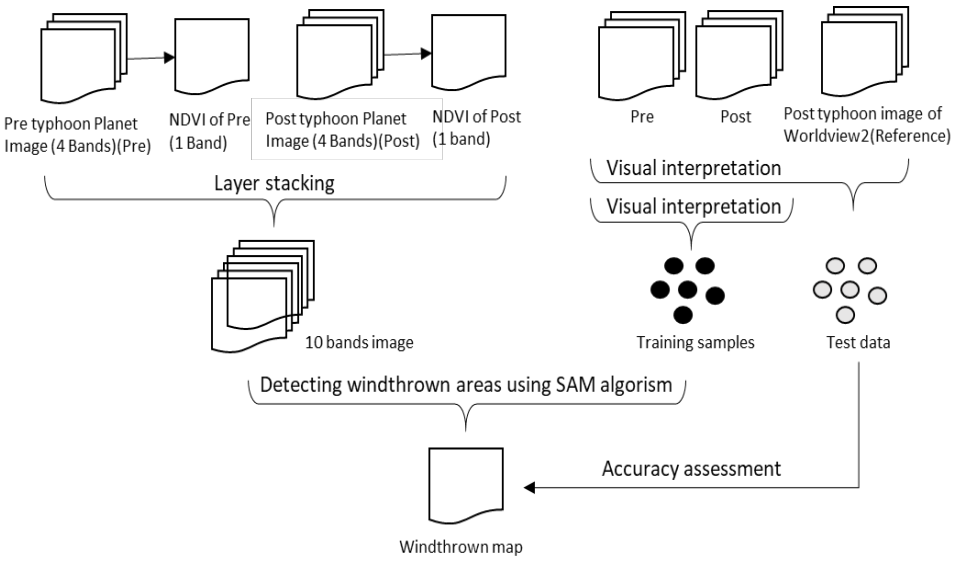
Supplementary Material S1. Comparing the pre- and post-typhoon PlanetScope images.



Supplementary Material S2. The result of a rapid survey of damaged trees in the study area.

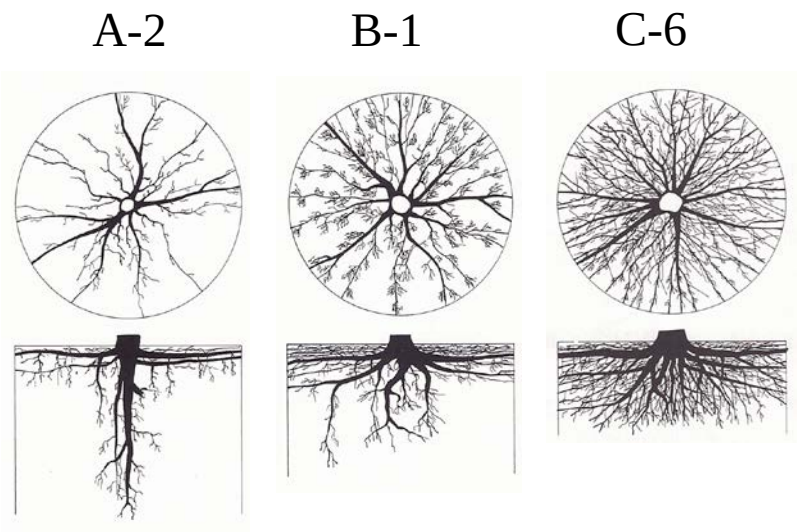
site	area surveyed (m^2)	dominant species	the number of uprootings	the number of broken trunks	total number of damaged trees	% of uprooting
1	60	*Abies sachalinensis*	42	11	53	79%
2	140	*Abies sachalinensis*	39	24	63	62%
3	100	*Larix kaempferi*	36	23	59	61%
4	80	*Larix kaempferi*	28	14	42	67%
5	140	*Betula ermanii*	65	20	85	76%
Total	520		210	92	302	70%

The survey was conducted in September 2018 in forest stands that had been completely destroyed by the typhoons in 2016 and were left as they were. We took photographs from the upper slope, and created virtual quadrarts on them using Adobe Photoshop CC2018, and identified uprootings and broken trunks within quadrarts.

Supplementary Material S3. Root systems and crown features of representative species in the study area.

types[1)]	representative species	lateral roots	fine roots	extension of root systems	taproots	coefficient of canopy resistance	tendency of uprooting assessed by $KF < W(Z_0+R)$ [4)]
		positively correlated to KF [2)]			positively correlated to R	positively correlated to W [3)]	
A-2	*A. sachalinensis*	developed	developed only in the surface	large	deep	big	high
B-1	*L. kaempferi*	remarkably developed	sparsely developed	large	middle	big	middle
C-6	*A. pictum*, *B. ermanii*, *F. crenata*	remarkably developed like matts	densely developed in entire	large	shallow	small	low

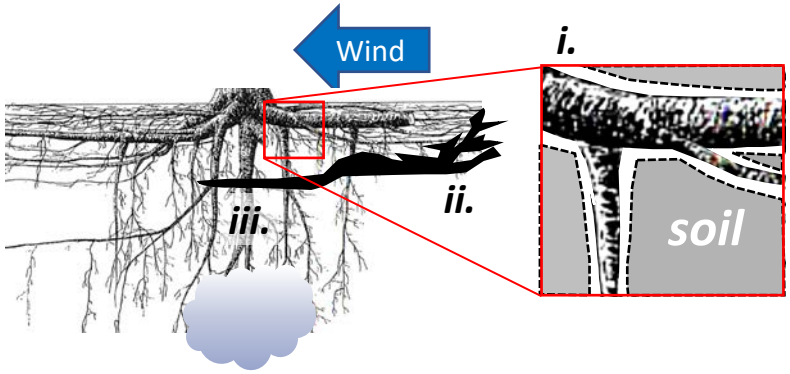
1) Karizumi (2010) classifies species into three big categories, i.e., A. species with deep taproots, B. species with middle taproots, and C. species with shallow taproots, and additionally classifies them into 6 to 7 sub-categories depending on the feature of lateral roots, fine roots, and extension of root systems.
2) Busgen and Munch (1929) states that KF becomes higher when the density of lateral roots and fine roots is higher, and the spread of the root system is larger.
3) Koizumi (2010) shows W has a strong relationship with the size and shape of the crown, and conifers have a higher W than hardwoods does.
4) In general, uprooting occurs when $W(Z_0+R)$ is larger than KF, where,
K: Root system strength per unit area (kg/m^2)
F: Root system detachment area (m^2)
W: Wind pressure acting on the wind center (kg/m^2)
Z_0: Distance from the ground to the wind center (m)
R: Thickness of root systems (m)



cited from Karizumi (2010)

Supplementary Material S4. Hypothesis on how storms and rain cause windthrow and how species dependency is expressed.

a. Why do storms and rainfall increase the risk of windthrow?



i. a small hollow hole between roots and the adhering soil (Karizumi, 2010)

ii. a complex network of cracks developed on the windward edge of the root-soil plate (Coutts, 1986).

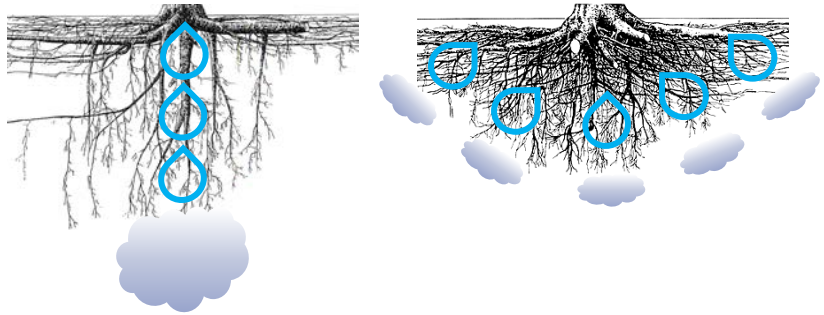
iii. an irregular crack that appears under the root-soil plate, apparently as a result of stretching the undersurface of the plate and separation of the sinker roots (Coutts, 1986).

High water content below the root plate decreases the root anchorage (Kamimura et al., 2012).

b. Why are the responses to rainfall different between species?

Tree with sparse lateral roots with thick taproots

Tree with dense lateral roots



The shape of the root system changes the amount of water below the root plate.