Spatial and Temporal Variations in Minimum Inter-event Time over Mainland China

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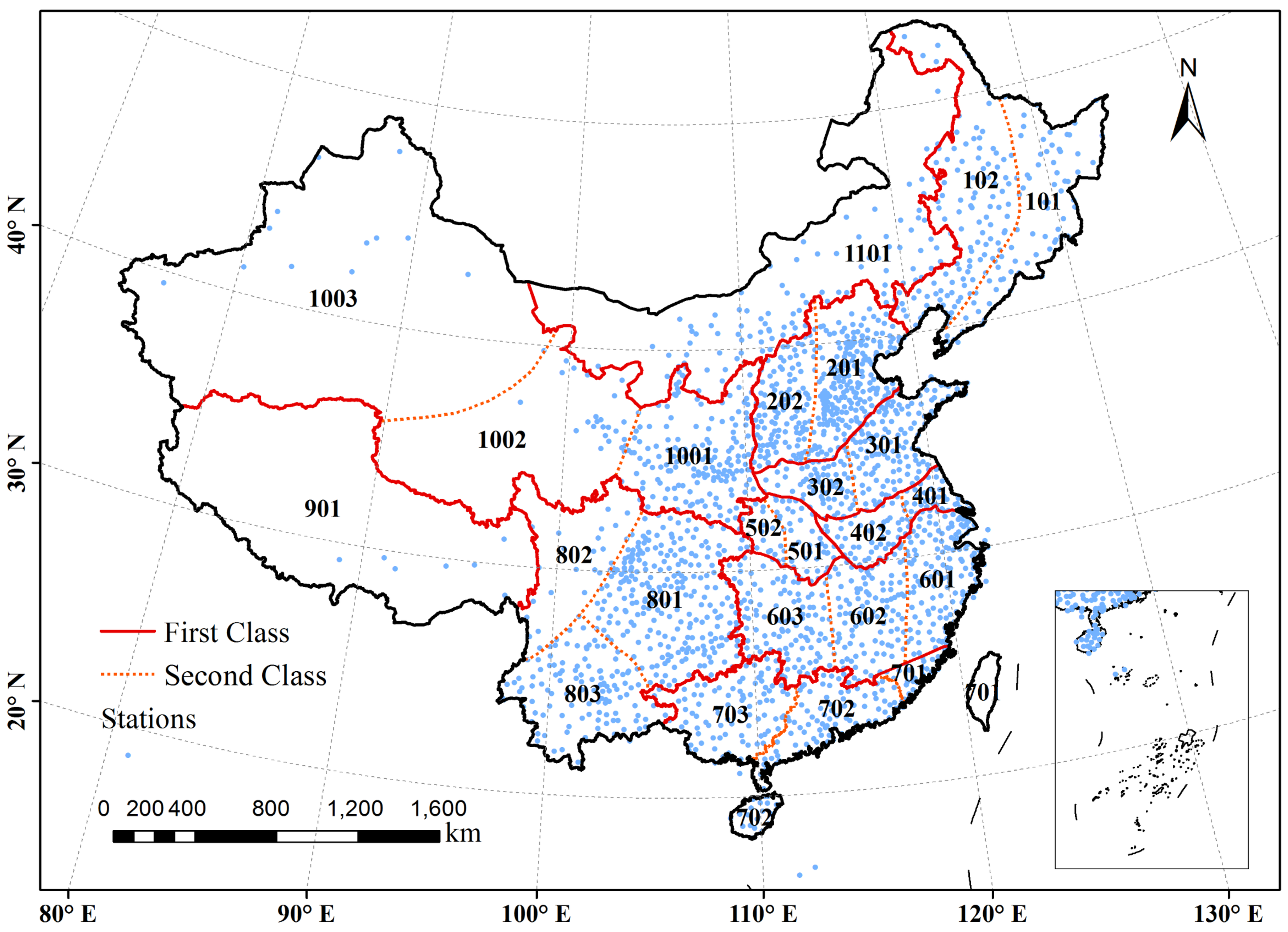
Introduction

Pluviograph precipitation records include wet periods and dry periods. Minimum inter-event time (MIT) is an index identifying individual rain event from pluviograph record: an event was defined as a duration of rainfall with the dry periods less than MIT, if the dry period in a duration equals or is greater than MIT, the duration was separated into two events. Event characteristics such as amount, duration and mean are closely related to the MIT. At the same time, MIT is a critical parameter in the event-based stochastic precipitation simulation. Exponential distribution method was used for more than 2000 stations with hourly precipitation data to obtain MIT values over mainland China.

Study Area and method



- 2122 stations with hourly precipitation data derived from siphon gauges were used. The gauges were stopped to avoid snow damage for northern stations in winter.
- 24 meteorological regions were divided across the mainland China.

Exponential method

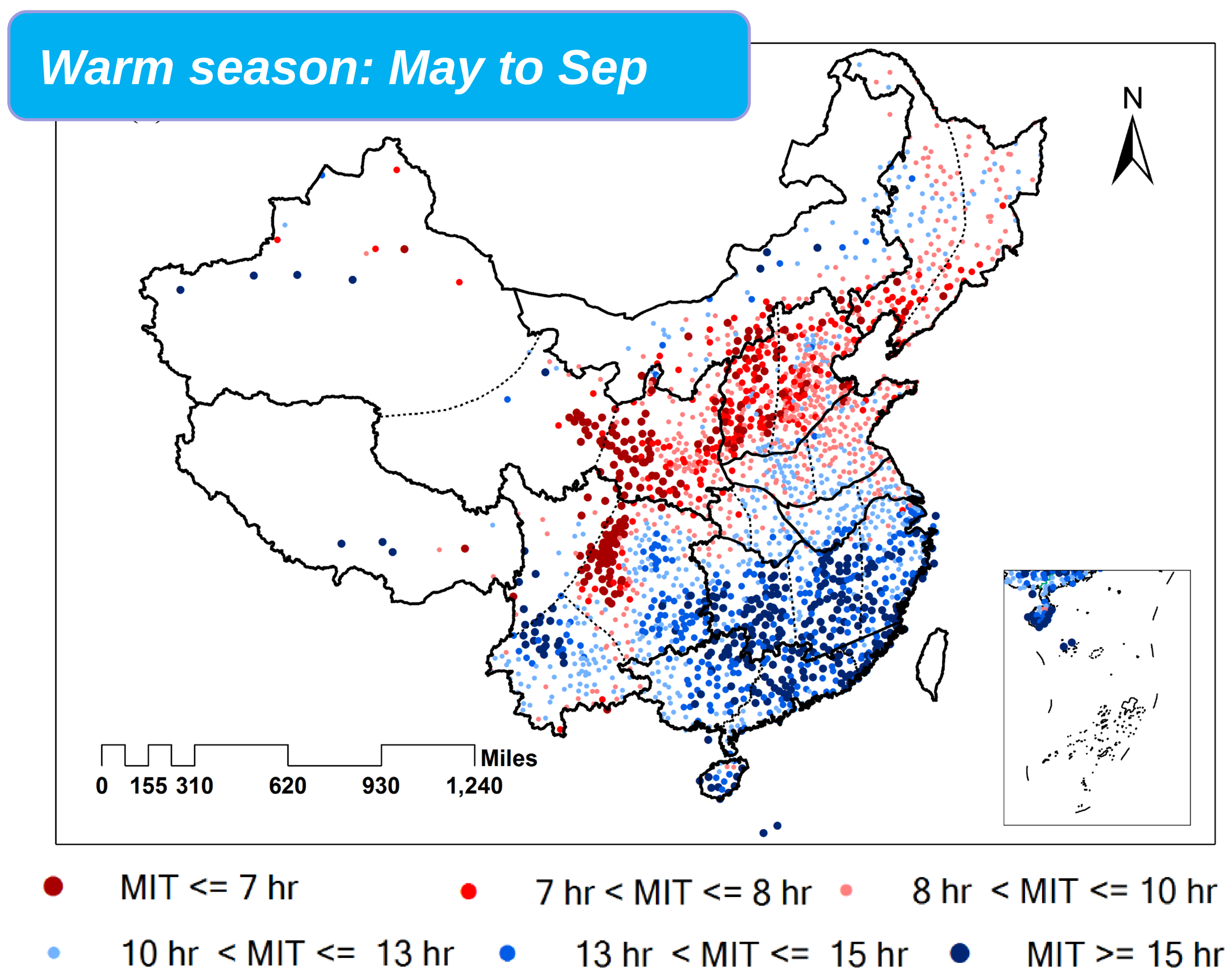
Restrepo and Eagleson (1982) proposed an exponential distribution method for obtaining MIT:

$$f(t) = \alpha \exp(-\alpha t), t \geq 0$$

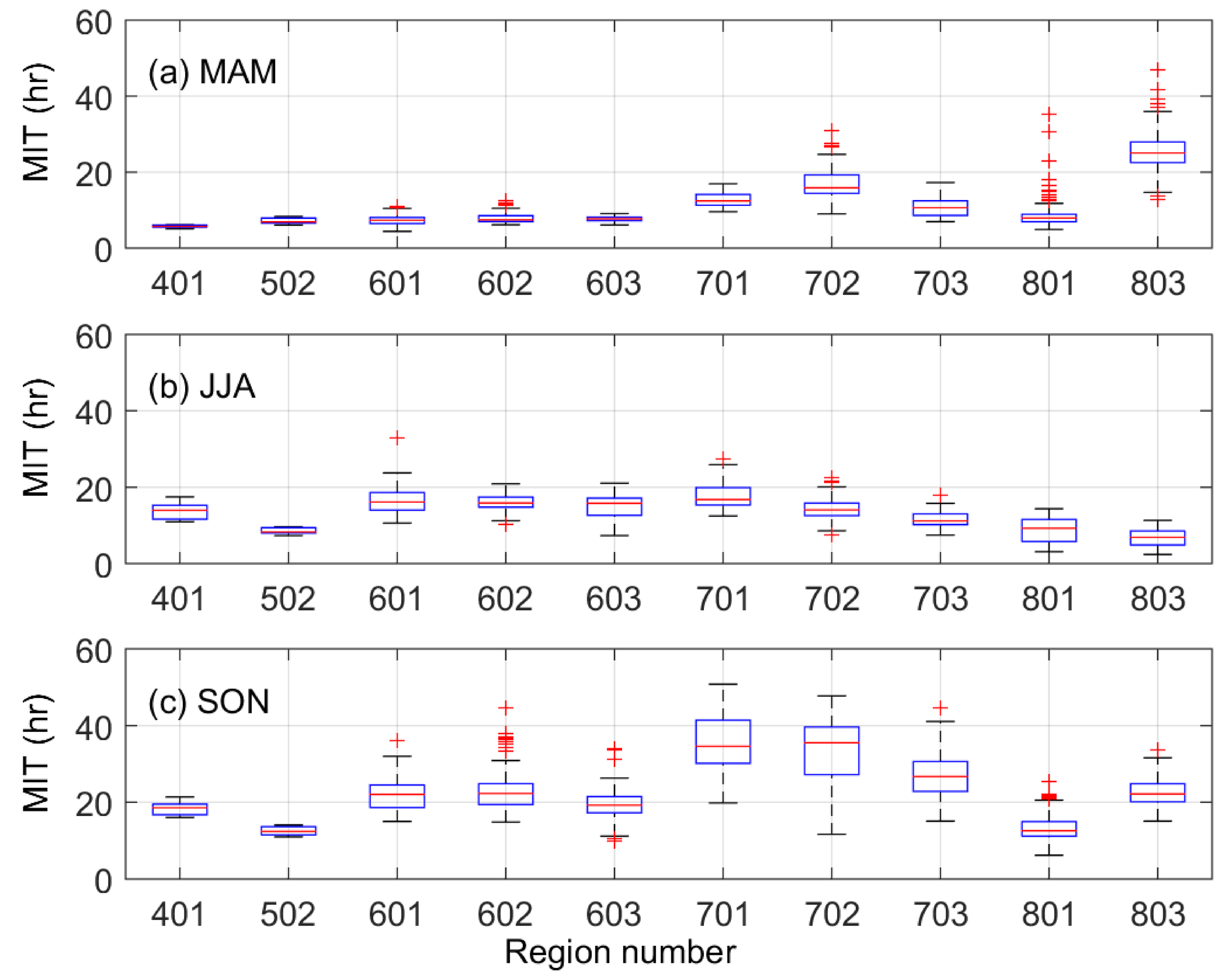
Where f(t) is the probability density function; α is the average event arrival rate, reciprocal of the mean time between event arrivals; t is the dry-period duration, the random variable. Larger values of dry-period durations between rainfall events are successively deleted until an exponential distribution can be assumed.

Spatial variations

Warm season: May to Sep



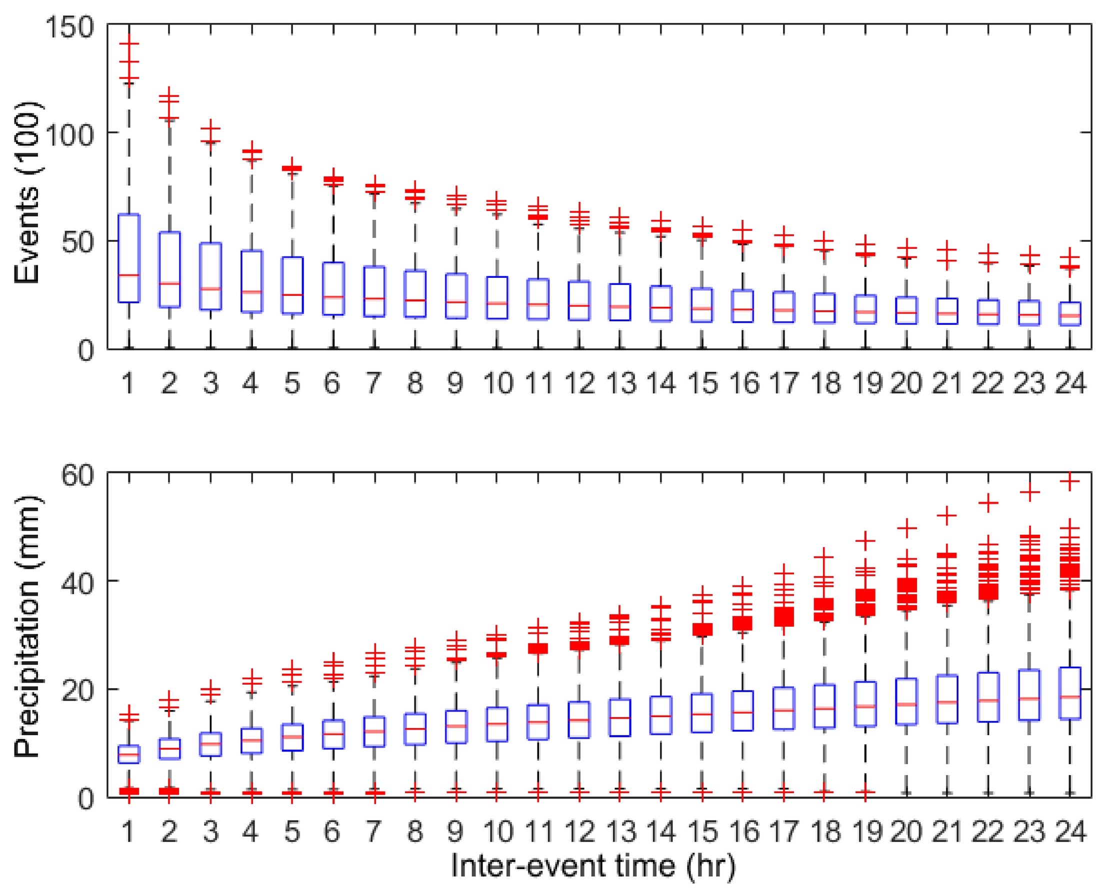
Seasonal Variations



Season	Correlation coefficient with MIT			
	Altitude	Dry period	Precipitation	Intensity
MAM	0.59*	0.66*	-0.37*	0.31*
JJA	-0.59*	0.59*	-0.21*	0.34*
SON	-0.19*	0.72*	0.01	0.63*

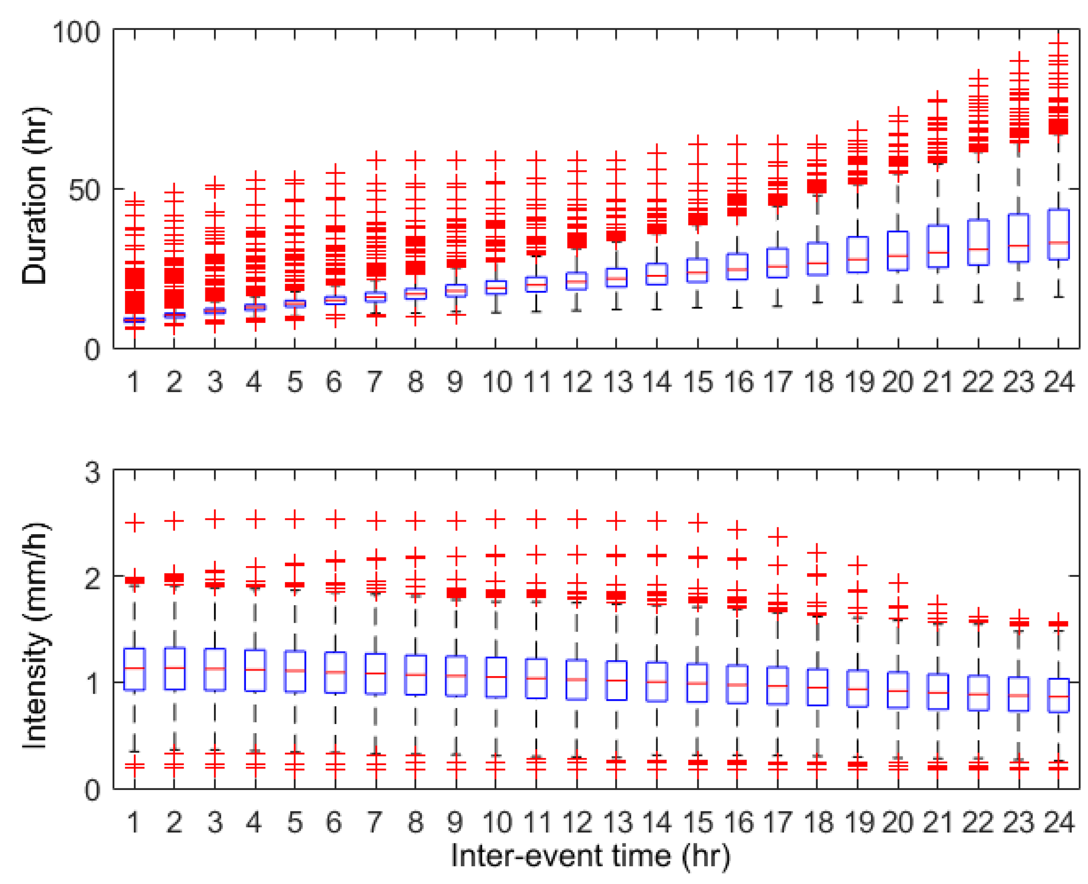
- MIT for nine of ten southern regions were increasing from spring (MAM, 10h), summer (JJA, 14h) and autumn (SON, 23h). Southern part of southwest China is an exception with larger MIT for the spring and autumn and lower for the summer.
- Altitude, dry period, precipitation and intensity were statistically related to the MIT.

Sensitivity analysis



Event characteristics, including number of events, precipitation (mm), duration(h) and intensity (mm/h) were sensitive to the change of MIT.

Boxplot shown number of events decreased, precipitation increased, duration increased and intensity decreased with MIT increased from 1 to 24h.



Summary

- Highly spatial variations in MIT were found among 24 meteorological regions with MIT ranging from 7 to 17h.
- MIT for most southern regions were increasing from spring through autumn.
- MIT do effect the event characteristics, which suggested MIT could be partly responsible for the difference of event characteristics from different places when they were compared.