

- can greatly improve our understanding of the spatial distribution of geophysical processes. One practical scale precipitation data into finer scales suitable for hydrological modeling.
- This research aims to reveal **self-similarity in the** a discrete two-dimensional wavelet transform.
- directional wavelet-coefficient sets at each scale.
- distribution are estimated.
- derived datasets with 1-km resolution.

surface.



THE UNIVERSITY OF TOKYO

# E. Estimation of parameters and results

Multiresolution decomposition is applied to each event. The parameters of the folded stable distribution are estimated **at each** scale for the 3 directional fluctuation fields. In a128-km squared surface, the sample sizes are:

Scale	1 km	2 km	4 km	8 km	16 km	32 km
Sample size	16129	3969	961	225	49	9

• No-rainfall areas (intensity = 0) reduce the sample size, hindering the estimation of parameters  $\alpha$  and  $\gamma$ .

• Examples of typical inter-scale behavior of estimated parameters  $\alpha$  and  $\gamma$ :

•••		u	Expor γ <sub>m</sub> =	ential g = $\gamma_2 2^H$	growth (m-1)			
		$\lambda_r$	Scale	e index	m = lo	g <sub>2</sub> (sc	ale) + 1	
6km	32km	m = 2 1 km	3 1 2	ر ۲ xm	4 km 8	5 8 km	6 16 km	7 32 km

t (E	W)	North – South (NS)				Diagonal (DI)			
2	<b>R</b> <sup>2</sup>	α	H	<b>Y</b> 2	$R^2$	α	H	<b>Y</b> 2	<b>R</b> <sup>2</sup>
11	0.96	1.48	0.45	0.11	0.97	1.47	0.46	0.06	0.96
10	0.96	1.51	0.45	0.11	0.97	1.48	0.43	0.05	0.96
11	0.97	1.42	0.48	0.16	0.96	1.43	0.55	0.06	0.97
11	0.98	1.46	0.52	0.14	0.97	1.46	0.55	0.06	0.97
06	0.97	1.48	0.46	0.07	0.97	1.45	0.47	0.03	0.95
N. Number of events for which self-similarity holds									

 $R^2$ : Coefficient of correlation of the exponential curve

• The results are average values without differentiating the type of rainfall. However, the excellent average correlation reveals the success of applying **folded stable distributions** for **revealing self-similarity**.

• Currently, we are studying the physical meaning of parameters  $\alpha$  and H. High values of H and low values of  $\alpha$  denote sharper fluctuations fields and higher frequency of extreme values, respectively. Hence, these parameters

Further research on this matter is aimed to statistically reproduce rainfall fields (at the same or even **finer scales**) that go through particular physical conditions. In this way a better understanding of rainfall spatial distribution