

# MURUNTAU

# GEOCHRONOLOGY

# and GRANITES

Greg Hall

Golden Phoenix International Pty Ltd

# Muruntau Production

- Discovered 1959 while seeking uranium
- Production commenced 1964
- Mining 64mtpa
- Milling 28mtpa @ 2.3gm/t in 2004 @ 1.5gm/t COG
- Stockpiling 32mtpa
- Heap leaching stockpiles (ex-Newmont JV)
- Open pit mining ceases 2025
- Stockpile reclamation to 2050
- Underground mining planned

# Muruntuau

- Pit 3km by 2km by 800m deep
- Pit expansion constrained by stockpiles
- New low grade open pit zones discovered north-east of pit
- Known zones east of pit at depth

# Granite / hornfels / ore drillhole SG10



Depth 4288m.  
Murun granite. Very coarse  
(possibly ?magmatic) muscovite  
and fresh appearance of biotite



# Murun Granite sample

- MT42318      SG 10 4077m
- Medium to fine grained strongly albitised granite
- K feldspar, albite, quartz, biotite (primary)
- Muscovite, chlorite (secondary)
- U-rich zircon, Th-rich monazite, fergusonite, uraninite, coffinite, fluorite (accessory minerals)

# Murun Granite

- 3 points from monazite grains
- 281-300ma Pb206/U238 age
- Preliminary age



# Granite / hornfels / ore drillhole SG10

Depth 3900m.

Quartz.-calc-silicate-feldspar vein & alteration envelope cross-cutting main foliation and overprinting crenulation as do pyrrhotite-biotite-feldspar veins in high grade psammitic hornfels





# Granite / hornfels / ore drillhole SG10

Depth 3600m. High grade psammopelitic hornfels. Note coarse decussate biotite aggregates overprinting crenulation and ovoid greeny patches (retrogressed cordierite?)





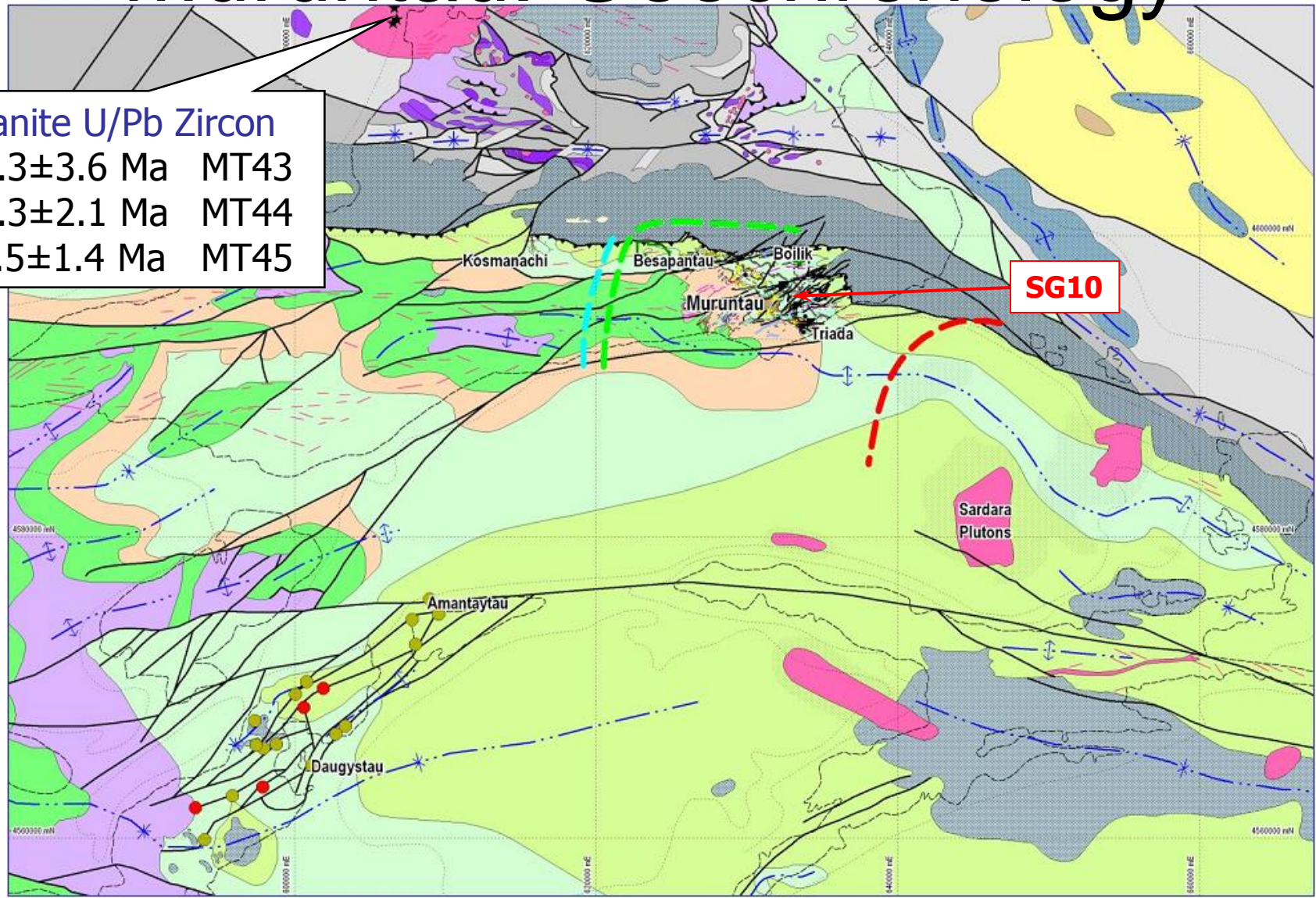
# Muruntau: Geochronology

## Granite U/Pb Zircon

289.3±3.6 Ma MT43

293.3±2.1 Ma MT44

287.5±1.4 Ma MT45





# Muruntau: Geochronology

## Granite U/Pb Zircon

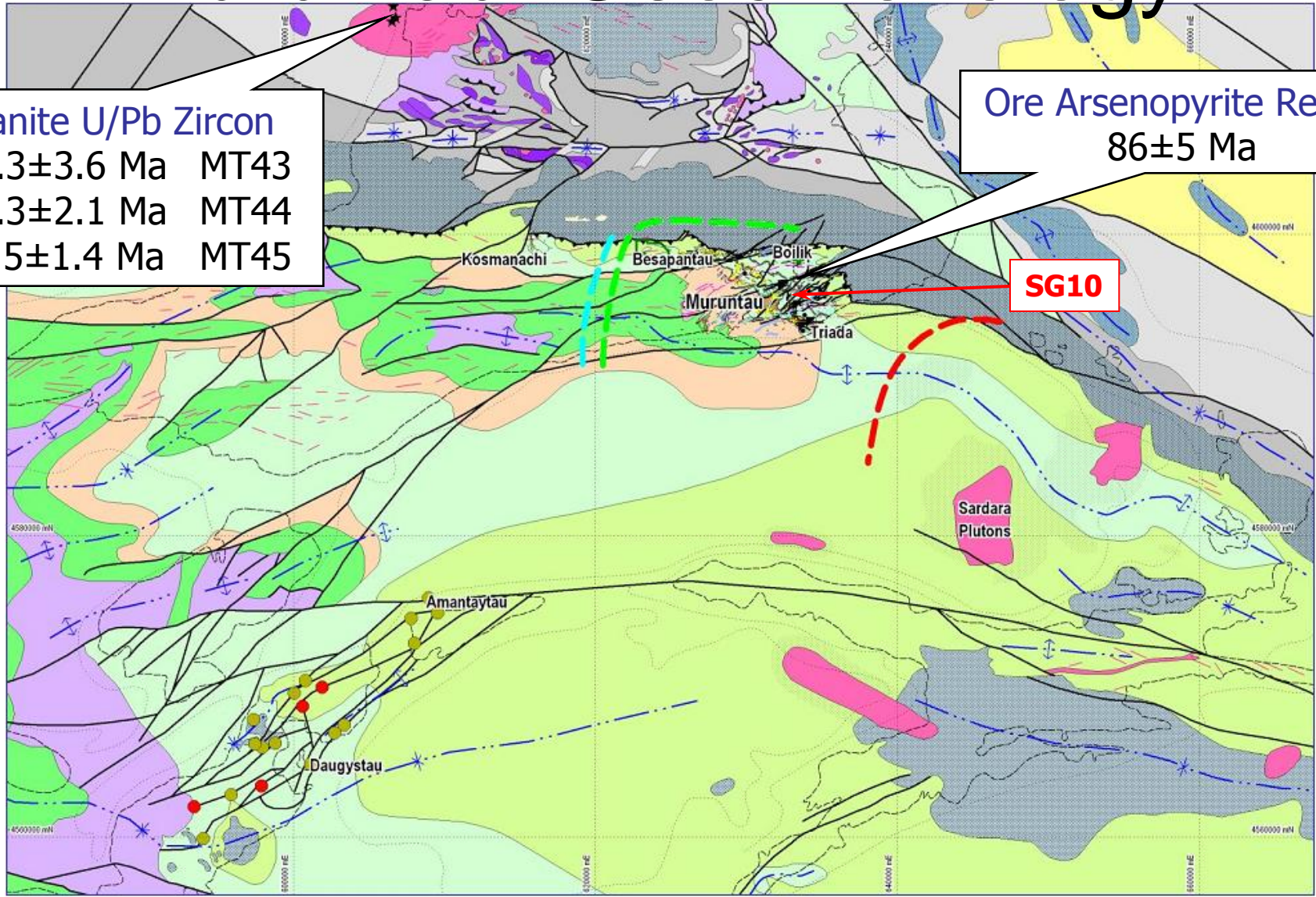
289.3±3.6 Ma MT43

293.3±2.1 Ma MT44

287.5±1.4 Ma MT45

Ore Arsenopyrite Re/OS  
86±5 Ma

**SG10**





# Muruntau: Geochronology

## Granite U/Pb Zircon

289.3 $\pm$ 3.6 Ma MT43  
293.3 $\pm$ 2.1 Ma MT44  
287.5 $\pm$ 1.4 Ma MT45

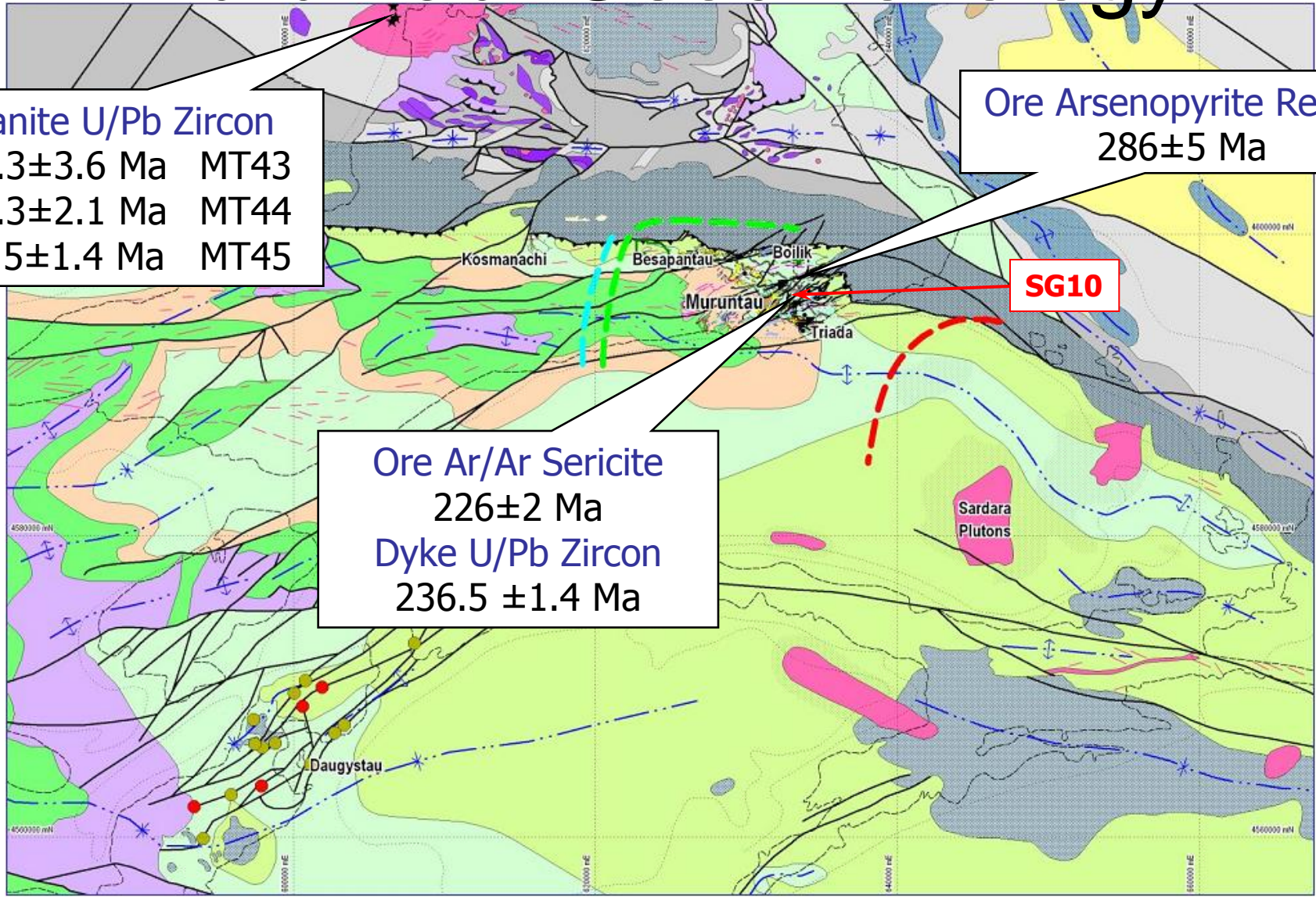
## Ore Arsenopyrite Re/OS

286 $\pm$ 5 Ma

**SG10**

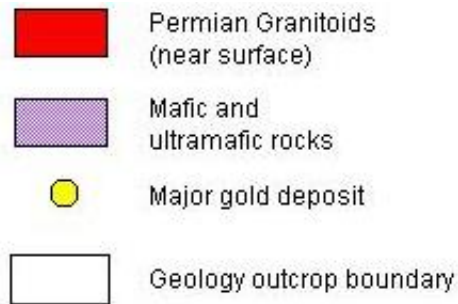
Ore Ar/Ar Sericite  
226 $\pm$ 2 Ma

Dyke U/Pb Zircon  
236.5  $\pm$ 1.4 Ma





# Pre-Mesozoic Outcrop Geology, Gravity & Gold Deposits

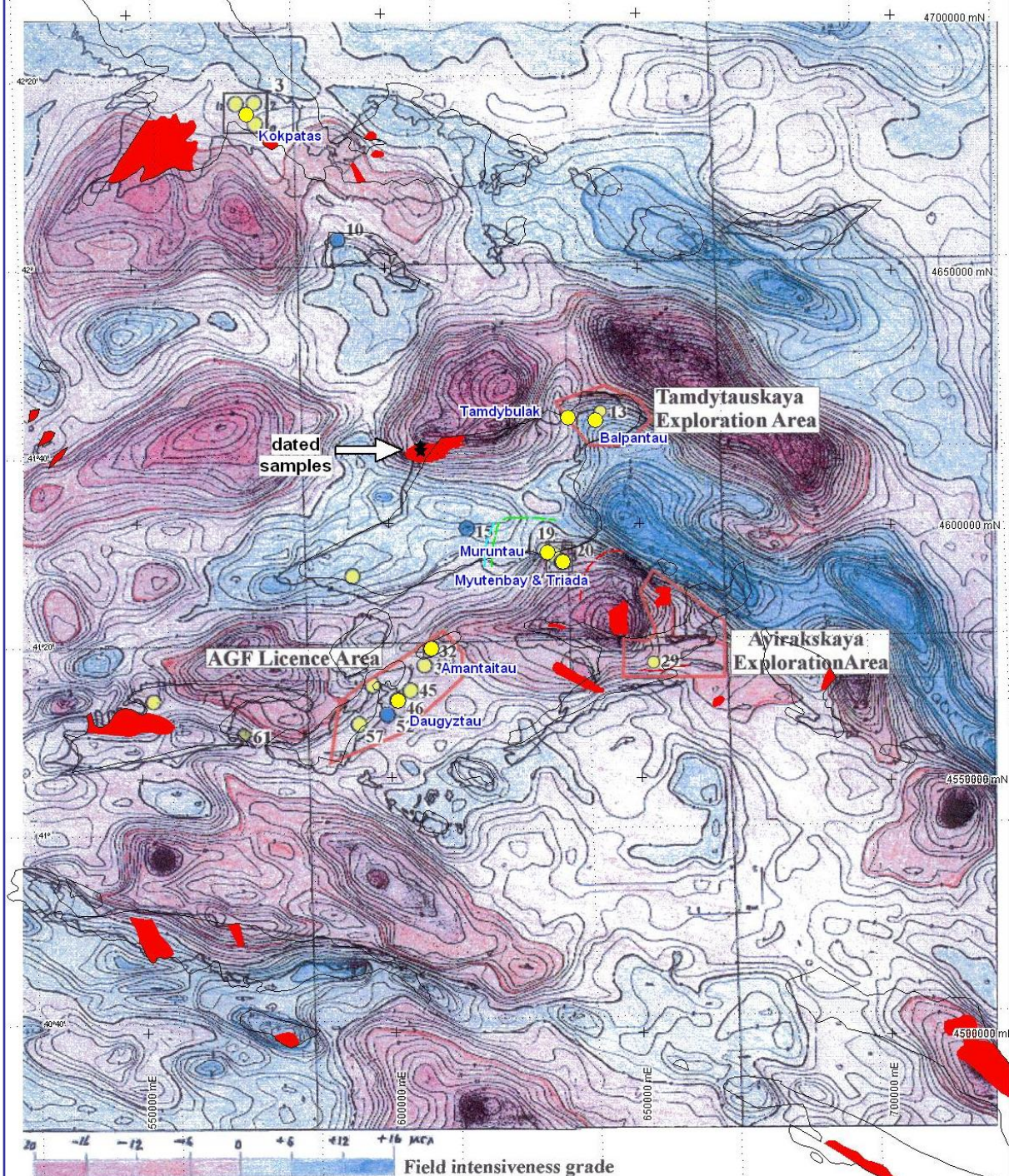


0 10 20 30

kilometres  
1:1 000 000

Projection: Lat/Long (WGS84)

P:\TWA\Murantau\Diagrams\Gravity Geology Deposits Outcrop.wor





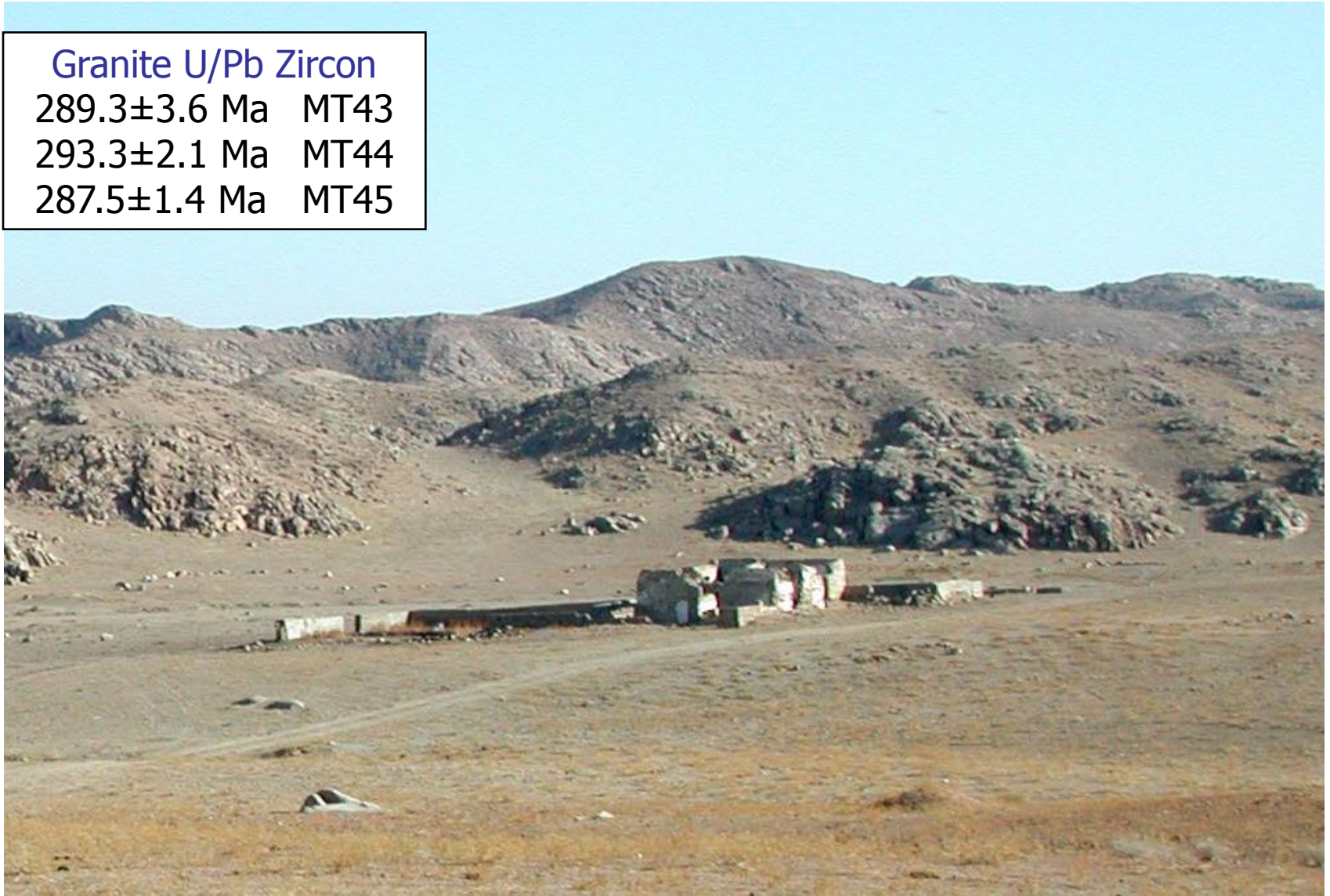
# Tamdytau Granite sample location

## Granite U/Pb Zircon

289.3 $\pm$ 3.6 Ma MT43

293.3 $\pm$ 2.1 Ma MT44

287.5 $\pm$ 1.4 Ma MT45



# Tamdytau Granite samples

- MT43 medium grained leucogranite, youngest phase, higher fractionation, autometasomatic alteration
- MT44 fine grained porphyritic to coarse grained leucogranite, commonly marginal facies, quenched contacts, overprinted by post magmatic alteration
- MT45 porphyritic coarse grained melanocratic monzogranite (adamellite) cut by leucocratic granites

# Tamdytau Granite samples

- MT43    289.3 +/- 3.6ma    23ppbAu
- MT44    293.3 +/- 2.1ma    15ppbAu
- MT45    287.5 +/- 1.4ma    24ppbAu

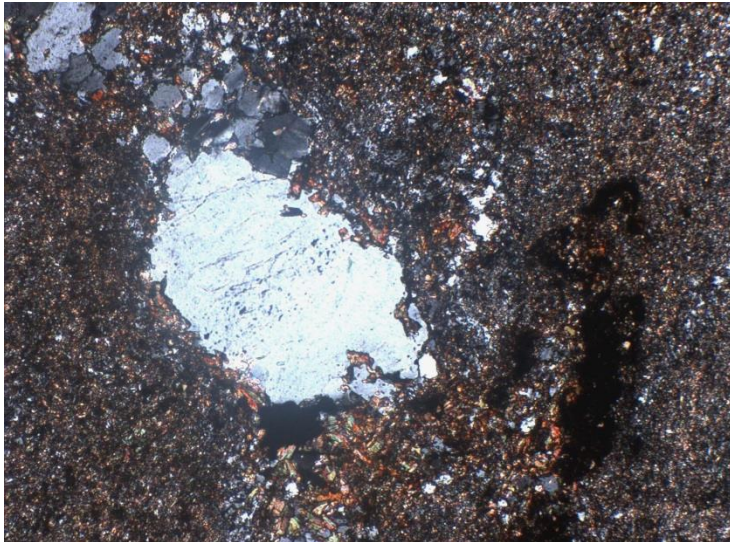


# Ore

## Kspar-Biotite alteration & mineralisation



Biotite-Kspar alteration around flat vein  
overprinted by patchy sericitic alteration



Arsenopyrite bearing, Kspar-biotite alteration, 1mm. across

Ore Arsenopyrite Re/OS  
 $286 \pm 5$  Ma

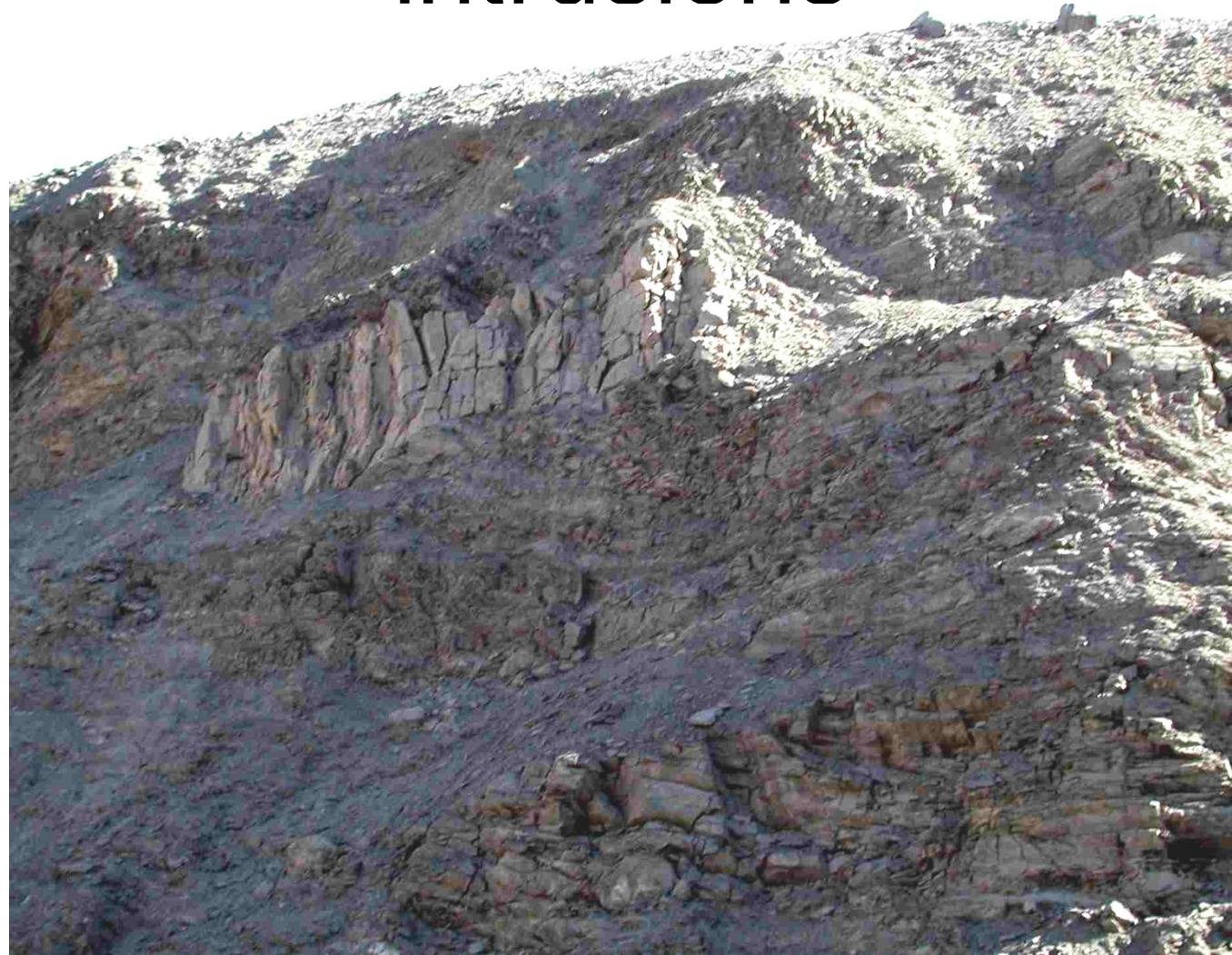


Arsenopyrite bearing, Kspar-quartz vein in  
Kspar-biotite metasomatite



# Muruntau: post mineralisation felsic intrusions

Level 350, east pit wall



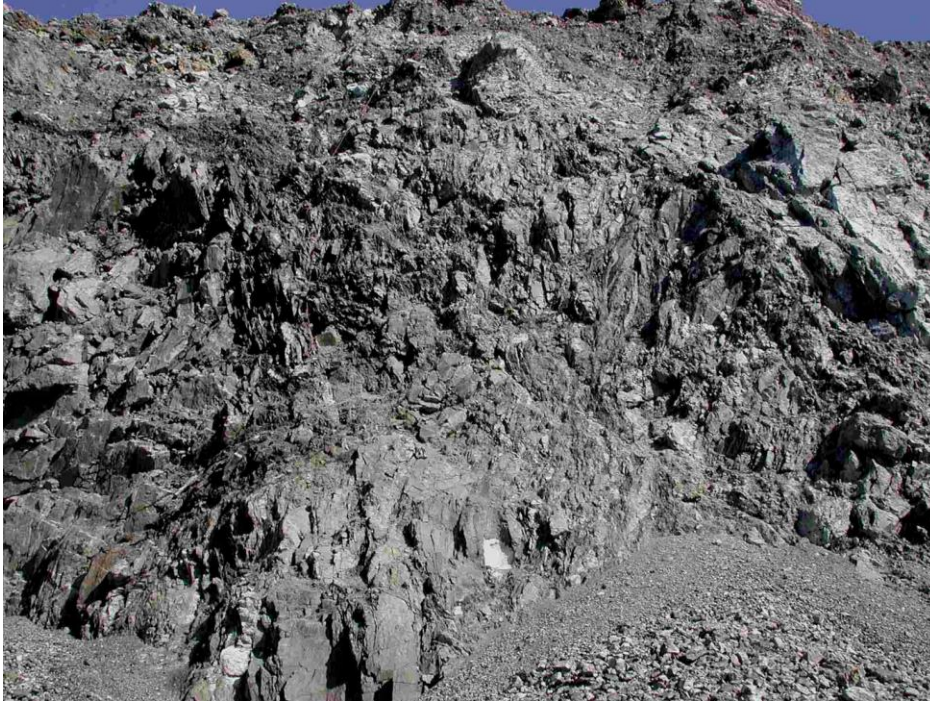
## Minor felsic intrusions:

- sills & dykes
- postdate main stage mineralisation, but retrogressively altered
- predate major fault movements
- $236.5 \pm 1.4$  Ma U-Pb zircon ages





# Muruntau: retrograde alteration



Southern fault zone, SW wall open pit Level 375;  
intense retrograde sericitic & graphitic alteration



Graphitic fault zone, SW wall open pit Level 375



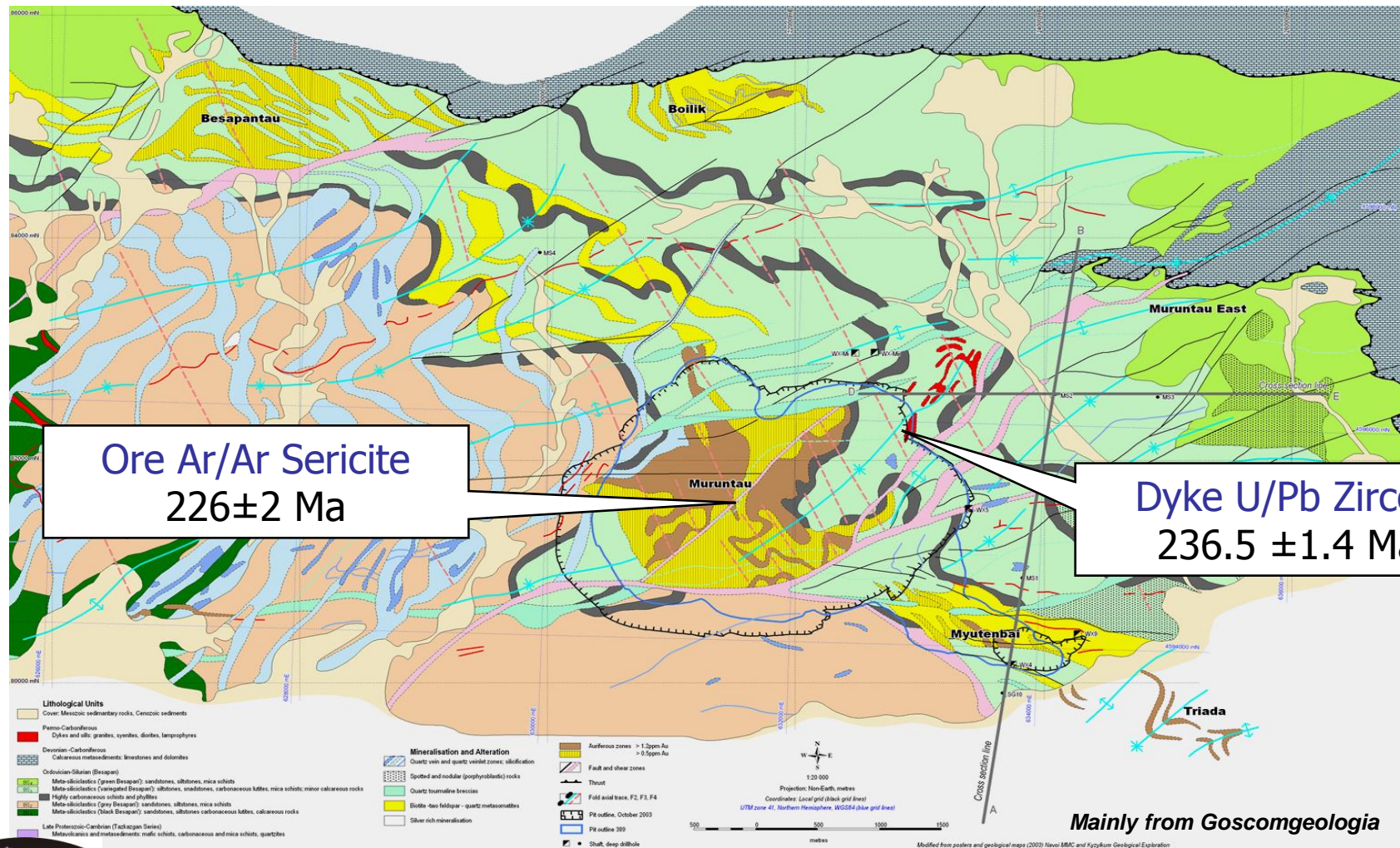
Carbonate-sulphide-sericite-chlorite  
veins cutting stockwork; Level 210



Sericite Ar/Ar  
 $226 \pm 2$  Ma

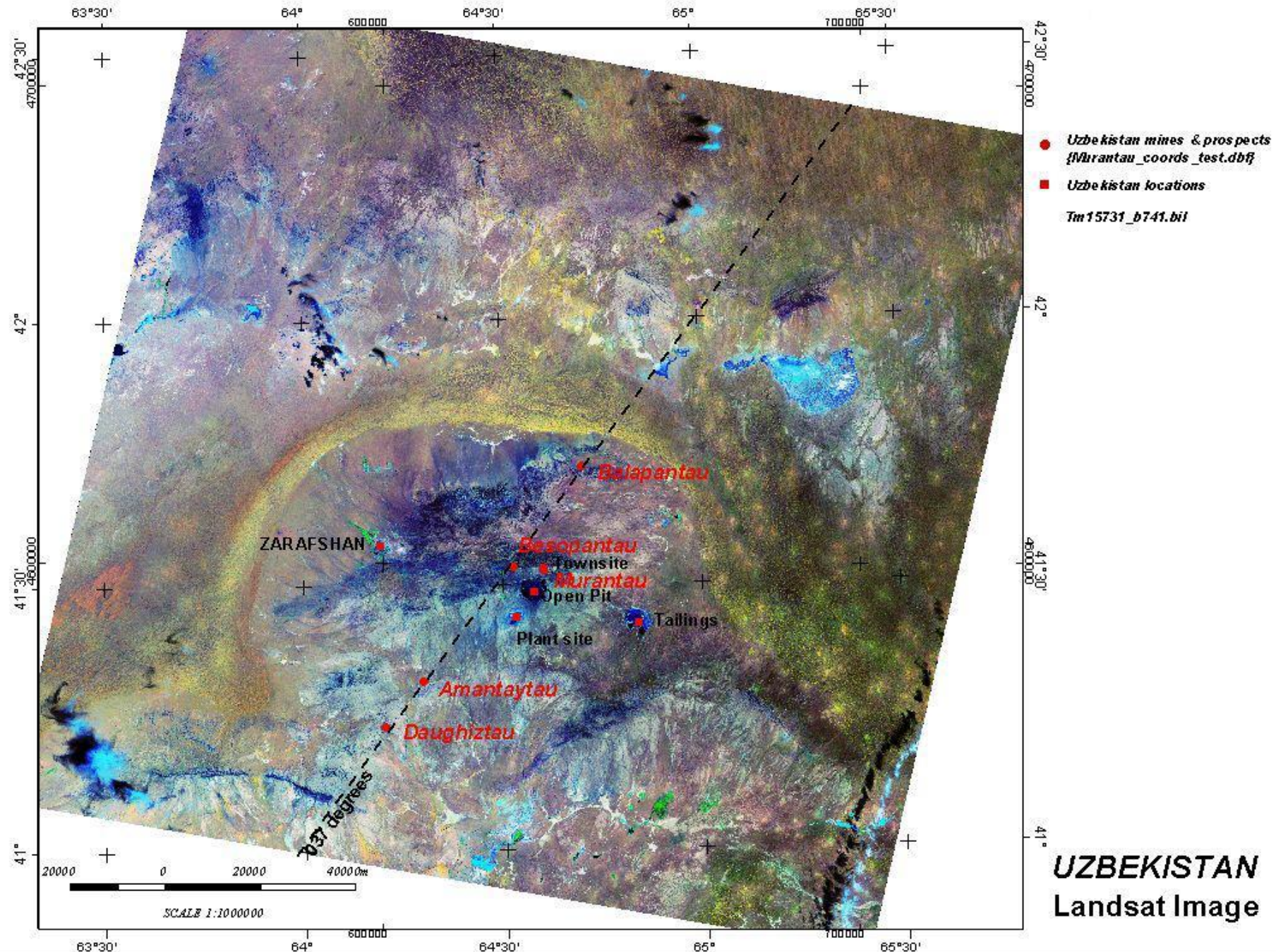


# Muruntau: local geology



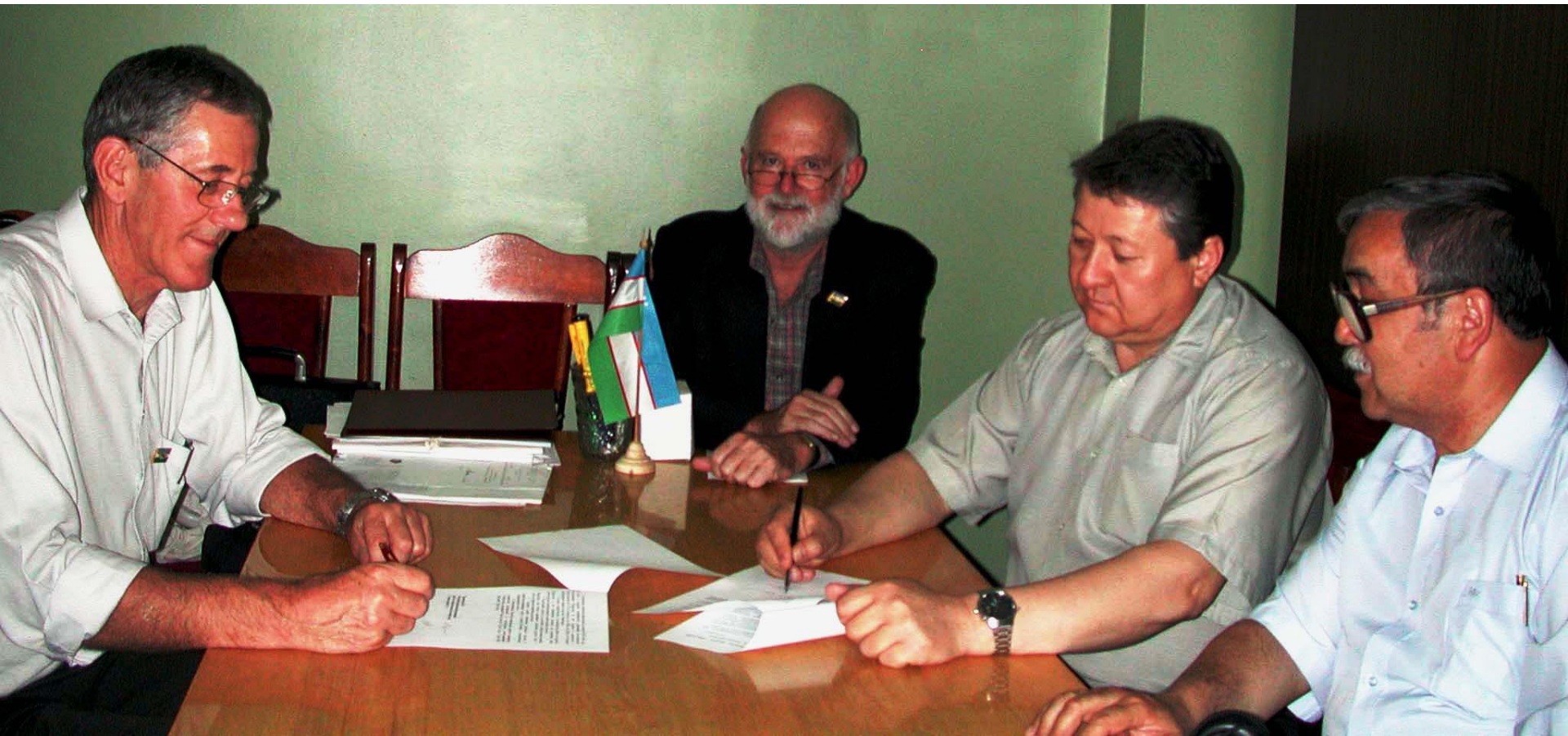


REF: lasiochizbekistanmurantau\_coords.apr Transverse Mercator Projection, WGS84 datum, Zone 41, OM 63, using metres





# Vic Wall 1944-2017



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