Inclinometer position and anemometer height test

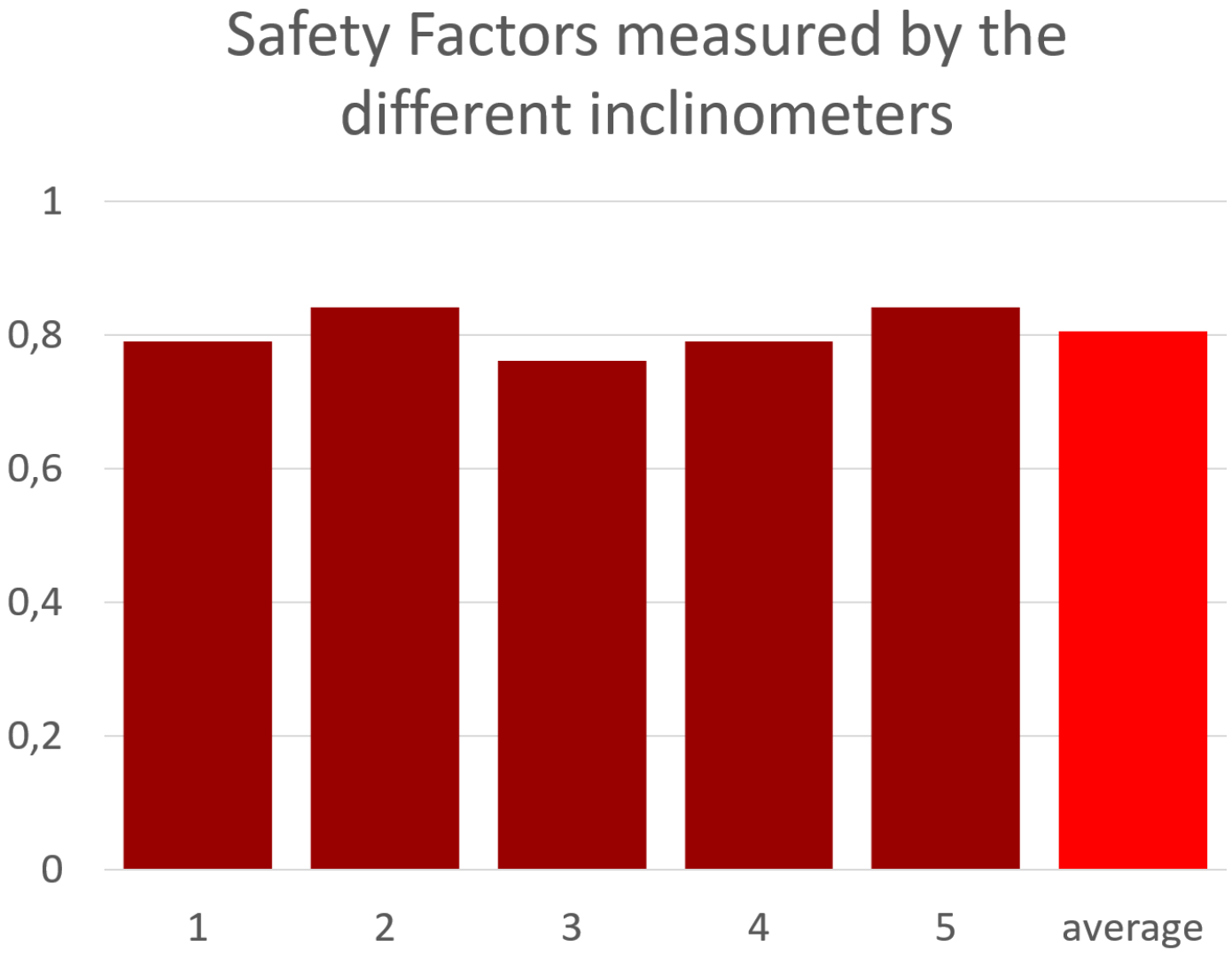
Experiment Part A

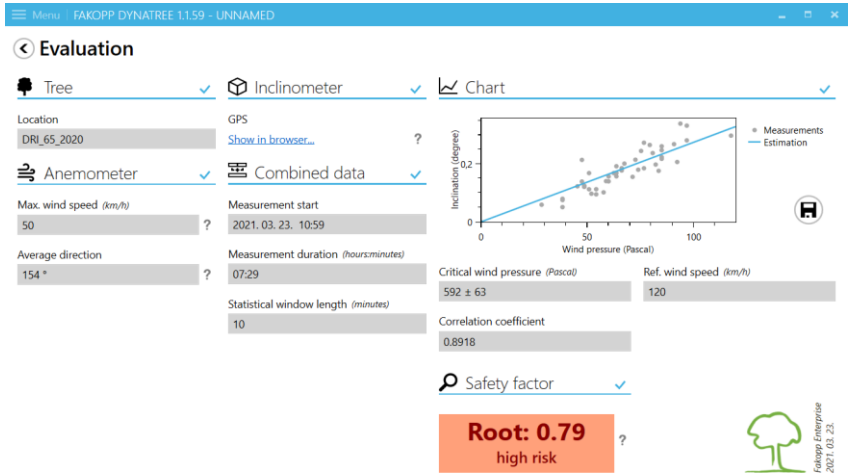
5 inclinometers were installed to the same tree to see if their position affect the measure safety.

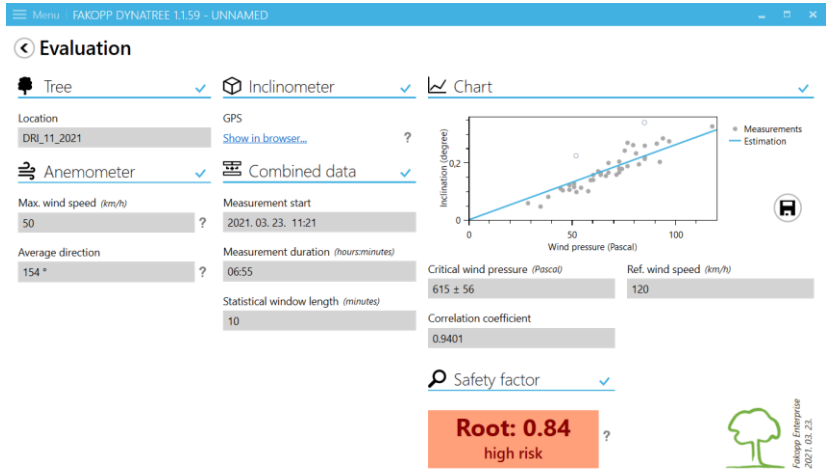
Experiment Part B

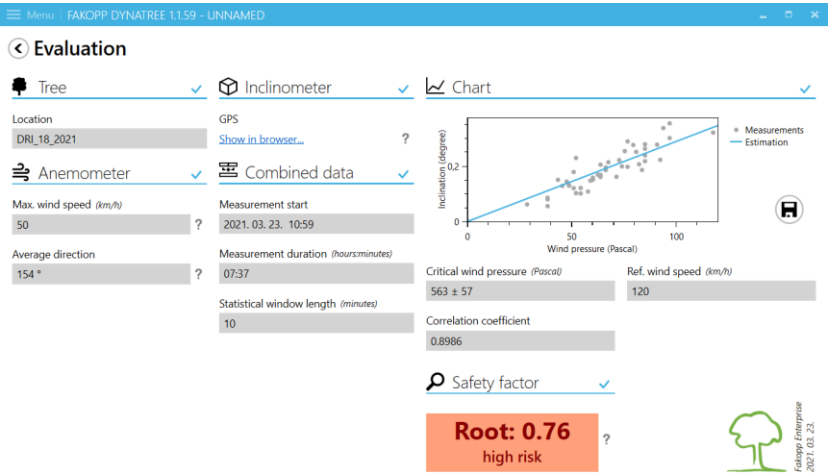
The anemometer was set to 4-, 5- and 10-meters height to test how much the safety changes.

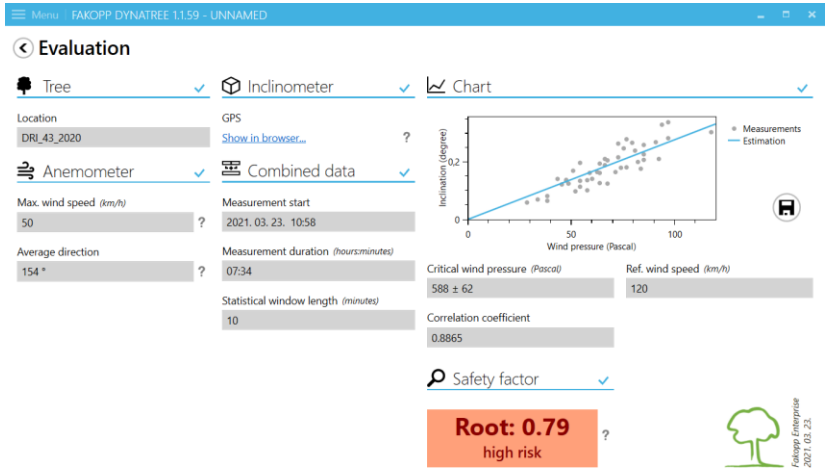
All the inclinometers measured almost the same safety.

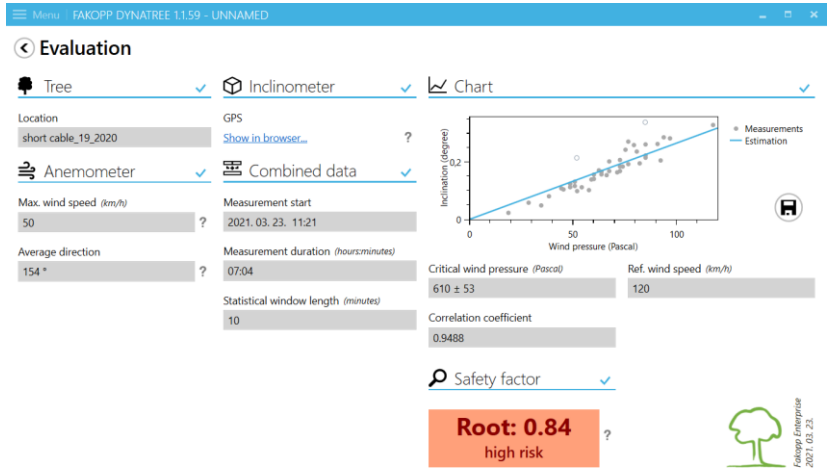












The evaluation windows in DynaRoot show the details.

The correlation coefficient of the curve fitted to the measurement's data

The highest wind gust during the measurement (it must be above 25 km/h).

Serial no.	SF	corr. coeff.	critical wind pres	duration	Vmax (km/h)	window
65_2020	0,79	0,892	592 +/- 63	7:29	50	10 min
11_2021	0,84	0,940	615 +/- 56	6:55	50	10 min
18_2021	0,76	0,899	563 +/- 57	7:37	50	10 min
43_2020	0,79	0,887	588 +/- 62	7:34	50	10 min
19_2020	0,84	0,949	610 +/- 53	7:04	50	10 min

The length of the statistical window (how many data is handled together during the analysis)

Serial number of the inclinometer

The evaluated Safety Factor

The wind pressure which could uproot the tree

Duration of the measurement hours:mins

Serial no.	SF	corr. coeff.	critical wind pres	duration	Vmax (km/h)	window
65_2020	0,79	0,892	592 +/- 63	7:29	50	10 min
11_2021	0,84	0,940	615 +/- 56	6:55	50	10 min
18_2021	0,76	0,899	563 +/- 57	7:37	50	10 min
43_2020	0,79	0,887	588 +/- 62	7:34	50	10 min
19_2020	0,84	0,949	610 +/- 53	7:04	50	10 min

As the measurements were done parallelly, the wind conditions were exactly the same.

The statistical window length of the evaluation was set to 10 minutes for all the inclinometers.

Serial no.	SF	corr. coeff.	critical wind pres	duration	Vmax (km/h)	window
65_2020	0,79	0,892	592 +/- 63	7:29	50	10 min
11_2021	0,84	0,940	615 +/- 56	6:55	50	10 min
18_2021	0,76	0,899	563 +/- 57	7:37	50	10 min
43_2020	0,79	0,887	588 +/- 62	7:34	50	10 min
19_2020	0,84	0,949	610 +/- 53	7:04	50	10 min

10 m

Serial no.	SF	corr. coeff.	critical wind pres	duration	Vmax (km/h)	window
65_2020	0,58	0,949	434 +/- 44	16:48	31	10 min
11_2021	0,57	0,949	422 +/- 43	17:05	31	10 min
18_2021	0,59	0,947	441 +/- 45	16:48	31	10 min
43_2020	0,60	0,948	444 +/- 43	16:43	31	10 min
19_2020	0,60	0,947	444 +/- 45	17:05	31	10 min

5 m

Serial no.	SF	corr. coeff.	critical wind pres	duration	Vmax (km/h)	window
65_2020	0,37	0,747	339 +/- 90	5:15	25	10 min
11_2021	0,37	0,794	331 +/- 83	4:42	25	10 min
18_2021	0,38	0,798	333 +/- 82	4:53	25	10 min
43_2020	0,38	0,793	334 +/- 83	4:57	25	10 min
19_2020	0,35	0,871	303 +/- 71	2:17	25	10 min

4 m

The anemometer was set to 4-, 5- and 10-m height, all the 5 inclinometers collected data.

The Safety Factor decreased significantly.

Conclusions

All inclinometers indicated similar SF
→ if root collar is intact, one inclinometer is enough to get realistic result.

Anemometer height is important, 10 m height provides significant higher SF, relative to 4 or 5 m.