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Supplementary material for

Integrating remotely sensed fuel variables into wildfire danger assessment for China

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S1. Fuel moisture content (FMC) Validation

A total of 377 FMC field measurements taken in grasslands and forest areas from 2001 to 2020 over 7 sites distributed in western China were used for validating the FMC retrieval methodology (Table S1). Samples were collected from the grassland and forest canopies, including live and dead foliage and stems in the case of grasslands and only foliage from the overstory forest. FMC was retrieved using radiative transfer models and the observed vs predicted relationship showed an overall $R^2 = 0.69$ and RMSE = 40.86% (Fig. S1). We show an example of the FMC distribution across China in Fig. S2. Full details on this methodology have been provided elsewhere (Quan *et al.* 2015; Quan *et al.* 2016; Quan *et al.* 2017a; Yebra *et al.* 2018; Luo *et al.* 2019).

Table S1. FMC field sites.

Sites	Fuel class	Latitude	Longitude	*n*
Wutumeiren	Grassland	92.585	37.205	84
Ruoergai	Grassland	102.66	33.982	50
Qinghaihu	Grassland	100.554	37.191	135
Lushan	Forest	102.267	27.835	41
Muli	Forest	102.190	28.255	42
Wuquanzhen	Forest	102.451	24.963	15
Baigongyan	Forest	104.2987	30.576	10

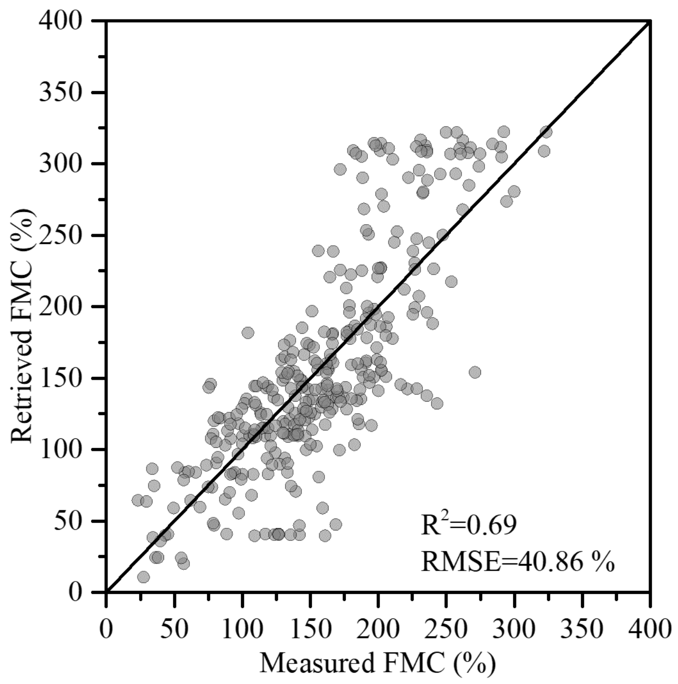

Figure. S1 Scatter plots of FMC retrievals vs. measurements.

S2. Foliage fuel load (FFL) validation

A total of 320 FFL measurements were sampled at 30 × 30 m scale over the grassland and forest regions in China (Table S2). For grassland, 3 subplots (0.5 × 0.5 m) were randomly selected to destructively sample the aboveground grass by removing all grass to the ground level. For the forest, the leaf area index (LAI) and crown coverage (ccov) of the tree canopy were measured using a fisheye camera system (Hemiview & EOS60D & Sigma EX DC4.5), and the width and height of trees were measured using a laser altimeter (ORPHA 800A). The tree foliage was measured using a portable power projectile, and the shape and type of tree crowns were also recorded. A GPS was then used to locate the geographical position of each sample which were immediately sealed in plastic bags to prevent the loss of water and transported to the laboratory for further processing: samples were weighed (fresh weight, W_{fresh}), over-dried for 24 hours at 105 ºC for grass and 48 hours at 70°C for the forest, and then weighed again (dry weight, W_{dry}). For more details on the field data, please refers to (Quan *et al.* 2017a; Quan *et al.* 2017b). The FFL was firstly retrieved using radiative transfer model from MCD43A4 products. The accuracy of retrieved FMC was validated using these above field measurements as listed in Table S1, with the overall R^2 = 0.66 and RMSE = 0.08 kg/m^2 (Fig. S3). An example of the FFL distribution of China was showing in Fig. S4.

Table S2. FFL field sites.

Sites	Fuel class	Latitude	Longitude	*n*	FFL_{mean} (kg/m^2)	FFL_{std}
Wutumeiren	Grassland	92.585	37.205	84	0.18	0.16
Ruoergai	Grassland	102.66	33.982	50	0.43	0.15
Qinghaihu	Grassland	100.554	37.191	135	0.12	0.05
Lushan	Forest	102.267	27.835	41	0.15	0.08
Baigongyan	Forest	104.2987	30.576	10	0.15	0.05

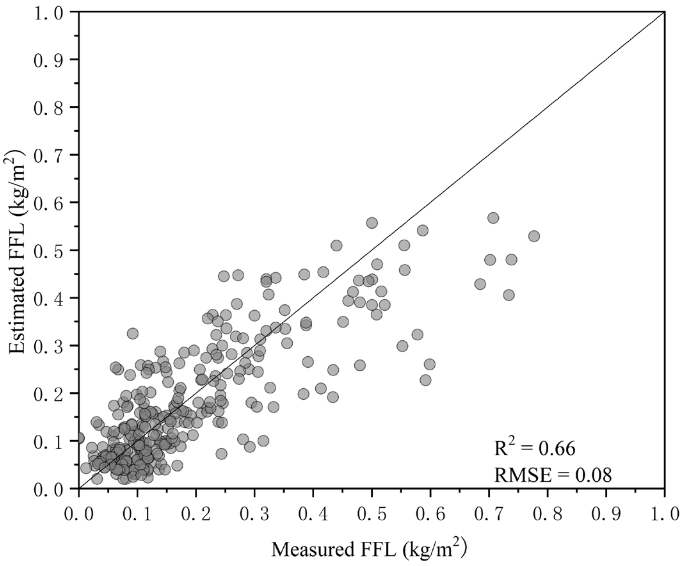

Figure. S2 Scatter plots of FFL estimates vs. measurements.

S3. Vegetation distribution map

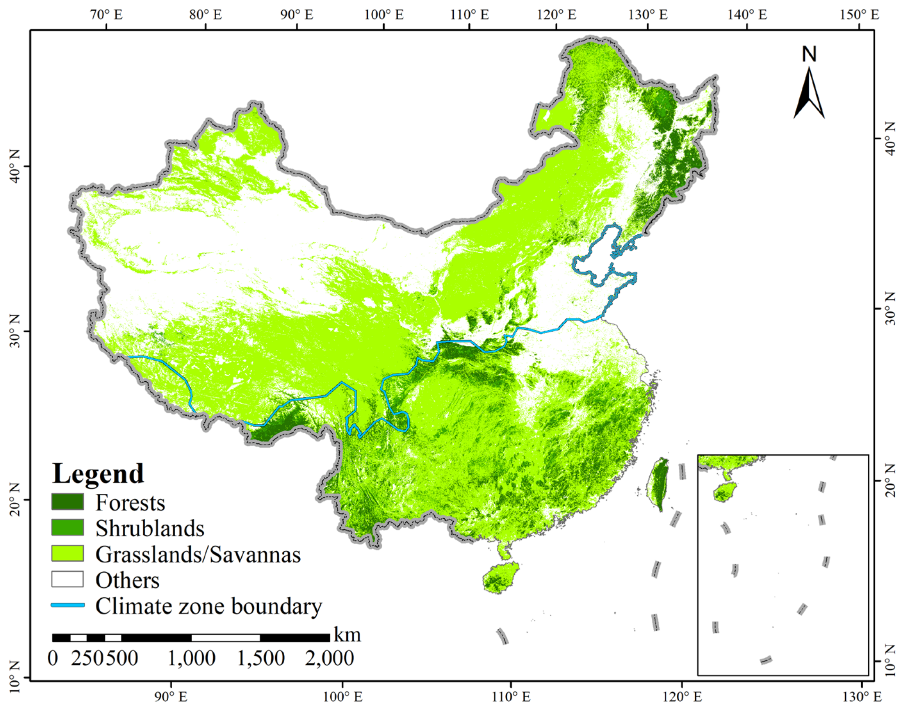

Figure. S3 Vegetation distribution map for the study area.

S4. Spatial distribution of these explanatory variables

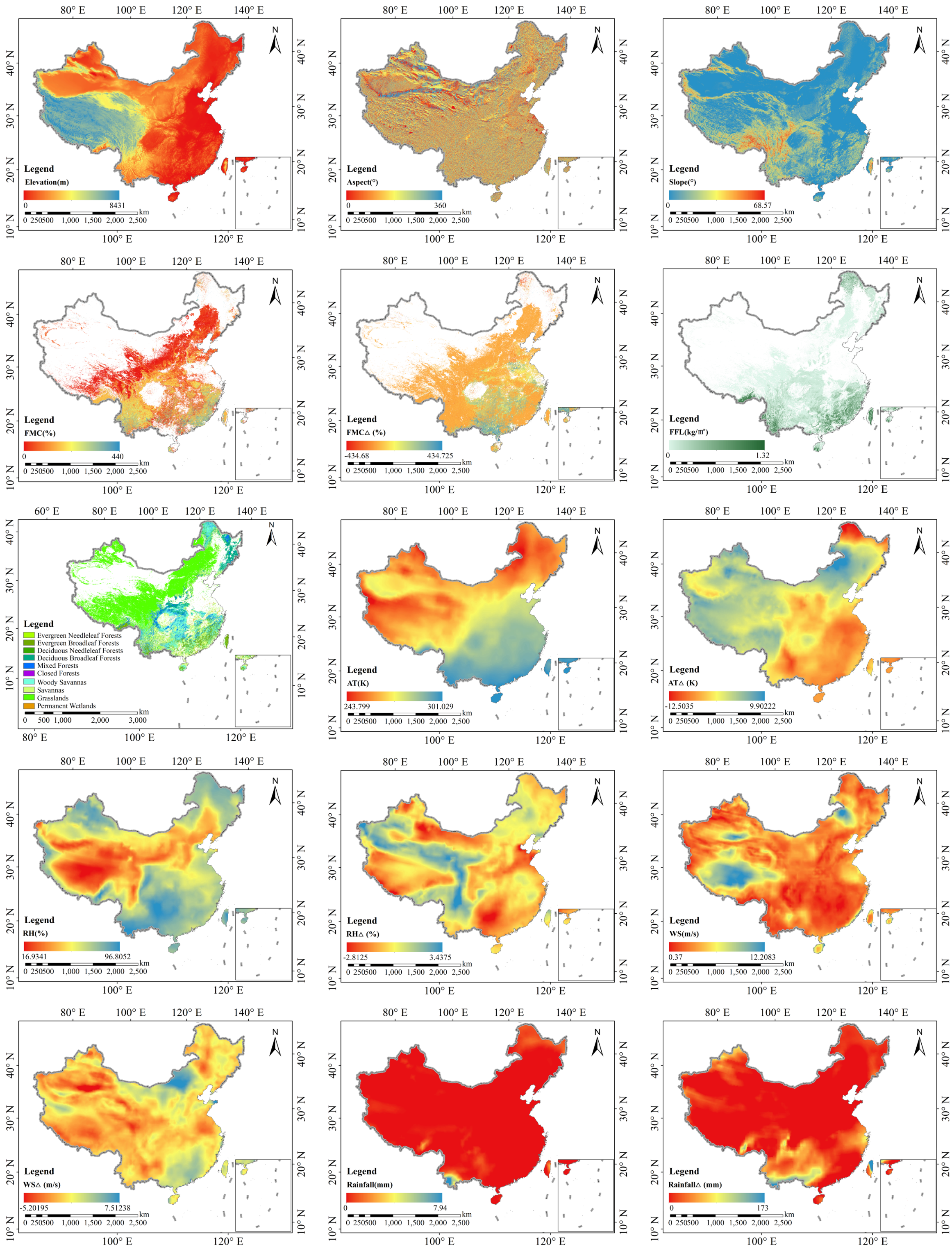

Figure. S4. Example data for the spatial distribution of the topography (aspect, elevation, and slope), fuel (FFL, vegetation class, FMC, FMC_{Δ}), and weather (rainfall, RH, T, WS, RH_{Δ}, AT_{Δ}, $rainfall_{\Delta}$, and WS_{Δ}) derived explanatory variables as regulated by the 'fire environment triangle'. The vegetation class, FFL, FMC, and weather variables were from the first day of 2019 and topography variables from the year 2011.

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