	Expression function	Dependent variable	R^2
Formula 1	Y=9.5819x-9667.7	Shadow	0.98
Formula 2	$Y=-.32483x^2+4.4946x+6.487$	Nightlight index	0.61

Table 1. The two regression functions

We can see that, floor area ratio obtained from the shadow is quite accurate, for the geometry information is clear in high resolution images, Floor area ratio and shadow have lineal expression, for shadow area is proportional to the area of buildings; while the floor area ratio obtained from the nightlight index is more uncertainty, for nightlight information is easily disturbed and damped by other factors, such as clouds, frost, and other chance events etc., especially, lights of upper floor will conceal lights of down floors; moreover, it will saturate when the lights adding to an extent, which conduct to an exceeding of the sensitivity of the remote sensor, all these cause the results that nightlight index and floor area ratio have quadratic polynomial expression.
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From the figures of volume rate distribution and the nightlight distribution, we can find out that, in the prosperous center of the city, such as streets of Gulou Districts and Jianye Districts, both volume rate and light index are high, and those of the surrounding areas are lower, as for Jiangning District, who is in better development style, its volume rate and light index are all in a moderate position. The nightlight index is not fully correspond to the buildings volume rate in high-rise forest area, the reason is the overlay and overlay by each other.

The level of building floor volume rate and the nightlight index is relatively synchronize, the heavier the night light value of the area, the higher the building floor area ratio, it is square polynomial function, that is, the growth rate is slower than the volume rate, and gradually tend to an extreme point. The increase in floor area ratio does not lead to an infinite increase in the light index which is mainly because of high-rise lighting superimposed effect, with additional traffic networks streetlights and other factors impaction on the city. According to this, we can draw the rule: average night light brightness of the street is limited to a certain extent.

5. CONCLUSION

From the results and the processing of buildings volume rate from ZY-3 images and from VIIRS nightlight data, they are all usable in different certain content. We can get a conclusion though the model and the deterministic coefficient that, ZY-3 images can imply the floor area ratio inversion of urban street administrative level after precisely shadow extraction; VIIRS/NPP nightlights data may show the floor area ratio in an extent after some proceeding. In future, we can try to improve the efficiency by two methods, one is mending the nightlight index accumulation method, the other is merging the nightlight index with the high resolution remote sensing images classification results. Nightlight data will contribute more in urban cognition and analysis.

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