

Based on Landsat Thematic Mapper band 7 grayscale image (http://landsat.usgs.gov) Universal Transverse Mercator projection

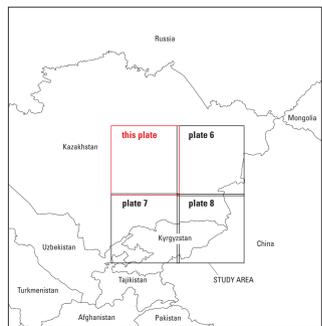
RATIO SCALE 1:660,000

50 25 0 25 50 MILES

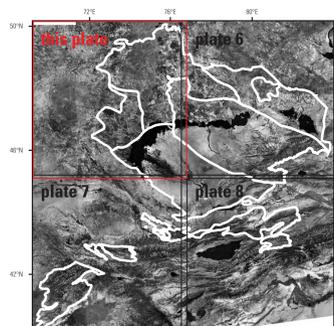
50 25 0 25 50 KILOMETERS

NATIONAL GEODETIC VERTICAL DATUM OF 1984

Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) hydrothermal alteration data were used to map potential porphyry copper sites. See table 2 (available online only at <http://pubs.usgs.gov/sir/2010/5090/>) for physical characteristics and locations of potential porphyry copper sites, listed by site number.



Index map showing location of study area, this map area (red outline), and bordering map areas (black outlines).



Index map showing location of this ASTER hydrothermal alteration map area (red outline), bordering map areas (black outlines), and permissive tract boundaries (white outlines).

**EXPLANATION**

[NOTE FOR PLOT USERS: Small, isolated data areas may be difficult to see on plots; see files for detail (<http://pubs.usgs.gov/sir/2010/5090/>)]

Alteration units, mapped using ASTER data

- Phyllic-altered rocks
- Silicic-altered rocks
- Argillic-altered rocks
- Permissive tract boundary
- Potential porphyry copper site

**ASTER Hydrothermal Alteration Map and Potential Porphyry Copper Sites of Northwestern Part of Study Area, Central Kazakhstan, Western Central Asia**

By  
**John C. Mars**  
2014

Any use of trade, product, or firm names in this publication is for descriptive purposes only and does not imply endorsement by the U.S. Government.

This map was prepared on an electronic platform directly from digital files. Dimensional calibration may vary between electronic platforms and between files of different sizes. The scale and projection of the map may change due to atmospheric conditions, hardware, scale and projection may not be true on plots of the map.

For more information, contact the National Geospatial Data Center, Box 23086, Federal Center, Denver, CO 80223-1488, USA. (303) 495-0555

Digital files available at <http://pubs.usgs.gov/sir/2010/5090/>

Supporting data: Mars, J.C., 2014, ASTER hydrothermal alteration maps and potential porphyry copper sites of northwestern part of study area, western Kazakhstan, western Central Asia, plate 5 of 8 (porphyry copper sites), Plate 5, 2014, 1:660,000, U.S. Geological Survey, Reston, VA, 2014. (Available online only at <http://pubs.usgs.gov/sir/2010/5090/>)

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