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Applying Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) spectral indices for geological mapping and mineral identification on the Tibetan Plateau

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(Submitted on 18 Jul 2011)

The Tibetan Plateau holds clues to understanding the dynamics and mechanisms associated with continental growth. Part of the region is characterized by zones of ophiolitic melange believed to represent the remnants of ancient oceanic crust and underlying upper mantle emplaced during oceanic closures. However, due to the remoteness of the region and the inhospitable terrain many areas have not received detailed investigation. Increased spatial and spectral resolution of satellite sensors have made it possible to map in greater detail the mineralogy and lithology than in the past. Recent work by Yoshiki Ninomiya of the Geological Survey of Japan has pioneered the use of several spectral indices for the mapping of quartzose, carbonate, and silicate rocks using Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) thermal infrared (TIR) data. In this study, ASTER TIR indices have been applied to a region in western-central Tibet for the purposes of assessing their effectiveness for differentiating ophiolites and other lithologies. The results agree well with existing geological maps and other published data. The study area was chosen due to its diverse range of rock types, including an ophiolitic melange, associated with the Bangong-Nujiang suture (BNS) that crops out on the northern shores of Lagkor Tso and Dong Tso ("Tso" is Tibetan for lake). The techniques highlighted in this paper could be applied to other geographical regions where similar geological questions need to be resolved. The results of this study aim to show the utility of ASTER TIR imagery for geological mapping in semi-arid and sparsely vegetated areas on the Tibetan Plateau.

Comments: 6 pages, 4 figures, 2 tables, Published in the International Archives of the Photogrammetry, Remote Sensing, and Spatial Information Science, Volume XXXVIII, pp. 464-469.

For associated web page, see this http URL

Subjects: **Geophysics (physics.geo-ph)**; Computer Vision and Pattern Recognition (cs.CV)

Journal reference: International Archives of the Photogrammetry, Remote Sensing, and Spatial Information Science, XXXVIII (2010) 464-469

Cite as: **arXiv:1107.3499 [physics.geo-ph]**

(or **arXiv:1107.3499v1 [physics.geo-ph]** for this version)

Submission history

From: Robert Corrie [view email]

[v1] Mon, 18 Jul 2011 16:59:30 GMT (2323kb)

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