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Supplement of

Dependency of tropical cyclone risk on track in South Korea

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Supplementary Table S1: Description of decision tree model variables – the diagnosis (target) variable and attribute (input) variables. Use column indicates the decision trees that use each variable.

	Variables	Description	Category
Diagnosis	Damage	If the TC has recorded any property loss to the province	Yes or No
	Province	Five provinces in South Korea. Two North-western, one south-western, one north-eastern and one south-eastern provinces	Gyeong-gi, Gang-won, Chung-cheong, Jolla and Gyeong-sang
Attributes	Track-group	Track pattern groups divided in to four through fuzzy c-means clustering method.	East-short, East-long, West-long, or West-short
	Radius	The longest radius of 30 knot winds or greater of the TC making landfall to South Korea from RSMC best-track (BT) data	Continuous
	Maxwind	Maximum sustained wind speed of the TC making landfall to South Korea from BT data	Continuous
	Pressure	Central pressure of the TC making landfall to South Korea from BT data	Continuous

Supplementary Table S2: Damage record availability by track-pattern groups and provinces. Unavailable damage records are cases that have influence duration longer than five days or overlap of more than two TCs in the period. National-undamaged cases are those who have no property loss from any of the provinces.

Track groups		East-short	East-long	West-long	West-short	Sum
All		22	31	16	16	85
Unavailable		1	3	4	6	14
National	All	21	28	12	10	71
	Damaged	8	21	12	10	51
	Undamaged	13	7	0	0	20
Gyeong-gi (GG)	All	21	28	12	10	71
	Damaged	1	9	9	6	25
	Undamaged	20	19	3	4	46
Gang-won (GW)	All	21	28	12	10	71
	Damaged	2	9	7	4	22
	Undamaged	19	19	5	6	49
Chung-cheong (CC)	All	21	28	12	10	71
	Damaged	2	9	6	8	25
	Undamaged	19	19	6	2	46
Jolla (JL)	All	21	28	12	10	71
	Damaged	5	17	10	9	41
	Undamaged	16	11	2	1	30
Gyeong-sang (GS)	All	21	28	12	10	71
	Damaged	7	21	10	9	47
	Undamaged	14	7	2	1	24
Sum of province data	All	105	140	60	50	355
	Damaged	17	65	42	36	160
	Undamaged	88	75	18	14	195

Supplementary Table S3: List of the grouped tropical cyclones that made landfall over South Korea during 1979 – 2010.

Year	East-short	East-long	West-long	West-short
1979			IRVING	JUDY
1980		ORCHID		JUNE
1981				AGNES
1982	KEN	BESS, ELLIS	CECIL	
1983				FORREST
1984	ED	HOLLY		
1985	ODESSA	PAT	JEFF, KIT, LEE	BRENDA
1986			VERA	NANCY
1987		DINAH	THELMA	
1988				
1989	ELLIS, JUDY			
1990	FLO	ZOLA		ROBYN
1991	GLADYS, noname	CAITLIN, KINNA, MIREILLE		
1992	IRVING, KENT	JANIS	TED	
1993	NATHAN, OFELIA	PERCY, ROBYN, YANCY		
1994	WALT	BRENDAN	ELLIE, SETH	DOUG
1995		FAYE, RYAN		
1996	EVE	KIRK		
1997	ROSIE, OLIWA	PETER	TINA	
1998	ZEB			YANNI
1999	PAUL	BART	OLGA	NEIL, ANN
2000	BOLAVEN		PRAPIROON	SAOMAI
2001				
2002			RAMMASUN	RUSA
2003	LINFA	MAEMI	SOUDELOR	
2004		NAMTHEUN, MEGI, CHABA, SONGDA		MINDULLE
2005		NABI		KHANUN
2006	WUKONG	SHANSHAN		EWINIAR
2007	MAN-YI	USAGI	NARI	
2008				
2009				
2010		DIANMU, KOMPASU, MALOU		
Number of TCs	22	31	16	16

Supplementary Table S4. 10-fold cross-validation results for best-track data for decision tree

Model	Tree size (mean/std err)	Error rate (mean/std err)	First attribute	Second attribute
Original	8	23.4%	Track cluster	Best-track wind speed & Province
10 rounds of c-v	9.9 / 0.7	31.3% / 2.1%		
Round 1	10	40.0%	Track cluster	Province
Round 2	12	31.4%	Best-track radius	Track cluster & Province
Round 3	8	34.3%	Best-track radius	Track cluster & Province
Round 4	10	34.3%	Track cluster	Province
Round 5	8	28.6%	Track cluster	Best-track wind speed & Province
Round 6	8	36.1%	Track cluster	Province
Round 7	10	27.8%	Track cluster	Best-track wind speed & Province
Round 8	10	30.6%	Track cluster	Best-track wind speed & Province
Round 9	12	30.6%	Track cluster	Province
Round 10	6	36.1%	Track cluster	Best-track wind speed & Province