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作者	单位	E-mail
<a href="#">李辉</a>	<a href="#">中国地质大学地球科学学院,武汉 430074</a> ; <a href="#">中国地质大学教育部长江三峡地质灾害研究中心,武汉 430074</a>	
<a href="#">彭松柏</a>	<a href="#">中国地质大学地球科学学院,武汉 430074</a> ; <a href="#">中国地质大学教育部长江三峡地质灾害研究中心,武汉 430074</a>	
<a href="#">乔卫涛</a>	<a href="#">中国地质大学地球科学学院,武汉 430074</a>	
<a href="#">林木森</a>	<a href="#">中国地质大学地球科学学院,武汉 430074</a>	
<a href="#">王振胜</a>	<a href="#">中国地质大学地球物理与空间信息学院,武汉 430074</a>	
<a href="#">田礼乔</a>	<a href="#">武汉大学测绘遥感信息工程国家重点实验室,武汉 430079</a>	<a href="mailto:tianliqiao@lmars.whu.edu.cn">tianliqiao@lmars.whu.edu.cn</a>

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摘要:

腾冲火山地热区位于印度板块与欧亚板块俯冲-碰撞带的弧后活动区,是我国新生代火山-地热最为活动的地区之一。本文利用MODIS夜间月平均地表温度(Land Surface Temperature, LST)数据,计算了研究区2001~2011年132个月的月平均地表温度,圈定了地温异常区;分析了异常区内及年际间的平均地表温度变化趋势,推测了可能的地下岩浆囊分布位置及活动特征。研究表明,腾冲地区现今地下可能存在3个岩浆囊:第1个位于五合-新华-蒲川-团田一带,面积约为537km<sup>2</sup>,地温异常最明显;第2个位于朗蒲-热海-马鞍山地区,面积约为226km<sup>2</sup>,地温异常次之;第3个位于马站-曲石之间,面积约为28km<sup>2</sup>,地温异常较为明显。3个地温异常区在年内的地表温度变化趋势基本一致,而且周期性明显,均在5~6月份和8~9月份出现2个温度峰。其中朗蒲-热海-马鞍山异常区的地温变化波动最大,可能反映地下岩浆囊地热系统与地表地下水系统的对流交换活动性更强。MODIS夜间月平均地表温度数据得出的结果与测震、GPS形变、He同位素比值及最大相对地热梯度等方法推测的地温异常区范围具有很好的一致性,特别是地温异常区内温度周期性变化的发现,表明卫星热红外遥感技术应用于地热异常实时监测与研究的巨大潜力。

英文摘要:

Tengchong volcanic geothermal area is located at the active arc zone of the subduction and collision of the Indian plate and Eurasian plates, and is considered as one of the most potentially active volcanic eruption areas in China. In order to study the spatial distribution and activity of the underground magma chamber, MODIS LST (Land Surface Temperature) data were used to identify the geothermal anomalies that may be created by the heating from the underground magma chamber. The monthly night MODIS LST data from Mar. 2000 to Mar. 2011 of the study area were collected and analyzed. The 132 month average LST map was derived and three geothermal anomalies were identified. In the light of the previous studies in this area, it can be deduced that there are three magma chambers beneath the three thermal anomalies. The first one is located along Wuhe-Xinhua-Puchuan-Tuantian with the most significant geothermal anomaly, and covers 537km<sup>2</sup>. The second one is situated in the Langpu-Rehai-Maanshan area with a significant geothermal anomaly and an area of 226km<sup>2</sup>. The third one is located between Mazhan and Qushi with an obvious geothermal anomaly and a coverage of 28km<sup>2</sup>. It is also found that the patterns of the monthly LST variation of the three thermal anomalies are similar, with 2 temperature peaks occurring in May, June and August, September, which is different from that of the local temperature of the same period. The 10-year annual LST of the geothermal anomaly in Langpu-Rehai-Maanshan area shows the greatest variations among the three, which suggests the active convective exchange of heat between the underground magma chamber and the surface water, and can be inferred that the beneath this magma chamber is the most active among the three. The findings of this study agree well with the results from seismology, GPS-based deformation detection, He isotopic emission and relative geothermal gradient measurement. It demonstrates the effectiveness and potential of thermal infrared remote sensing in geothermal studies.

关键词: [岩浆囊分布](#) [MODIS LST](#) [地热异常](#) [热红外遥感](#) [腾冲](#)

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黔ICP备07002071号-2

主办单位：中国矿物岩石地球化学学会

单位地址：北京9825信箱/北京朝阳区北土城西路19号

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