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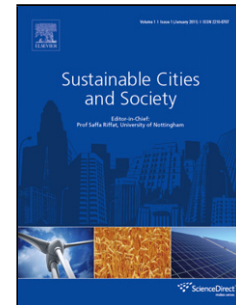
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1 Comparison of urban heat island and urban 2 reflection in Nanjing City of China

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9 Highlights:

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- 11 1. We illustrated the linear relation between land surface temperature and urban
12 reflectance.
- 13 2. The land surface temperature mainly has negative relation with vegetation surface at the
14 rate of $Y = -X$ and $Y = -2.5X$.
- 15 3. There is mainly positive relation between land surface temperature and substrate surface
16 at the rate as $Y = X$ and $Y = 2.5X$.
- 17 4. The land surface temperature has mainly negative relation with dark surface at the rate
18 of $Y = -3X$.
- 19 5. Some abnormal phenomenon is caused by the mixed pixels and moisture soil.
- 20 6. The intensity of land surface temperature also influences the population number and
21 precipitation as the equator of $Y = 4.2503X + 590.7$ and $y = 2.3811x + 14.986$.

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24 **Abstract:** The spectral properties and surface temperature of land cover influences the urban
25 environmental conditions. This research takes the Nanjing city in Jiangsu Province of China as a
26 case. The urban reflectance is grouped into three types (substrate, vegetation and water) by linear
27 spectral mixture. The substrate surface in Nanjing is expanding from the central urban area to the
28 suburbs during, but the intensity of substrate surface in the central urban has weakened since 2007.
29 The land surface temperature mainly has negative relation with vegetation surface at the rate of $Y =$
30 $-X$ and $Y = -2.5X$. There is mainly positive relation between land surface temperature and substrate
31 surface at the rate as $Y = X$ and $Y = 2.5X$. The land surface temperature has mainly negative relation
32 with dark surface at the rate of $Y = -3X$. Some abnormal phenomenon is caused by the mixed pixels
33 and moisture soil. At the same time, the intensity of land surface temperature also influences the
34 population number and precipitation as the equator of $Y = 4.2503X + 590.7$ and $y = 2.3811x + 14.986$. The
35 linear quantitative relation between land surface temperature and vegetation, substrate and dark
36 surface are potential to apply for ecologic, hydrologic and climate models and for a reasonable land
37 planning.

38 **Keywords:** Land surface temperature; Urban reflection; Linear spectral unmixing; Nanjing;

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40 1. Introduction

41 There are two important problems related to urban heat island effect: (1) How much
42 temperature increase is caused by urban heat island? (2) How the ecosystems respond to global
43 warming? At present, the majority of developing counties in the world are experiencing rapid
44 urbanization and industrialization. Over the past 20 years, rapid urbanization has led to dramatic

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