

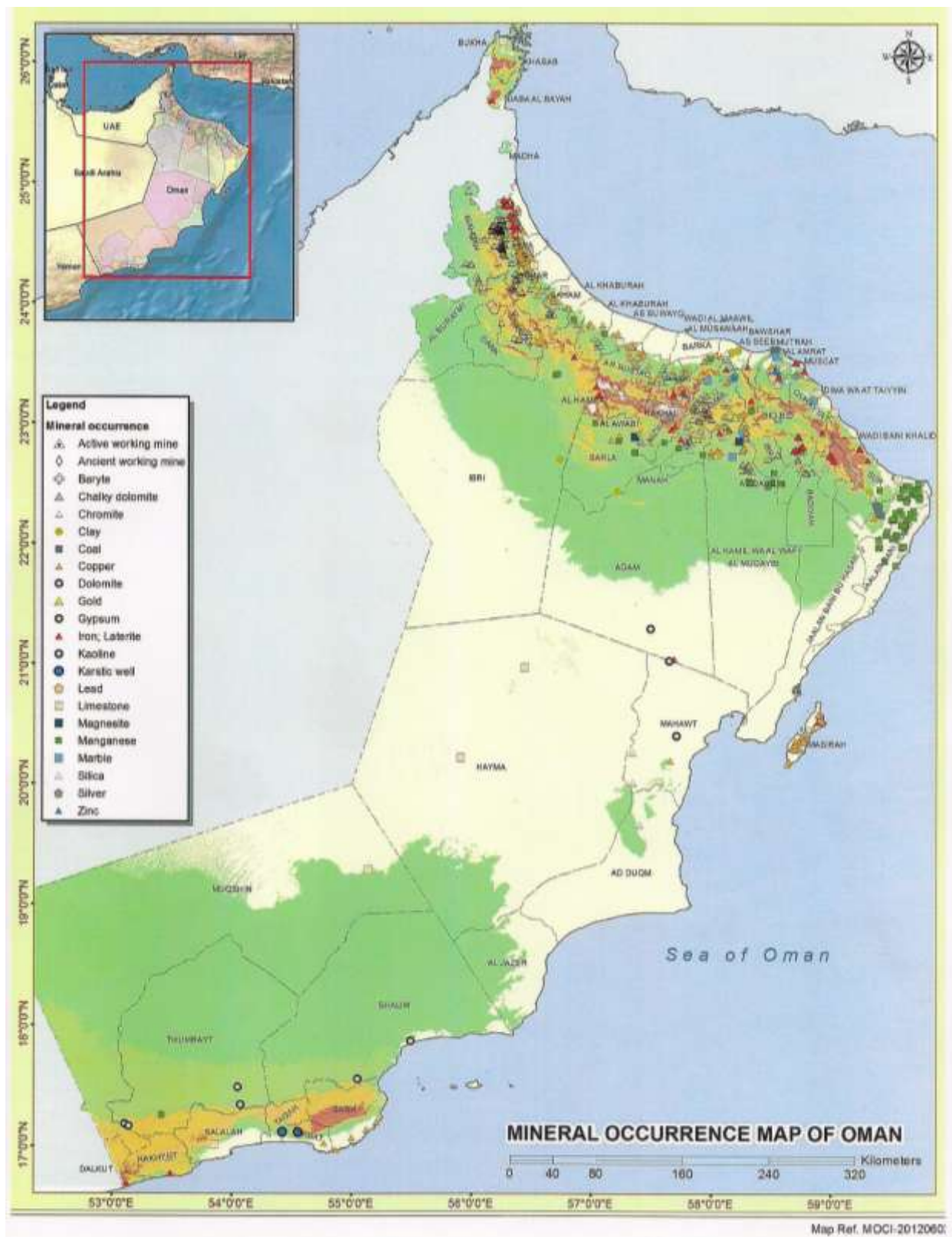


Figure 1. Minerals occurrence map of the Sultanate of Oman

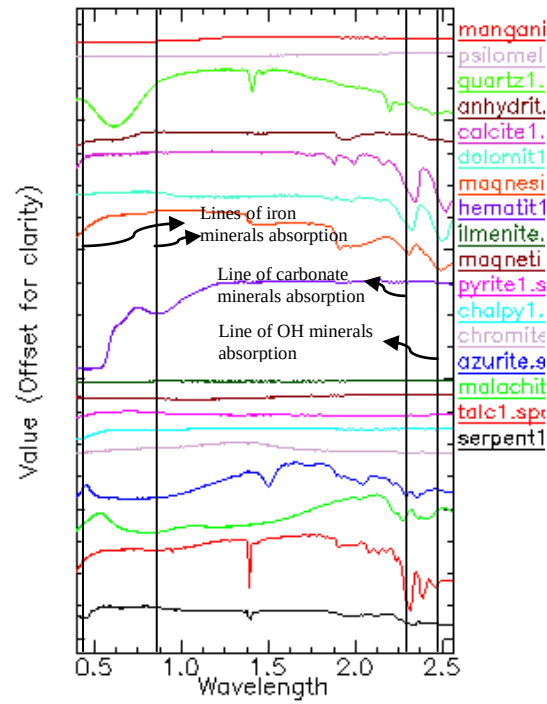


Figure 2. Spectral plot of major economic minerals stacked from the USGS Spectral Library (modified from Rajendran et al., 2013).

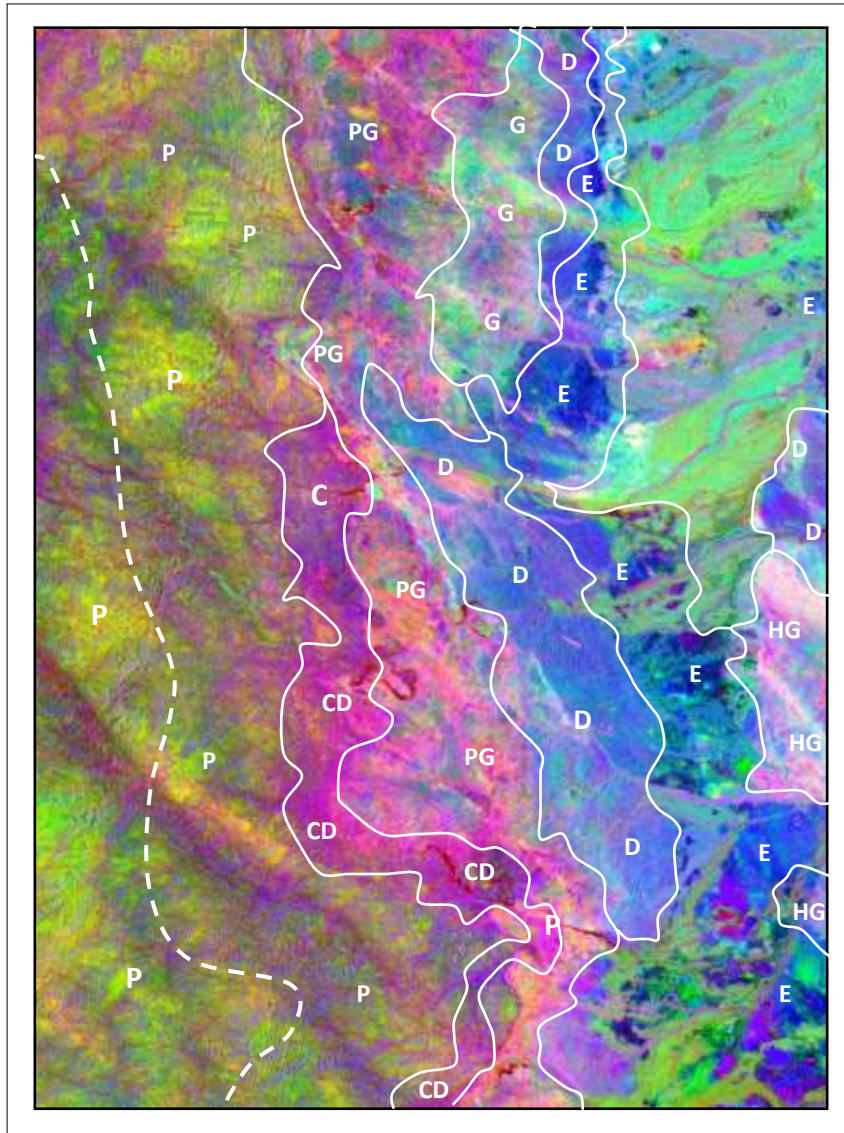


Figure 3. RGB image of PC5, PC4 and PC2 of PCA showing rocks of ophiolite sequence and zone of chromite mineralization. E- Basic extrusives mostly spilites with pillow lava or conglomerate; D- Diabase dyke swarms; G- Gabbro; HG- Gabbroid hypabyssal rocks; PG- Cumulate layered gabbro; P and CD- Sheared serpentized harzburgite (Rajendran et al., 2012).

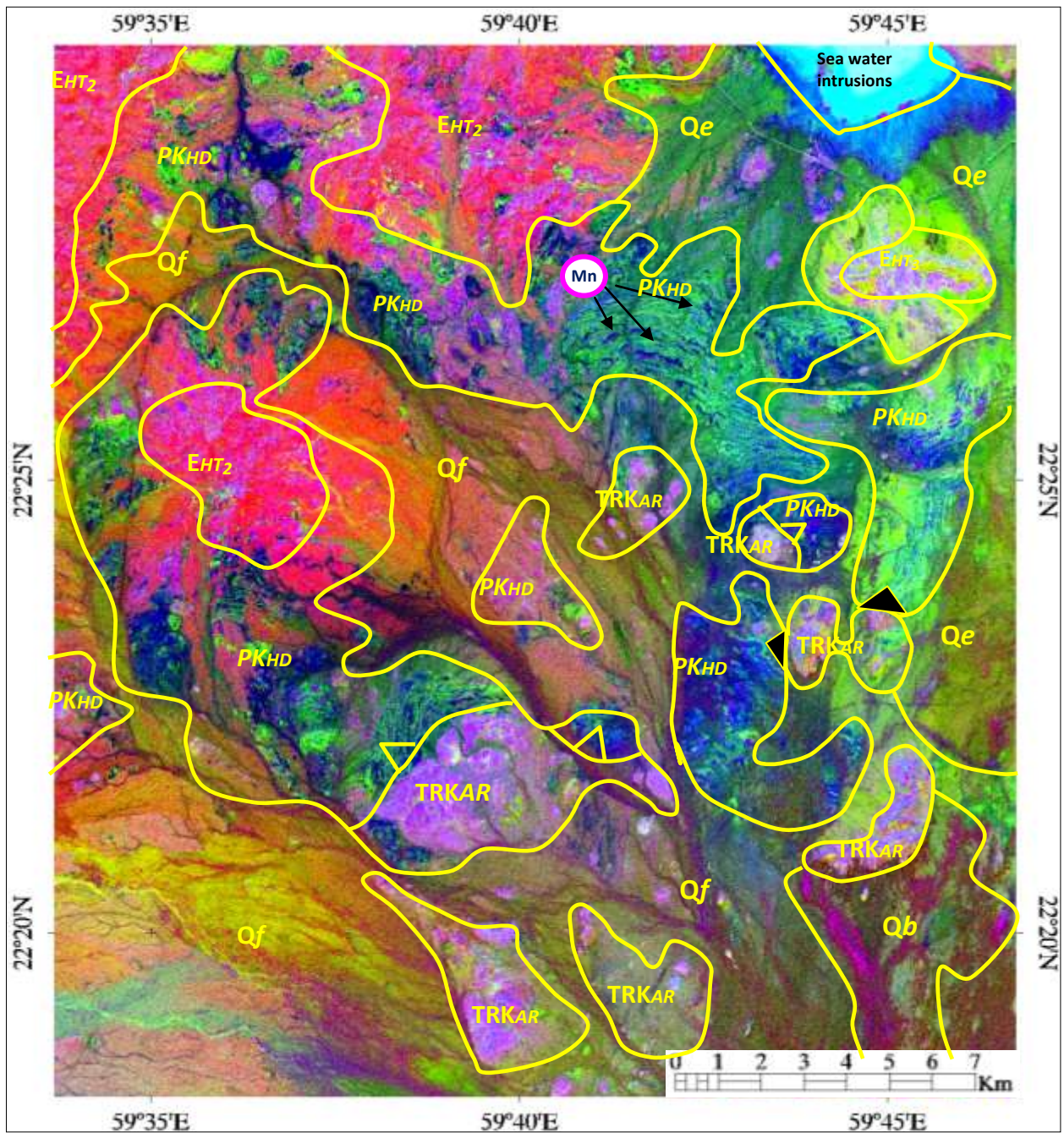


Figure 4. Principal Components RGB image (R: PC1, G: PC2 and B: PC3) showing the occurrence of manganese deposits in Ras Al Hadd region, Oman (Qf –Alluvial; Qb- Sabkhah; Qe-Aeolian; MF_2 - Middle Fars Group (Miocene to Pliocene); MF_1 - Lower Fars Group (Miocene to Pliocene); EM_D - Dhofar Group (Late Eocene to Early Miocene); E_{HT3} - Upper Hadhramut Group (Paleocene to Eocene); E_{HT2} - Middle Hadhramut Group (Paleocene to Eocene); TRK_{AR} - Al Aridh Group; PK_{HD} - Hamrat Duru Group) (Rajendran and Nasir, 2013a)

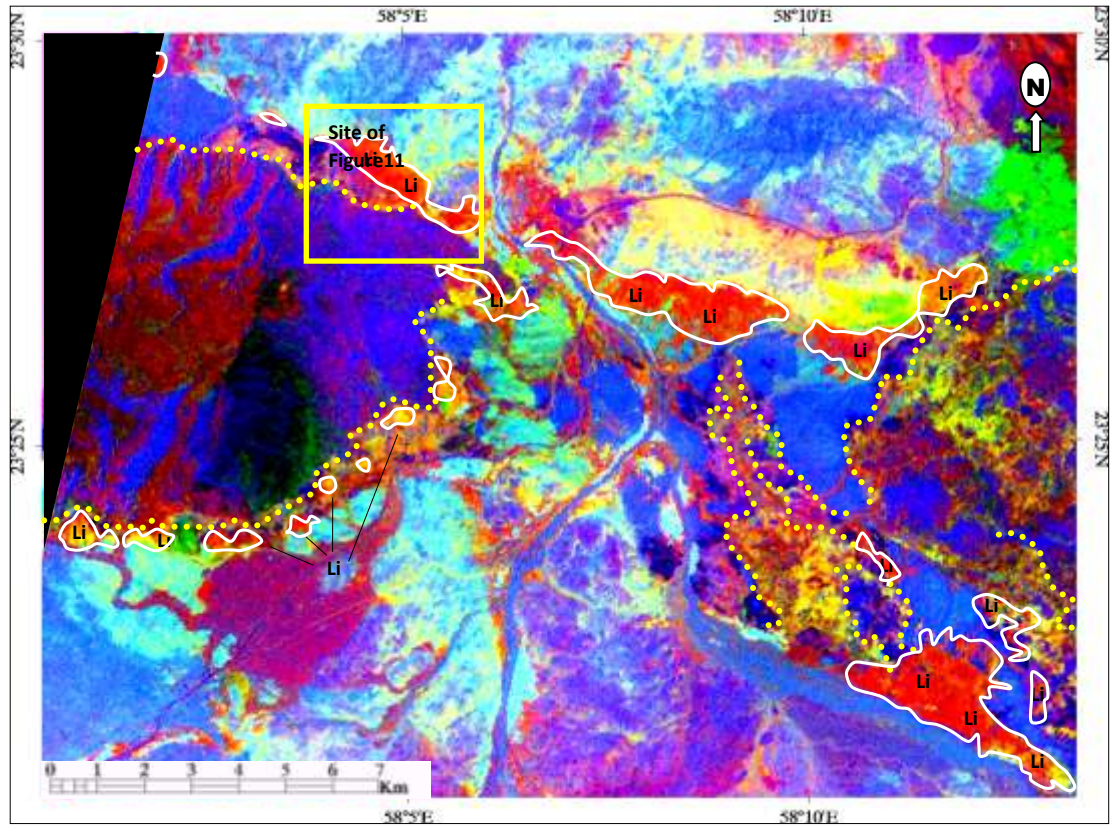


Figure 5. ASTER SWIR RGB (PC5, PC3 and PC1) image showing the presence of hydrothermal altered rock (listwaenite in dark red color marked as Li) and mineralized areas in range of colors interpreted along the thrust fault zones (dotted lines in yellow color) of the Fanjah area (Rajendran et al., 2013).

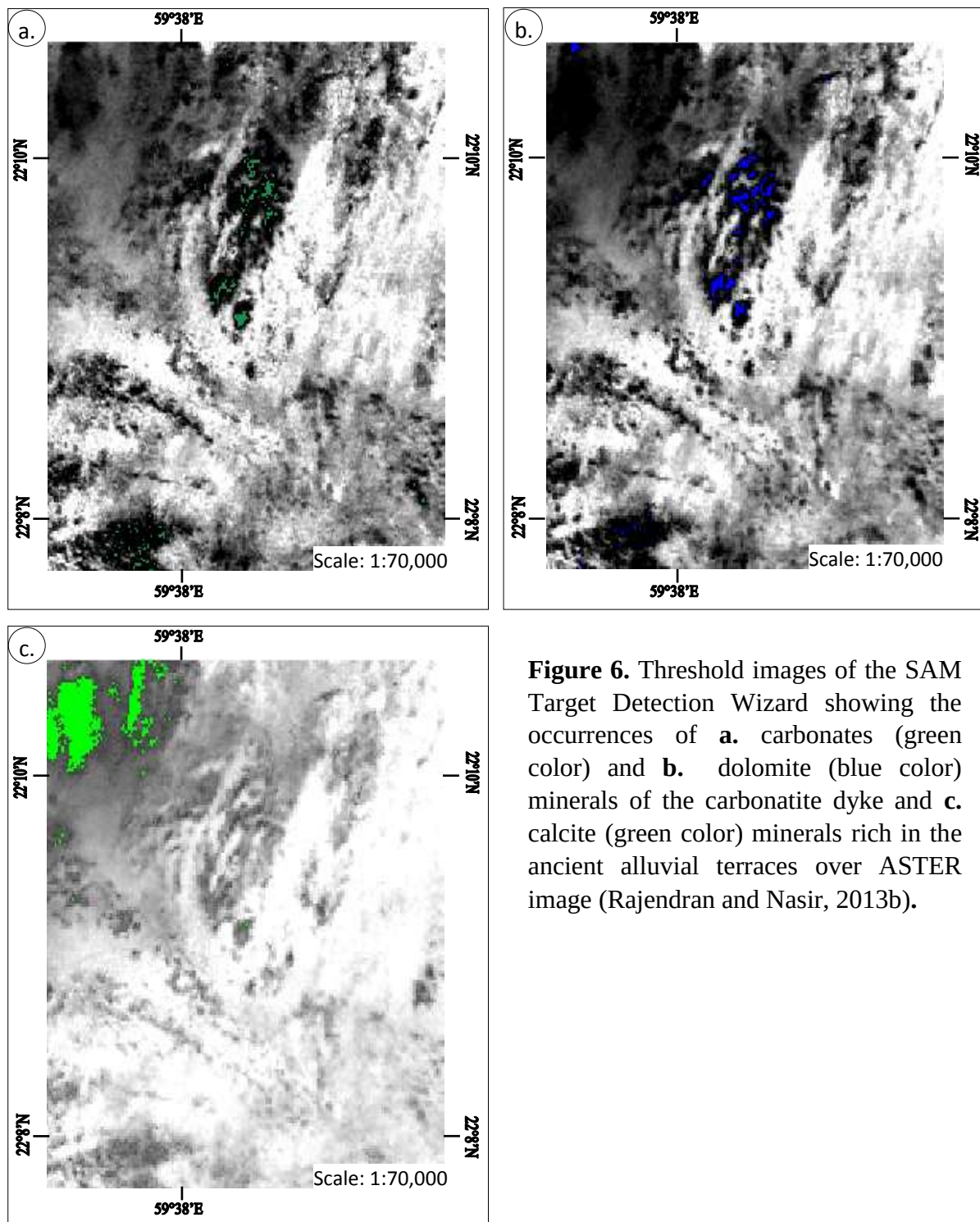


Figure 6. Threshold images of the SAM Target Detection Wizard showing the occurrences of **a.** carbonates (green color) and **b.** dolomite (blue color) minerals of the carbonatite dyke and **c.** calcite (green color) minerals rich in the ancient alluvial terraces over ASTER image (Rajendran and Nasir, 2013b).

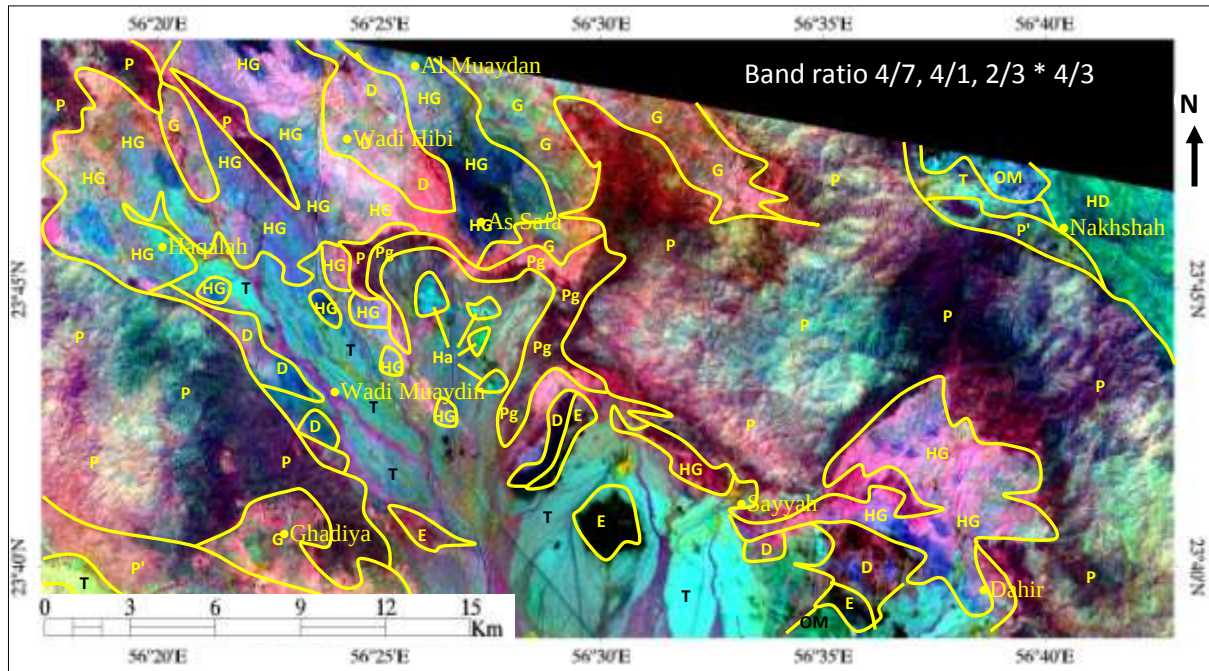


Figure 8. ASTER RGB band ratios (4/7, 4/1, 2/3*4/3) image (Rajendran and Nasir, 2014a) showing the hydrothermally altered serpentinized peridotites of study area. T – Tertiary formations; E- Basic extrusives mostly spilites with pillow lava; D- Diabase dyke swarms; HG- Gabbroid hypabyssal rocks; G- Gabbro; Pg- Peridotites with gabbro intrusions; P – Peridotites partly serpentinized; P' - strongly sheared serpentinized harzburgite, Ha- Haliw Formation; OM- Oman Melange; and HD – Hamrat Duru Formations.

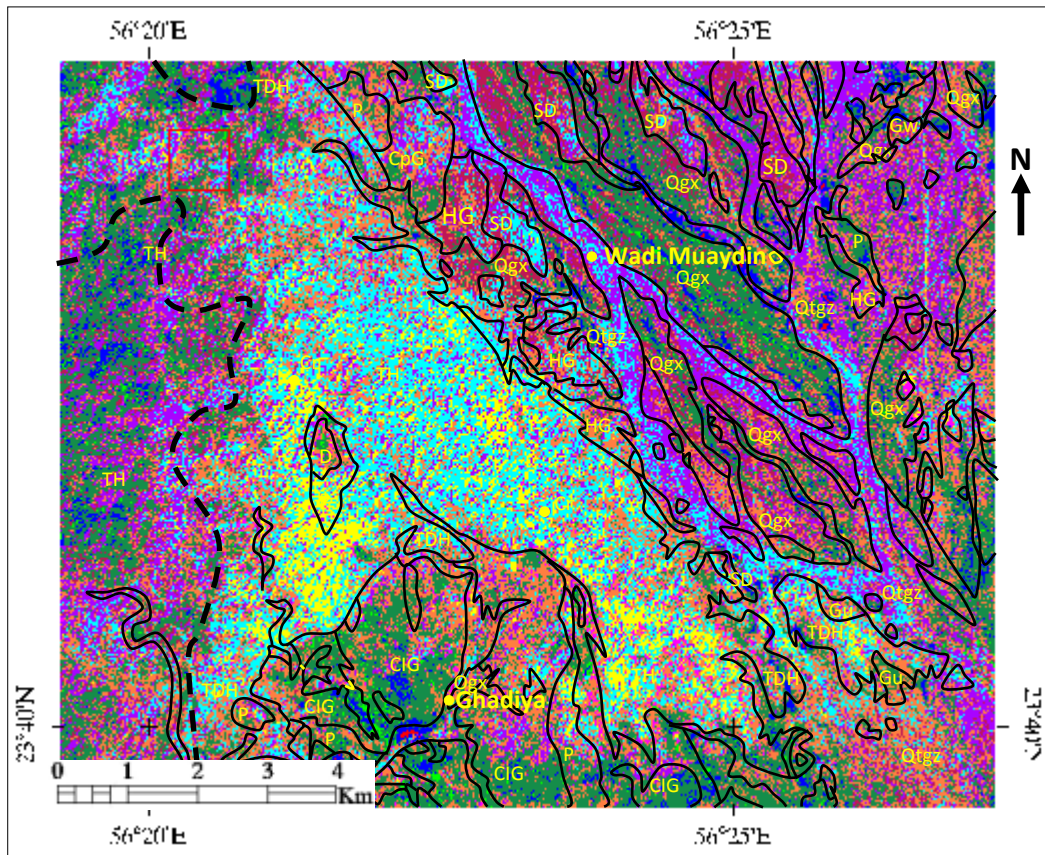


Figure 9. SAM classified image (Rajendran and Nasir, 2014a) showing the occurrence of hydrothermal altered serpentine minerals (cyan in color) within the serpentinized zone. The abbreviations of the image are T – Tertiary formations; E- Basic extrusives mostly spilites with pillow lava; D- Diabase dyke swarms; HG- Gabbroid hypabyssal rocks; G- Gabbro; Pg- Peridotites with gabbro intrusions; P – Peridotites partly serpentinized; P' - strongly sheared serpentinized harzburgite, Ha- Haliw Formation; OM- Oman Melange; and HD – Hamrat Duru Formations.

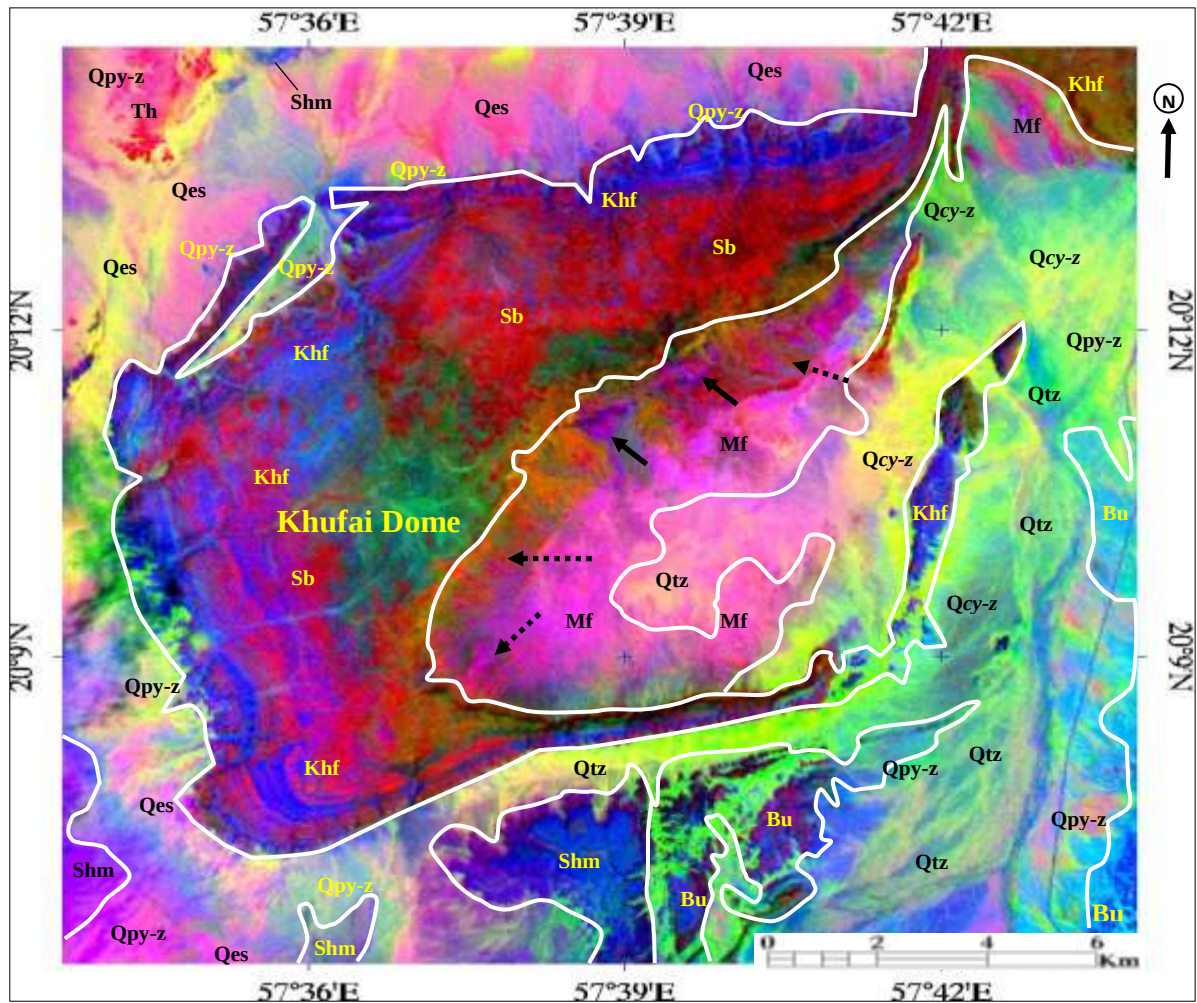


Figure 10. ASTER RGB image of PC1, PC2 and PC3 showing the occurrence of Huqf Super Group formations (Masirah Bay – Mf; Khufai – Khf; Shuram – Shm; Buah – Bu; Silicified breccias - Sb), the Haima Super Group formation (Thumaylah – Th) and the Quaternary formations (Qes, Qcy-z, Qpy-z, Qtz) in and around the Khufai Dome (Rajendran, 2016).

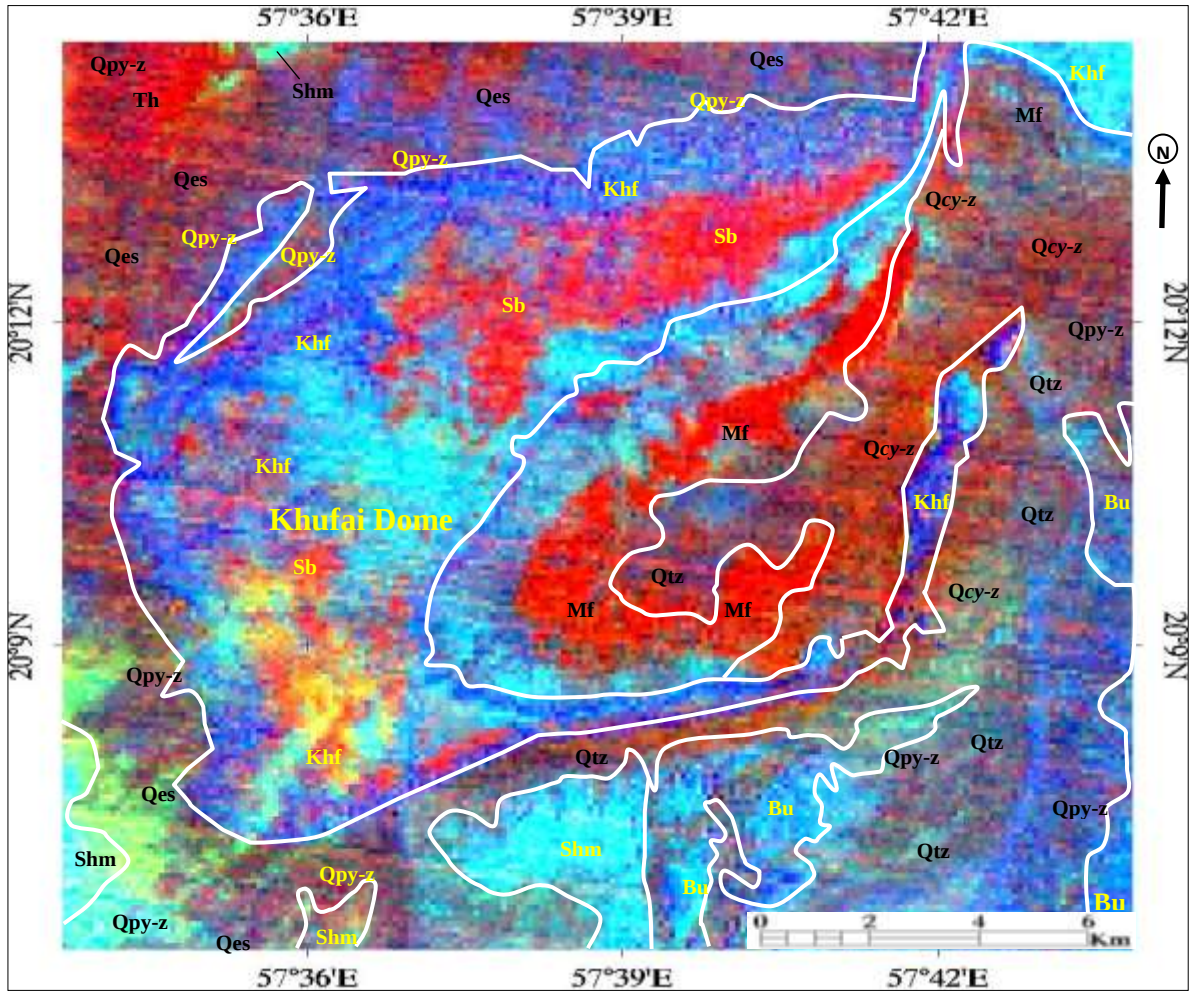


Figure 11. ASTER TIR minerals indices RGB color composite image (R = QI, G = CI, and B = MI) showing the quartz-rich silicate formations of Masirah Bay in red orange, the carbonates of Khufai and Buah Formations in the range of blue and the silty shale of Shuram Formation in cyan and the Quaternary deposits in mixed purple in and around of the Khufai Dome (Masirah Bay – Mf; Khufai – Khf; Shuram – Shm; Buah – Bu; Silicified breccias - Sb, Thumaylah – Th; Quaternary formations – Qes, Qcy-z, Qpy-z, Qtz; Rajendran, 2016).

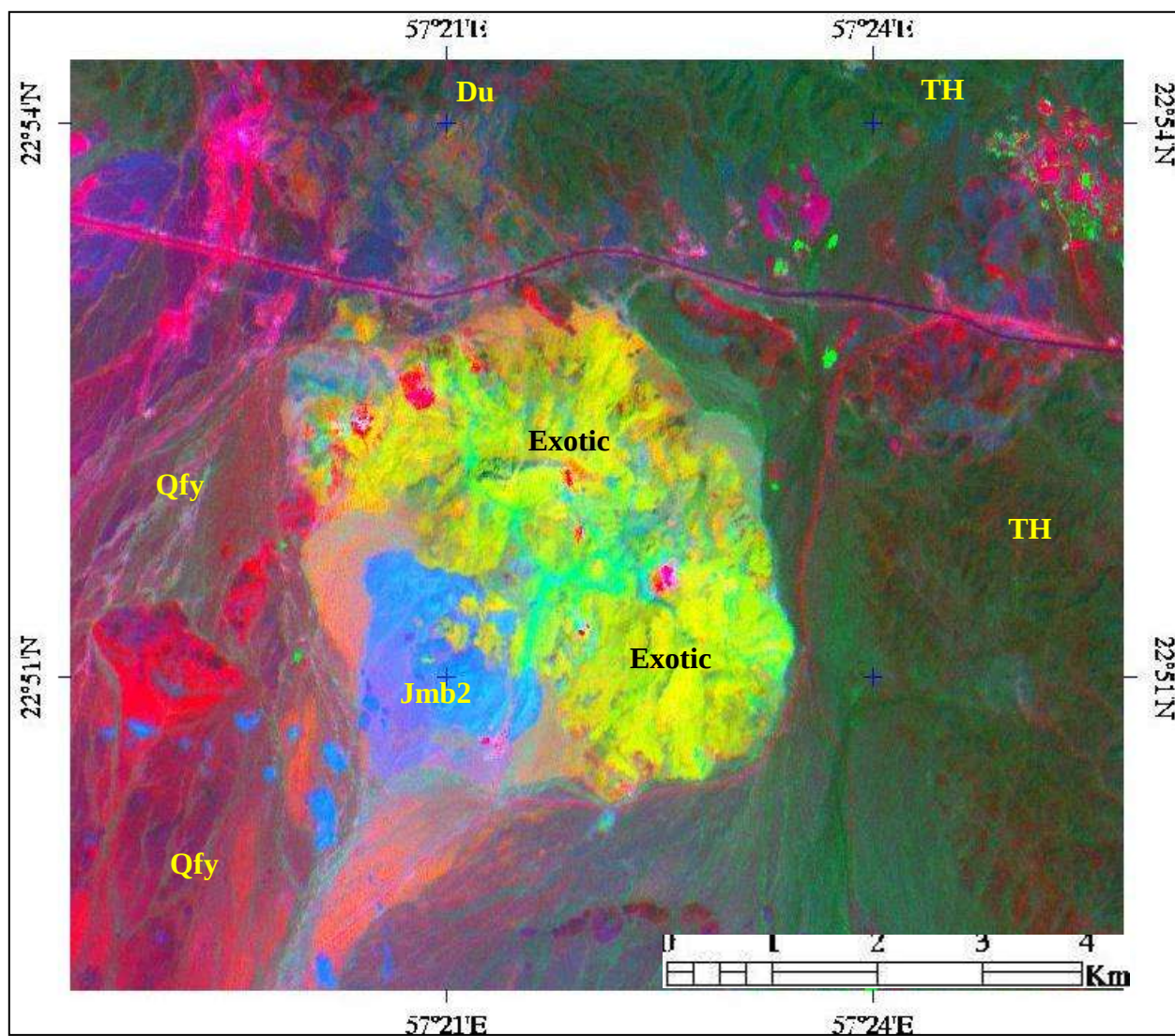


Figure 12. Decorrelated image of ASTER spectral bands 8, 3, 1 showing the occurrence of marble (Oman Exotic) in bright yellow near Al Hamra region, Oman. (TH – Tectonized Harzburgite; D- Dunite; Jmb2- Qfy – Quaternary deposits).

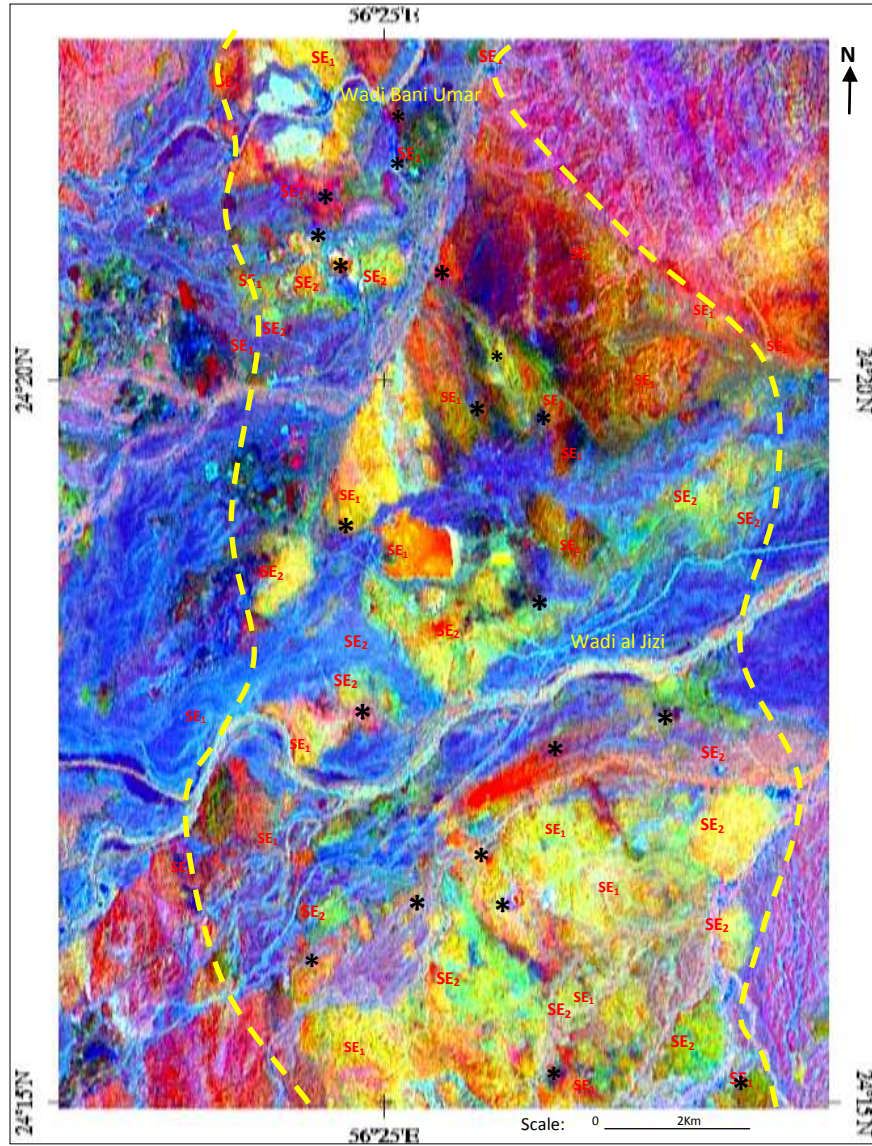


Figure13. RGB image of band ratios (R: $(b1+b2)/b3$; G: $(b2+b4)/b5$; B: $(b4+b6)/b5$) showing the VMS mineralized zone and dashed line is the recommended zone for exploration (SE₁ and SE₂ are extrusives and * Cu occurrences; Rajendran et al., 2013b).

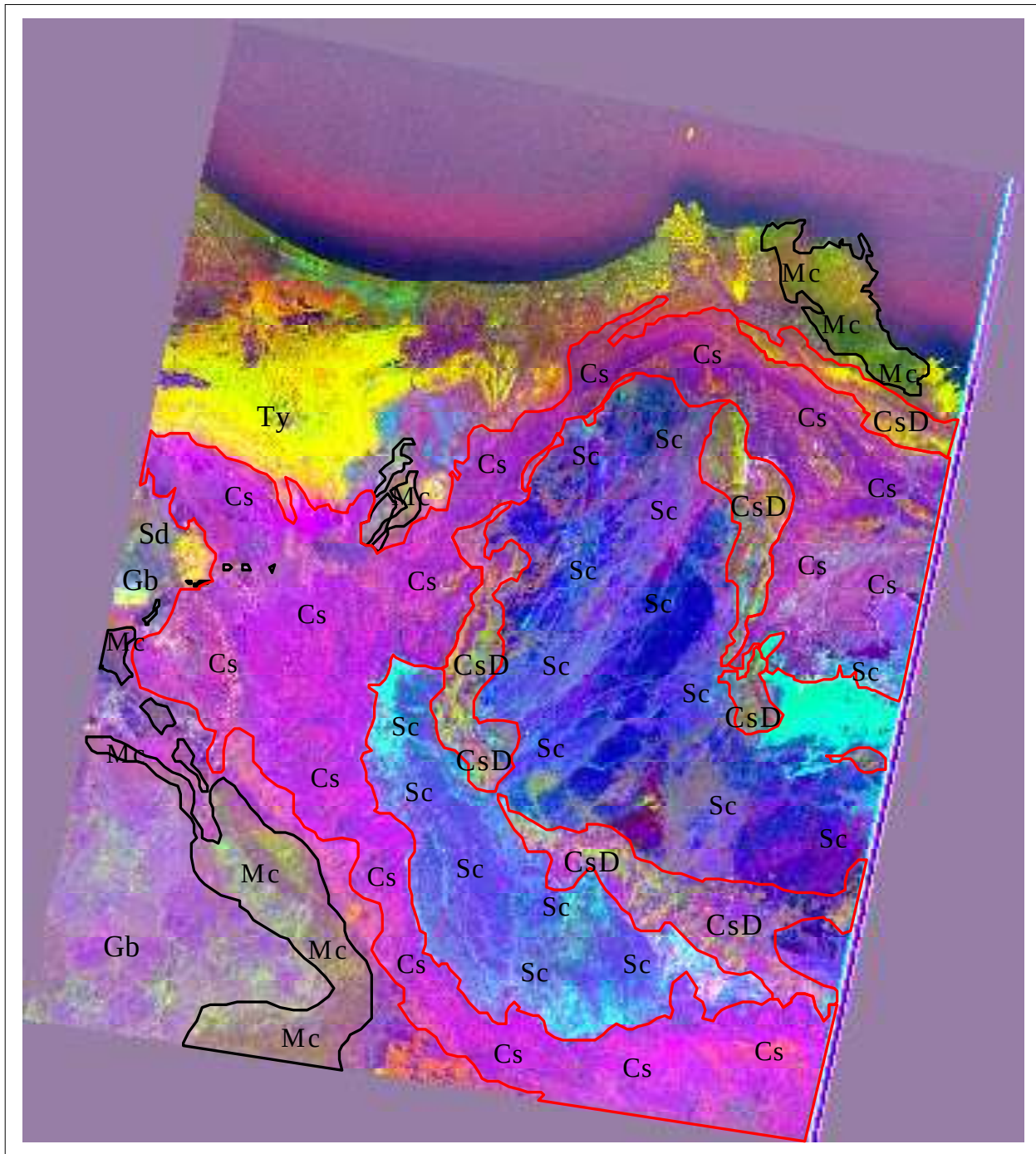
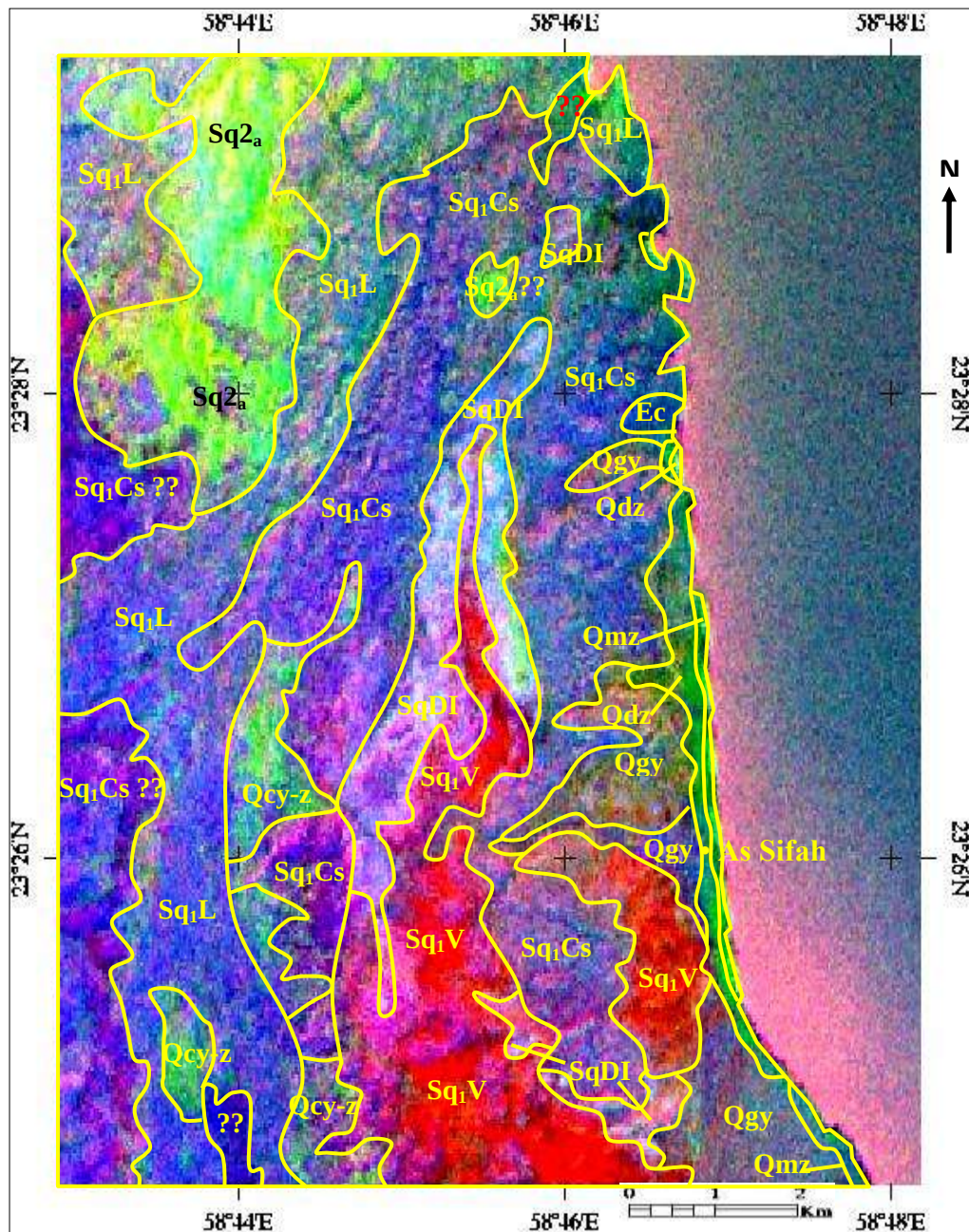


Figure 14. RGB color composite (R = PC5, G = PC3, B = PC2) showing the discrimination of quartz-rich silicates (blue), carbonates (purple) and mafic-rich ophiolite (light green) rock formations. (quartz-rich silicates (blue; Sc), carbonates (purple; Cs and CsD), mafic-rich ophiolite (light green; Mc), Layered Gabbro (Gb), Sheeted dykes (SD) and biocalst and limestone rich sands (Ty). (Rajendran et al., 2011)



LEGEND

Autochthonous Units

- Sq2_a** - Black, fusulinid –bearing limestone and dolomite
- Sq1L** - Nodular limestone, yellow dolomite, silicified limestone
- Sq1C** - Black, fusulinid –bearing limestone and dolomite
- Sq1V** - Schist and white tuff
- SqDI** - Dolerite sills and dykes

Quaternary formations

- Qdz/Qmz** - Coastal dunes (green)/ Beach Sand (yellow)
- Qcy-z** - Active or sub recent slope deposits, scree
- Qgy** - Sub-Recent alluvial fans; terraces

Figure 15. ASTER RGB image of principal components PC4, PC3 and PC2 showing the occurrence and spatial distribution of hydroxyl bearing metamorphic rocks and carbonate formations in the As Sifah region, Oman (Rajendran and Nasir, 2015a).

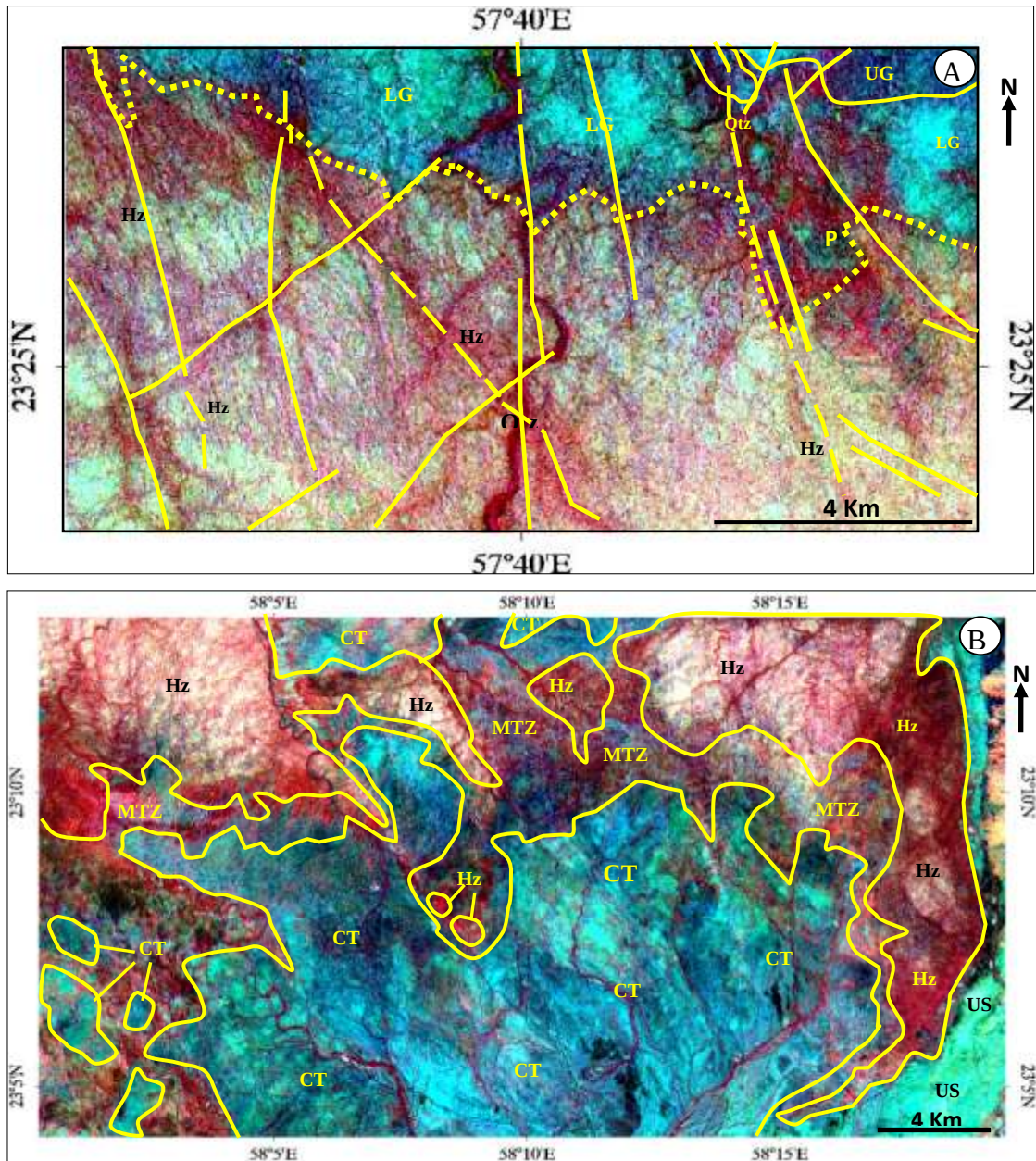


Figure 16. ASTER RGB images of band ratios A) (4/8, 4/1, 3/2*4/3)) of Wadi Al Abyad region of the Nakhl massif showing the thin Moho (dashed line) in between the mantle (harzburgite) and crustal (gabbro) rocks (Hz – Harzburgite, LG – Lower Gabbro, UG – Upper Gabbro, Qtz – Recent Wadi Alluvium) and B) the of Wadi Nidab and Wadi Abda of the Sumail massif show the occurrence of thick Moho Transition Zone (Hz - harzburgite, MTZ - Moho Transition Zone, CT – crust, US - Undifferentiated Sediments) (Rajendran and Nasir, 2015 b).