



東華理工大學

EAST CHINA UNIVERSITY OF TECHNOLOGY

江西省数字国土重点实验室

The Key Laboratory of Digital Land and Resources



# Landslide risk mapping based on Random Forest algorithm in Ruijin, Jiangxi, China

**Xiaoting Zhou<sup>1</sup>, Weicheng Wu<sup>1\*</sup>, Ziyu Lin<sup>1</sup>, Guiliang Zhang<sup>2</sup>, Renxiang Chen<sup>2</sup>, Yong Song<sup>2</sup>, Tao Lang<sup>2</sup>, Penghui Ou<sup>1</sup>, Wenchao Huangfu<sup>1</sup>, Yang Zhang<sup>1</sup>, Lifeng Xie<sup>1</sup>, Xiaolan Huang<sup>1</sup>, Yaozu Qin<sup>1</sup>, Shanling Peng<sup>1</sup> and Chongjian Shao<sup>1</sup>**

<sup>1</sup> Key Laboratory of Digital Lands and Resources and Faculty of Earth Sciences, East China University of Technology, Nanchang, 330013 Jiangxi, China

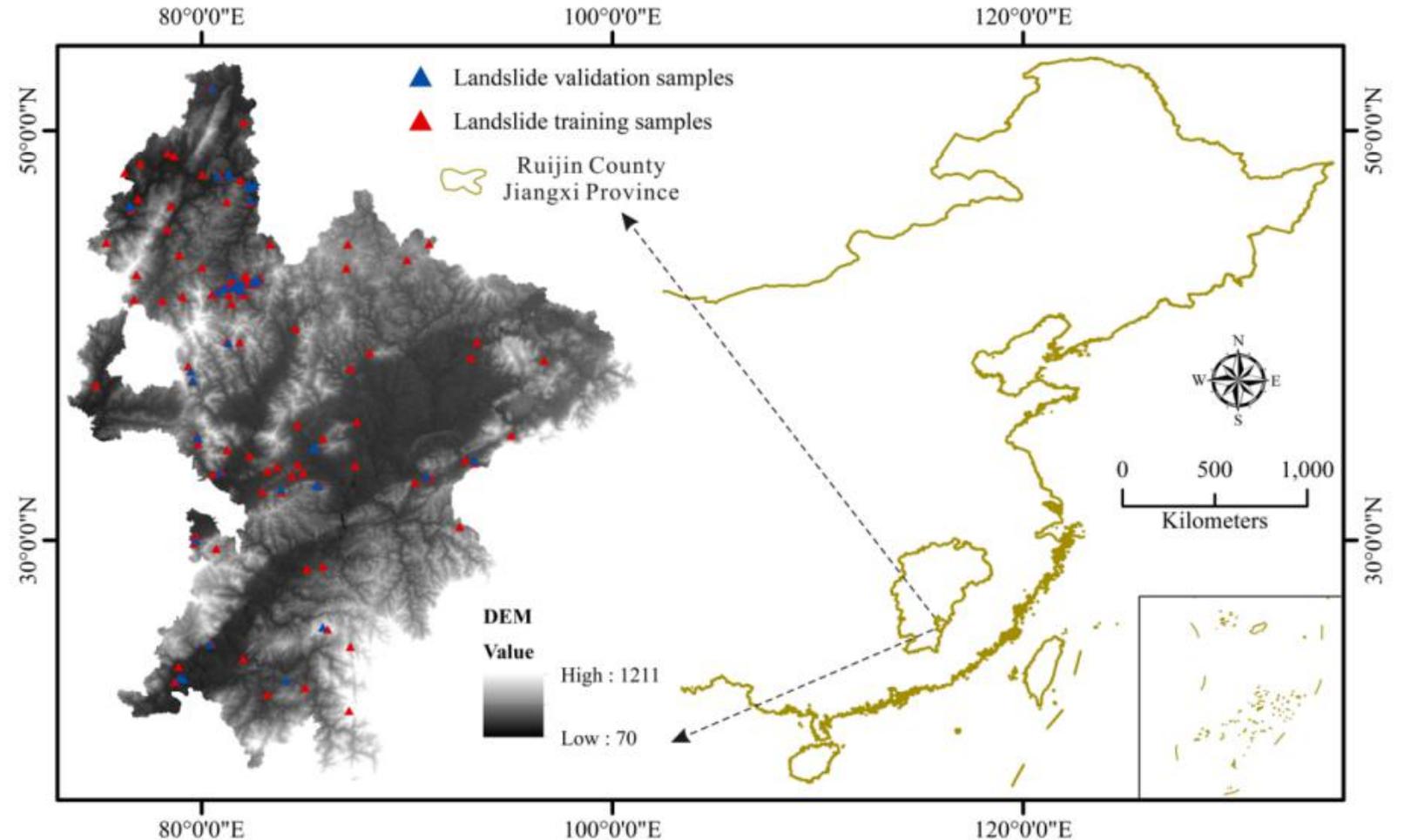
<sup>2</sup> 264 Geological Team of Nuclear Industry, Ganzhou, Jiangxi, China

\*Correspondence: [Wuwc030903@sina.com](mailto:Wuwc030903@sina.com)/ [201860012@ecut.edu.cn](mailto:201860012@ecut.edu.cn)

# *The study area*

Ruijin County is located in the southeast of Jiangxi Province, China, extending from  $115^{\circ} 41' 10'' \sim 116^{\circ} 21' 49''$  E in longitude and  $25^{\circ} 32' 15'' \sim 26^{\circ} 17' 45''$  N in latitude, covering an area of about 2436 km<sup>2</sup>.

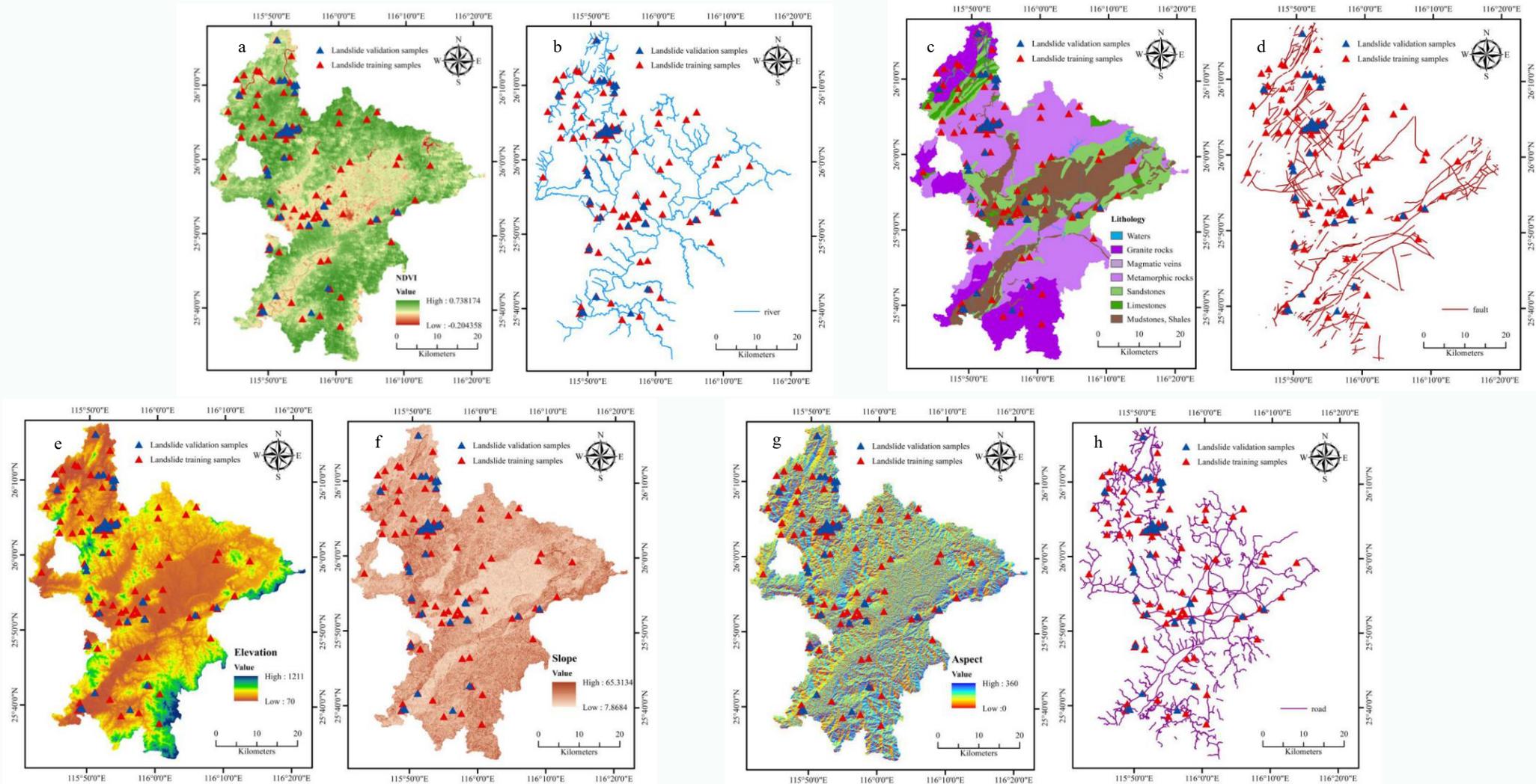
The hot and humid weather leads to severe weathering of rock mass leading to formation of a thick weathered crust in which most landslides take places in the study area. From the human side, artificial cutting on slope for infrastructure construction (such as roads and highways) and housing development, provokes instability of mass causing landslides.



Location of the study area, Ruijin County in Jiangxi province, China and location of the training and validation sites of landslides in the study area

# Data-landslide hazard factors

The raster factor layers of lithology, distance to fault, distance to lithostratigraphic boundary, thickness of the weathered crust, soil, sand (0-30cm), sand (30-100cm), clay (0-30cm), clay (30-100cm), elevation, slope, aspect, plan curvature, profile curvature, NDVI, rainfall, distance to river and distance to road were stacked together to compose an optical-radar combined 18-band dataset in Universal Transvers Mercator (WGS\_84\_UTM\_50 N).



Landslide hazard factors: (a) NDVI (b) River (c) Lithology (d) Fault (e) Elevation (f) Slope (g) Aspect (h) Road

## *Data-historic landslide records*

155 historical landslides from 1970 to 2013 year were obtained from 1:50,000 geological hazard survey of Ruijin Country and verified in field. These landslides are characterized by different sizes varying from 2 m<sup>2</sup> to 64000 m<sup>2</sup>.

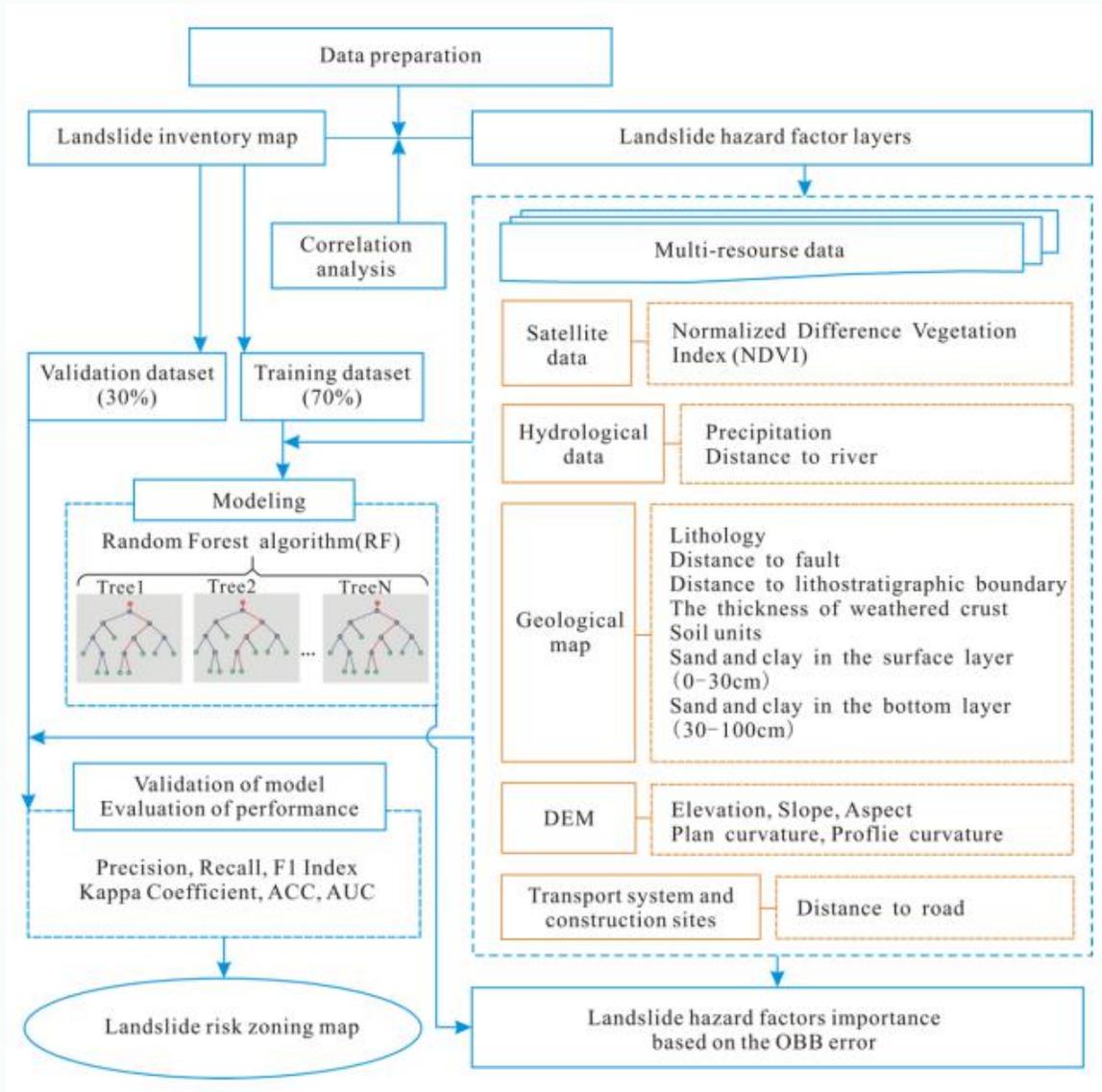
The stable areas were identified on Google Earth images with the slope values less than 1 degree, and they were mainly flat region of water bodies, urban areas, and cultivated land. Landslides with an area greater than 900m<sup>2</sup> were also identified and delineated on Google Earth.

In addition, we randomly selected 109 (70%) landslide samples as the training set to generate [model](#) and 45 (30%) landslide samples as the verification set for validation purposes (Pourghasemi et al., 2013).



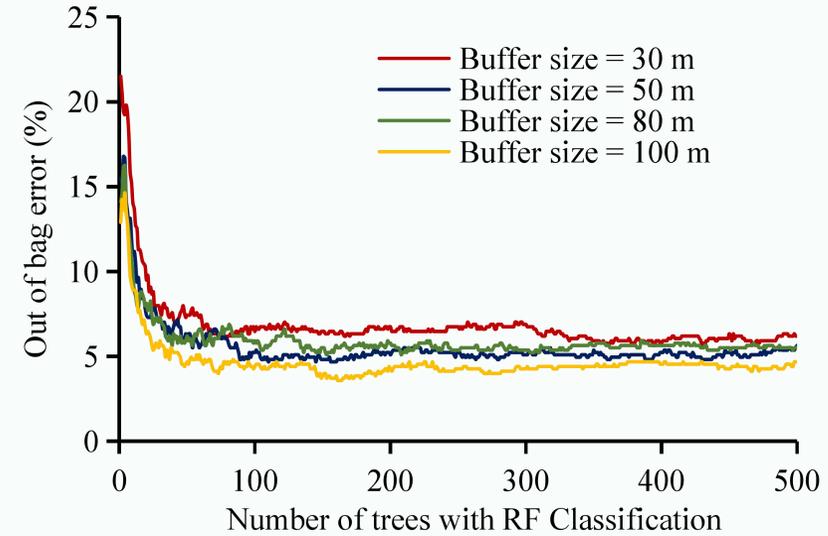
Oblique views of landslides in Google Earth images. The locationcoordinates

# Methods-RF Classification



# Result-Evaluation and validation of Model

- OOB error plot of the RF Classification model



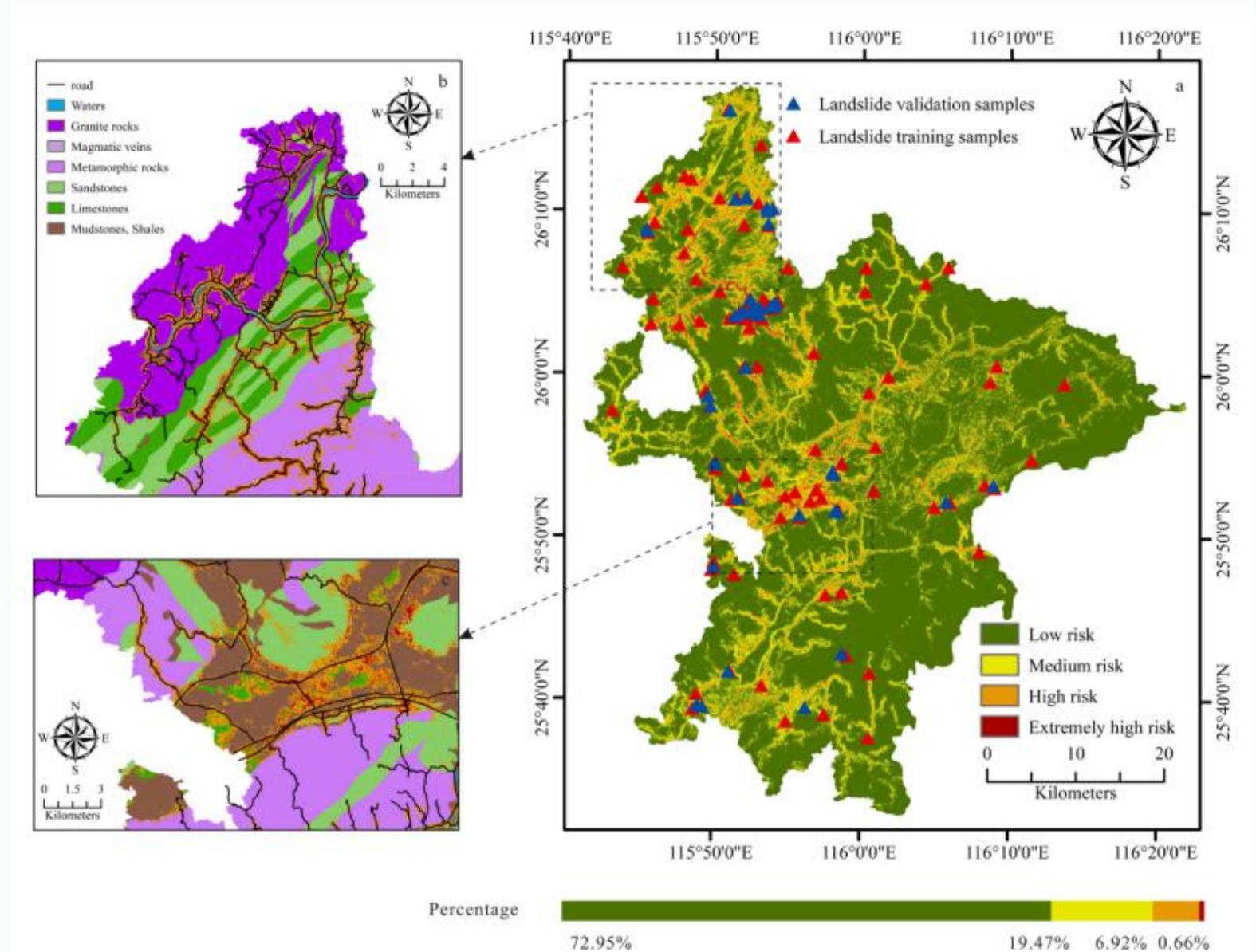
- Analysis of performances using training dataset and validation dataset for the RF Classification model

Item	Training Dataset	Item	Validation Dataset
Precision (%)	94.53	Precision (%)	92.86
Recall (%)	95.28	Recall (%)	87.84
F1 Index (%)	94.90	Kappa Coefficient (%)	84.32
Accuracy (%)	94.91	Accuracy (%)	92.18

Ntree = 300, Buffer Size = 80 m

## *Result-Landslide risk zoning mapping by RF Classification model*

According to the results of landslide risk zoning, the prediction results of the landslide disaster area in the study area were basically consistent with the field survey. (1) High-risk areas of landslide were mainly linearly distributed, characterized by near river and road. (2) In the center of the study area, high-risk areas of landslide concentrated in the Quaternary soil layer, especially at the boundary of lithologic strata. (3) In the hard granite strata, there were also obvious high-risk areas linearly distributed along the road.



The landslide risk zoning map of Ruijin County



東華理工大學

EAST CHINA UNIVERSITY OF TECHNOLOGY

江西省数字国土重点实验室

The Key Laboratory of Digital Land and Resources



Thank you for your attention!