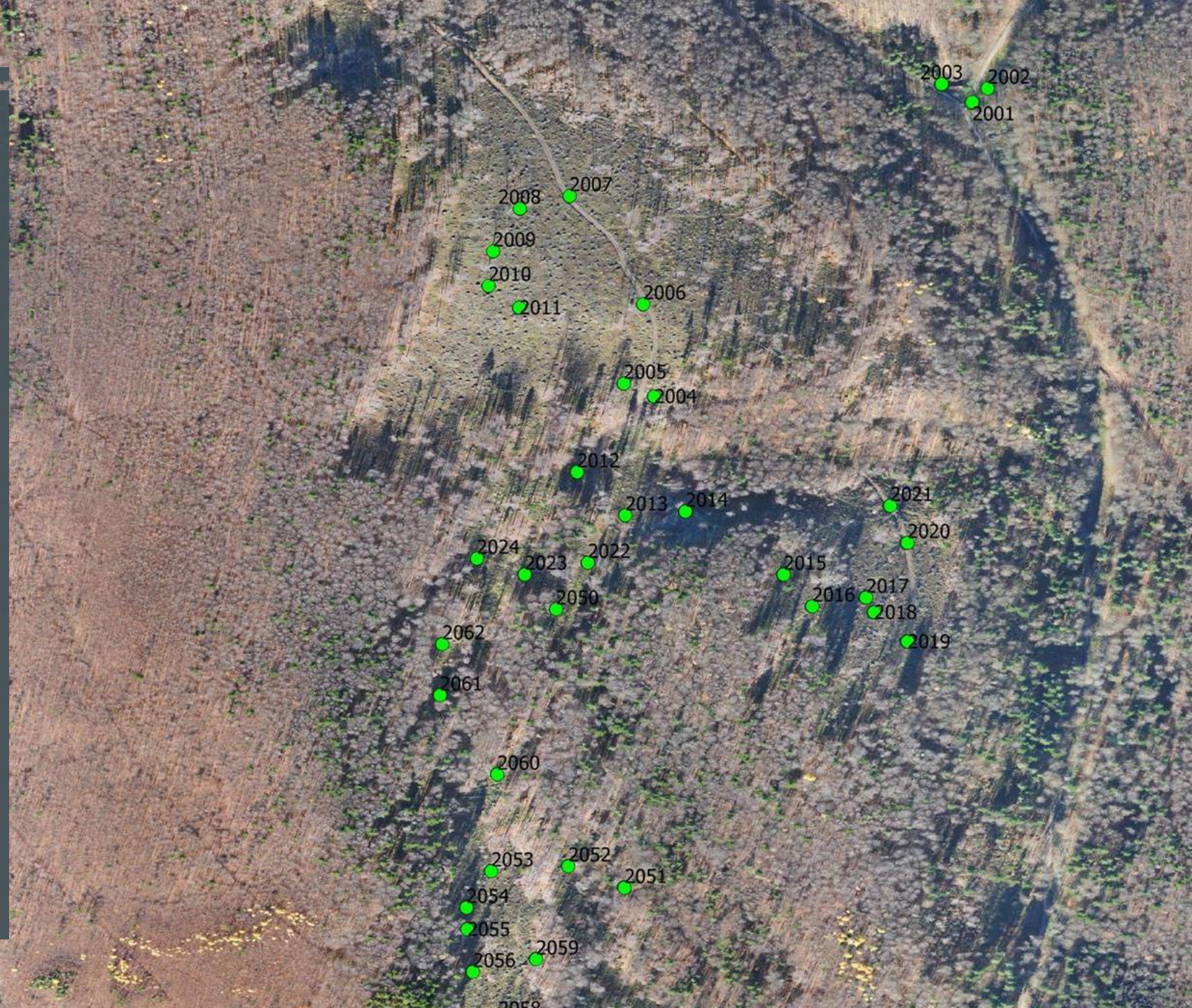




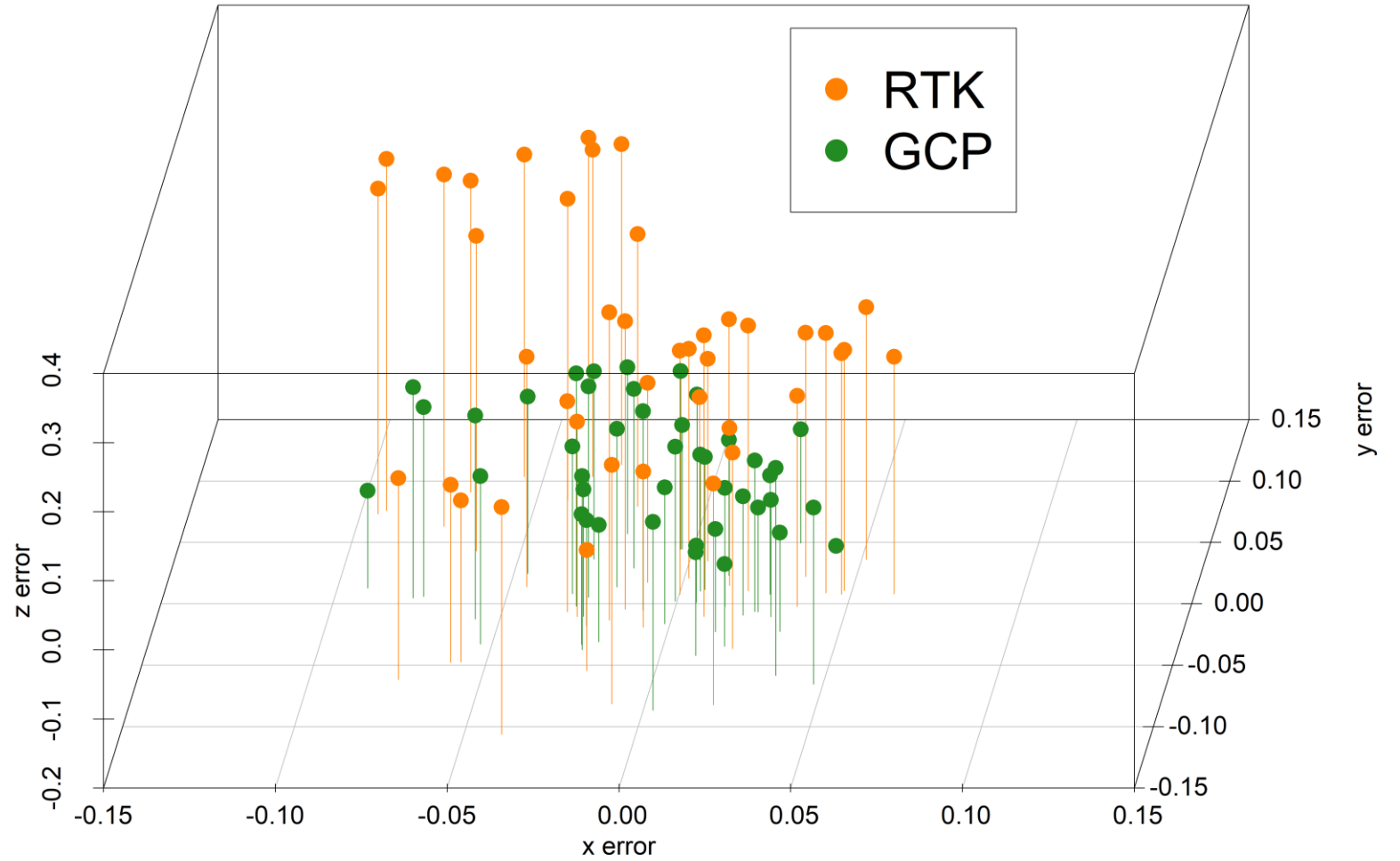
EBEE PLUS

POSITIONAL ACCURACY

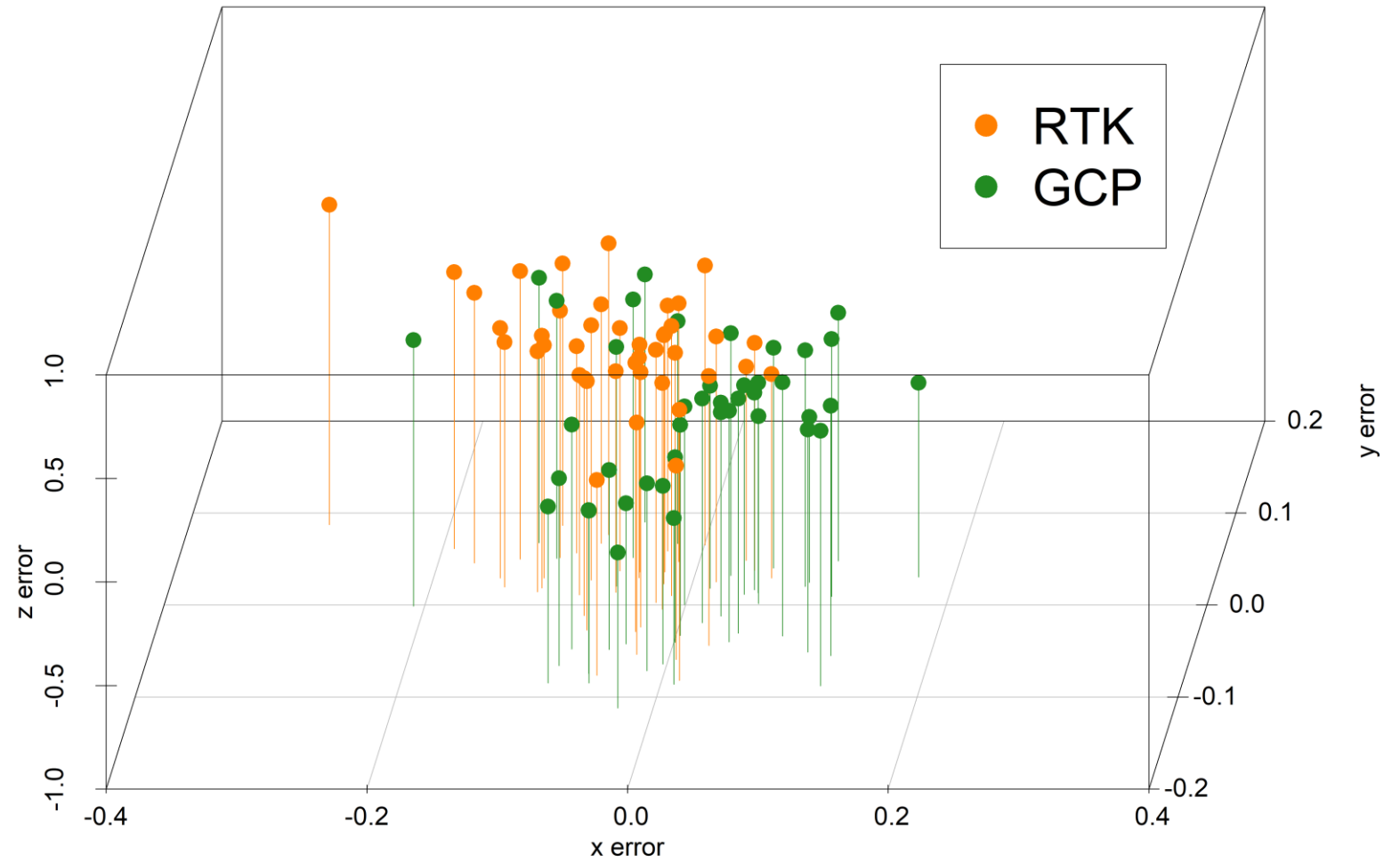
- RTK vs. GCP
- Two Flights vs. One Flight

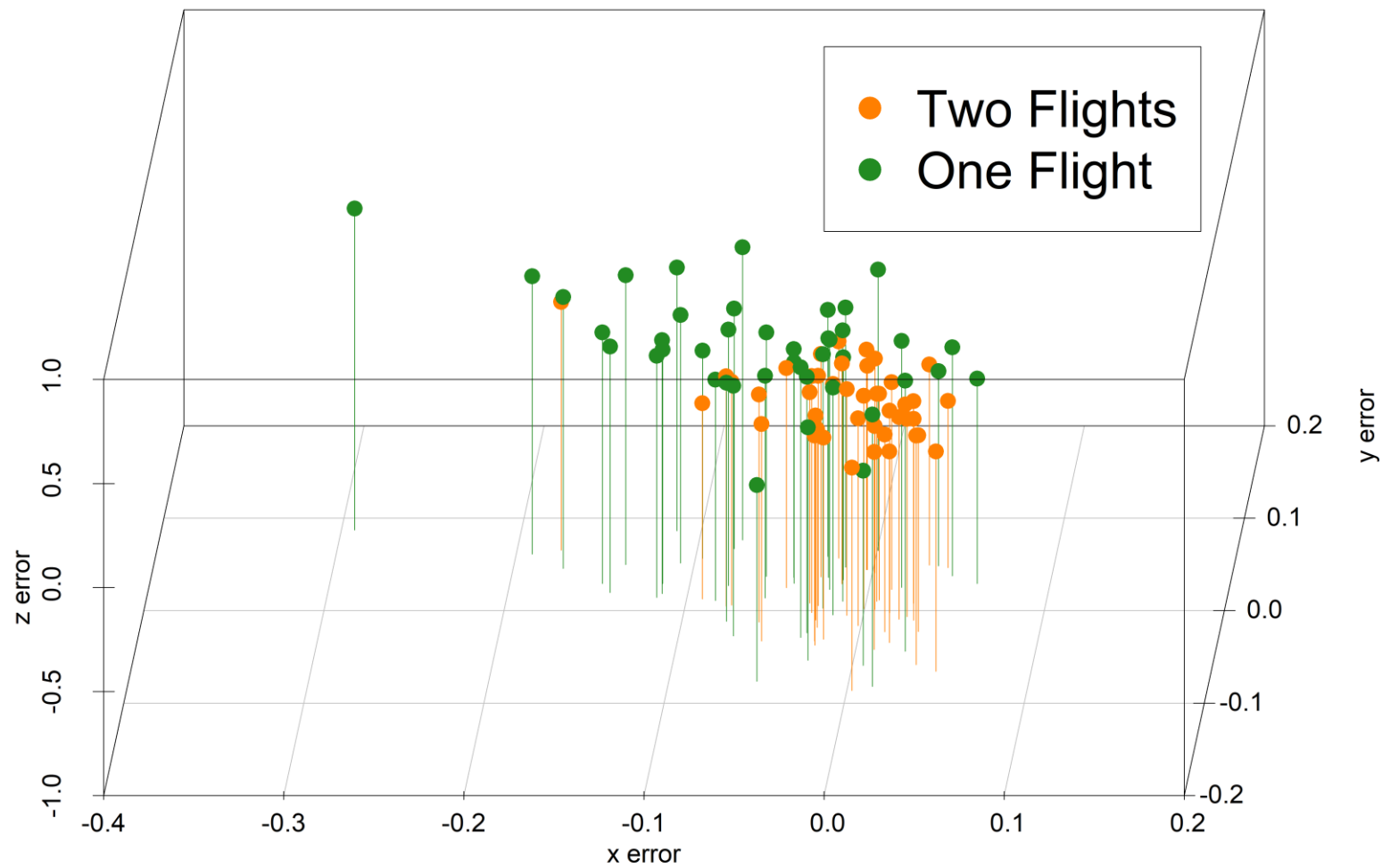


RTK VS. GCP (TWO FLIGHTS)



RTK VS. GCP (ONE FLIGHT)





TWO FLIGHTS
VS.
ONE FLIGHT
(RTK)

TWO FLIGHTS

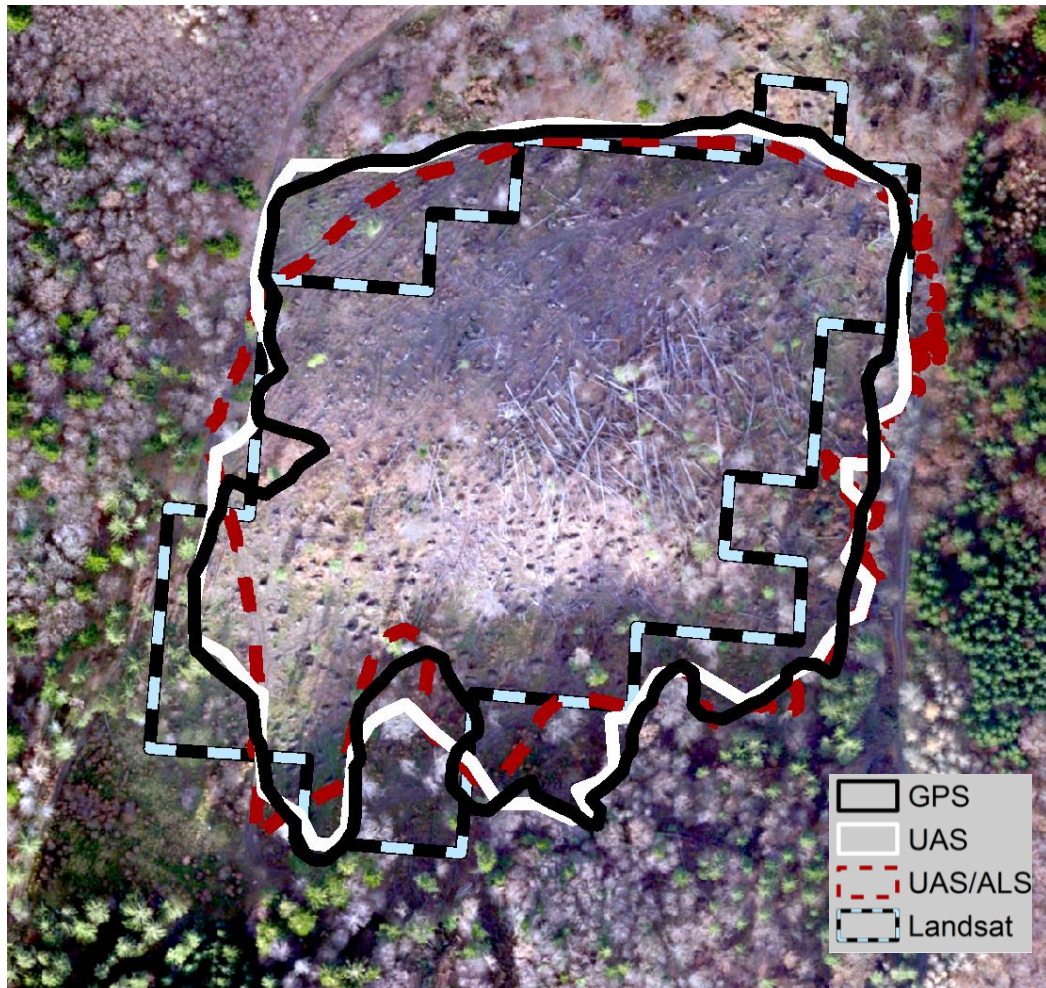
ONE FLIGHT

	X	Y	Z	Total
Images	0.73	0.67	1.19	1.15
RTK	5.64	6.00	18.57	20.31
GCP	4.33	3.32	7.28	9.10

	X	Y	Z	Total
Images	0.41	0.27	0.61	0.78
RTK	9.12	4.58	22.48	24.69
GCP	8.67	4.61	22.80	24.83

Tomašík, J., et. al. Accuracy of Photogrammetric UAV-Based Point Clouds under Conditions of Partially-Open Forest Canopy. **Forests** 2017, 8, 151.

WINDTHROW DETECTION



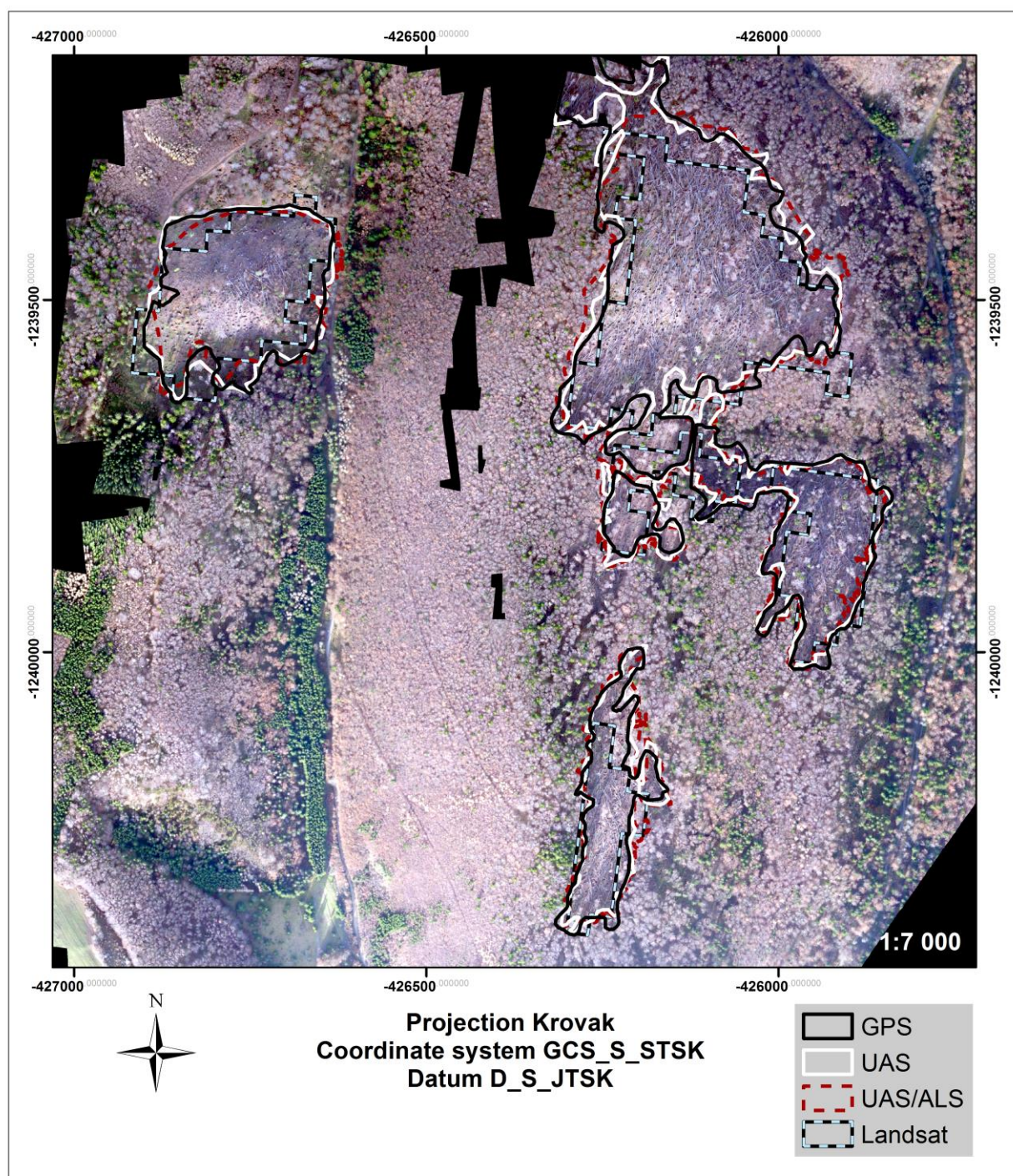
GNSS

UAS

UAS/ALS

Landsat

Mokroš, M., et al. "Early stage forest windthrow estimation based on unmanned aircraft system imagery." *Forests* 8.9 (2017): 306.

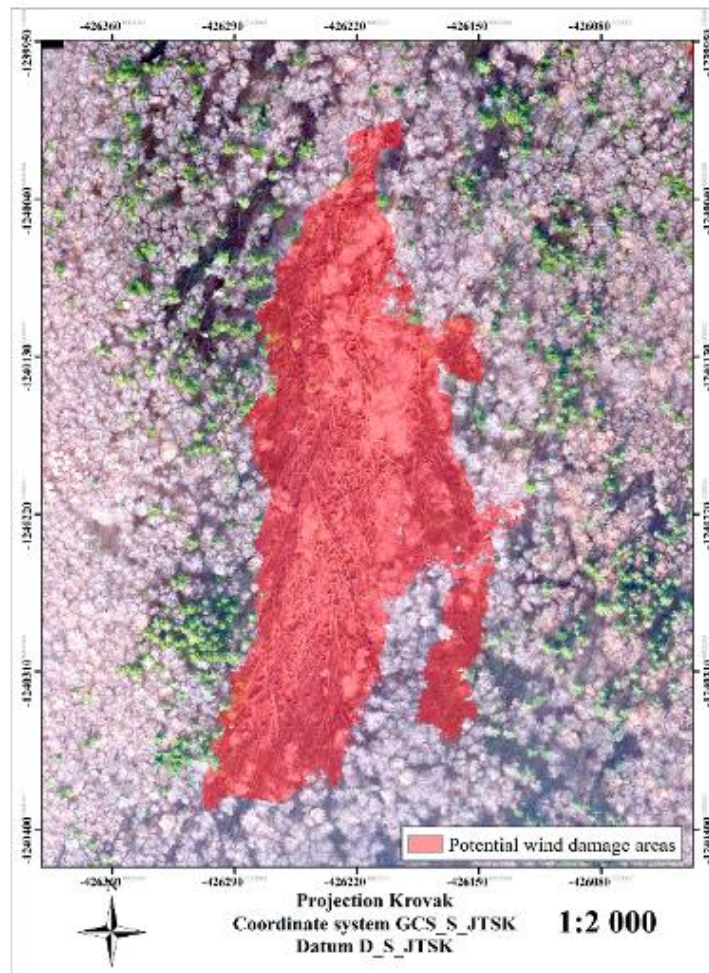
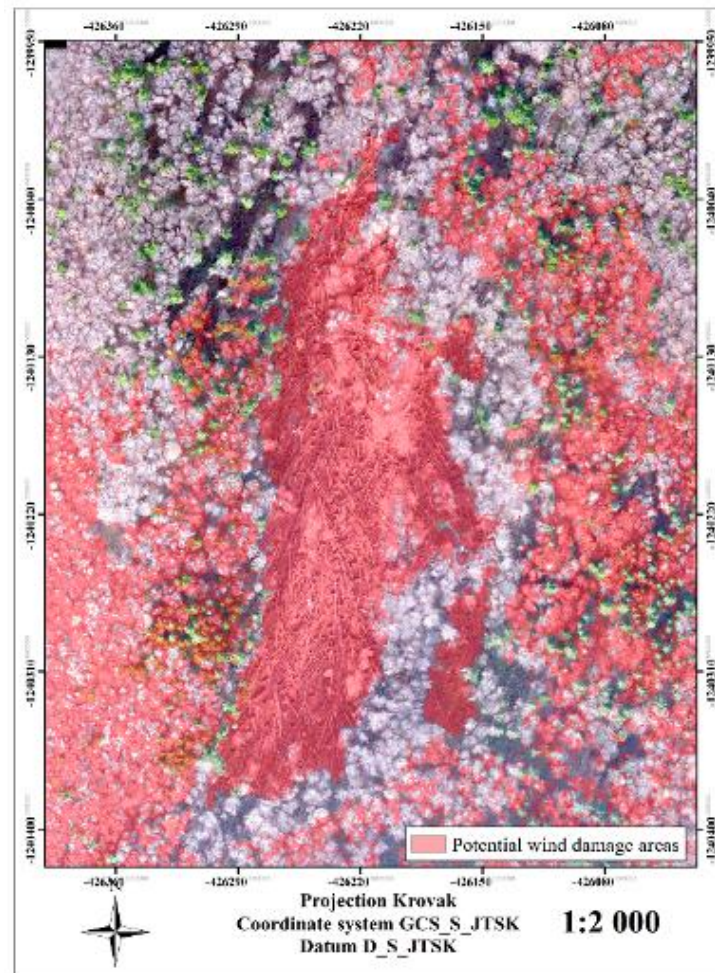


Plot ID	GNSS	UAS	UAS/ALS	Landsat
	(ha)			
1	5.29	5.38	5.08	4.59
2	2.44	2.48	2.78	1.71
3	0.75	0.89	1.03	0.45
4	4.32	4.10	4.04	3.42
5	12.59	12.24	12.63	9.63
Sum	25.39	25.09	25.56	19.8

Plot ID	GeoXT	Nomad	Garmin	Xperia
	(ha)			
1	5.45	5.48	5.49	5.56
2	2.19	2.06	2.06	2.34
3	0.84	0.68	0.83	0.87
4	4.44	4.54	4.34	4.19
5	13.10	12.94	13.15	13.19
Sum	26.02	25.69	25.87	26.15

Mokroš, M., et al. "Early stage forest windthrow estimation based on unmanned aircraft system imagery." **Forests** 8.9 (2017): 306.

UAS vs. UAS/ALS



SALVAGE LOGGING ESTIMATION

Stand ID	Forest Plan (FP)				UAS		Volume Difference FP – UAS (m³ (%))
	Tree Species	Tree Species Rep. (%)	Volume Per ha (m³)	Volume of Damaged Trees (m³)	Calamity Area (ha)	Volume of Damaged Trees (m³)	
541a	FS	95	486	2794	6.12	3418	-624 (22)
542	FS	90	430	2614	5.90	2392	222 (8)
543	FS	80	346	35	0.40	109	-74 (210)
544	FS	85	411	1395	3.35	1484	-89 (6)
545	FS	55	229	79	0.83	187	-108 (136)
547a	FS	80	464	1552	2.86	1117	435 (28)
547b	FS	75	408	183	1.60	614	-431 (235)
559	FS	80	325	1762	6.89	1798	-35 (2)
560a	AA	88	155	18	0.11	0	18 (100)
562a	FS	60	220	138	0.61	52	86 (62)
562b	PA	50	162	78	0.00	2	75 (97)
Sum				10,648		11,173	-525 (4.93)

THANK YOU FOR YOUR ATTENTION



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