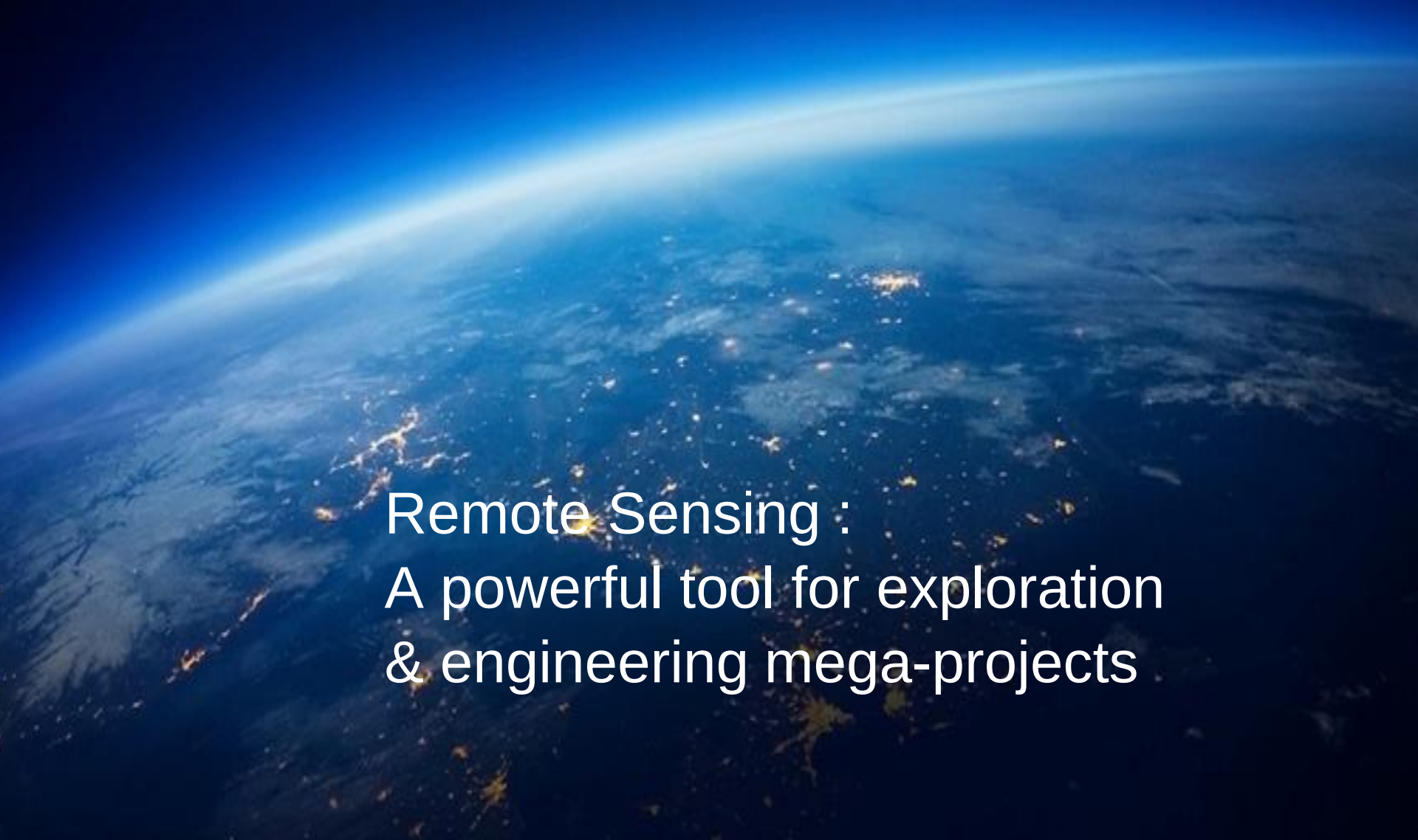




Remote Sensing : A powerful tool for exploration & engineering mega-projects

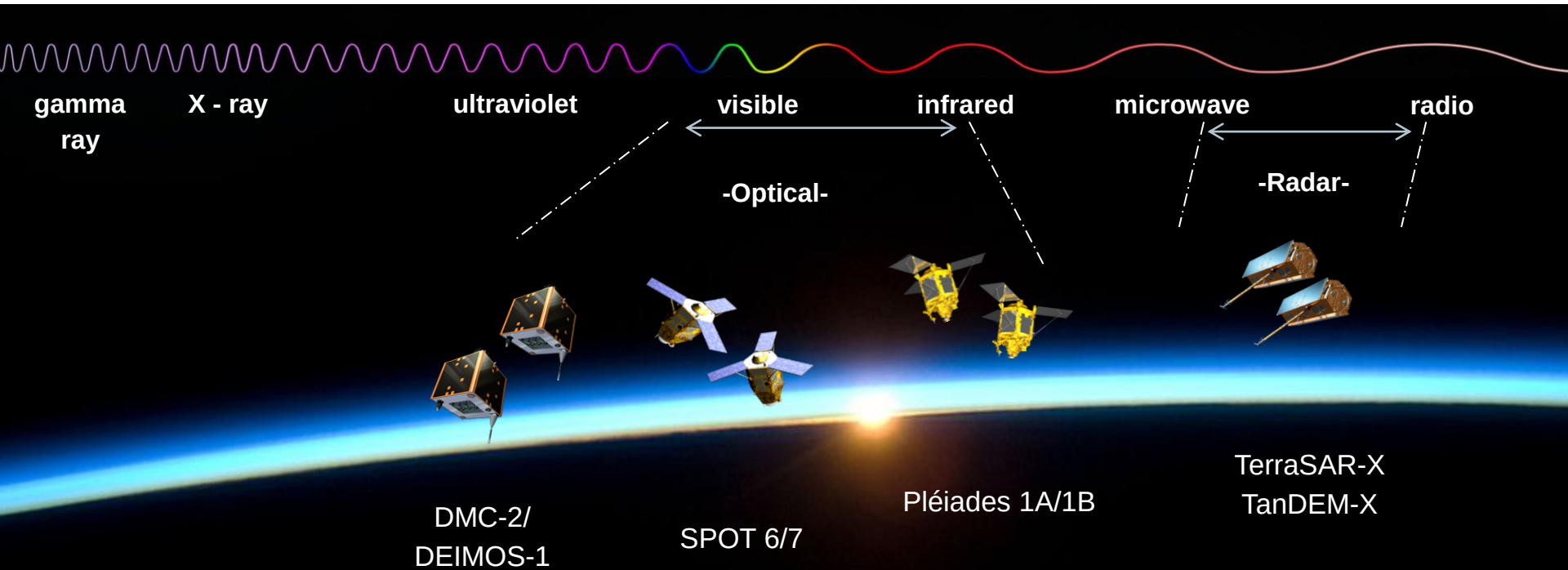
DEFENCE AND SPACE

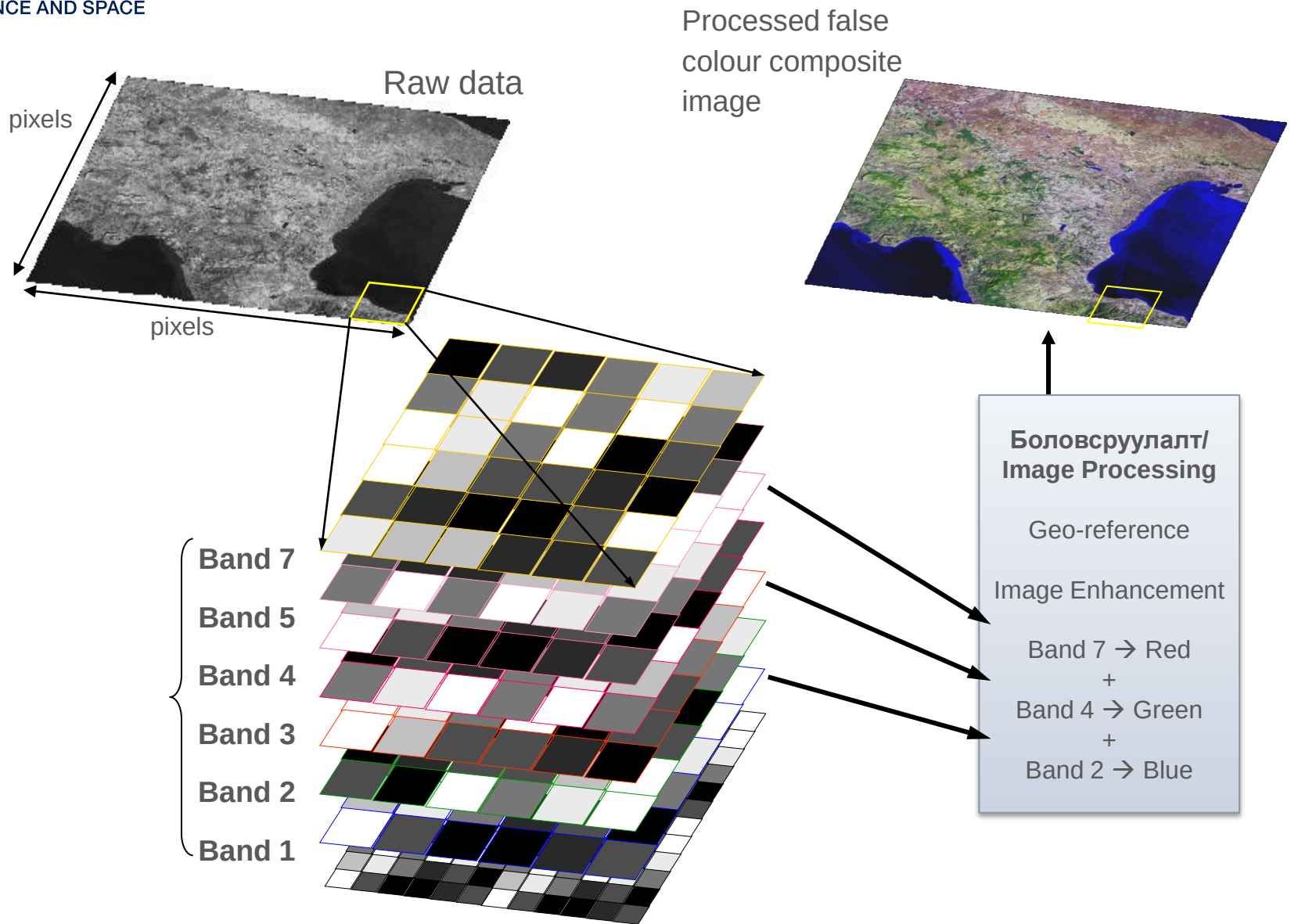
Maral Bayaraa
06/03/2017

AIRBUS

Airbus DS –ийн хиймэл дагуулын өгөгдөл

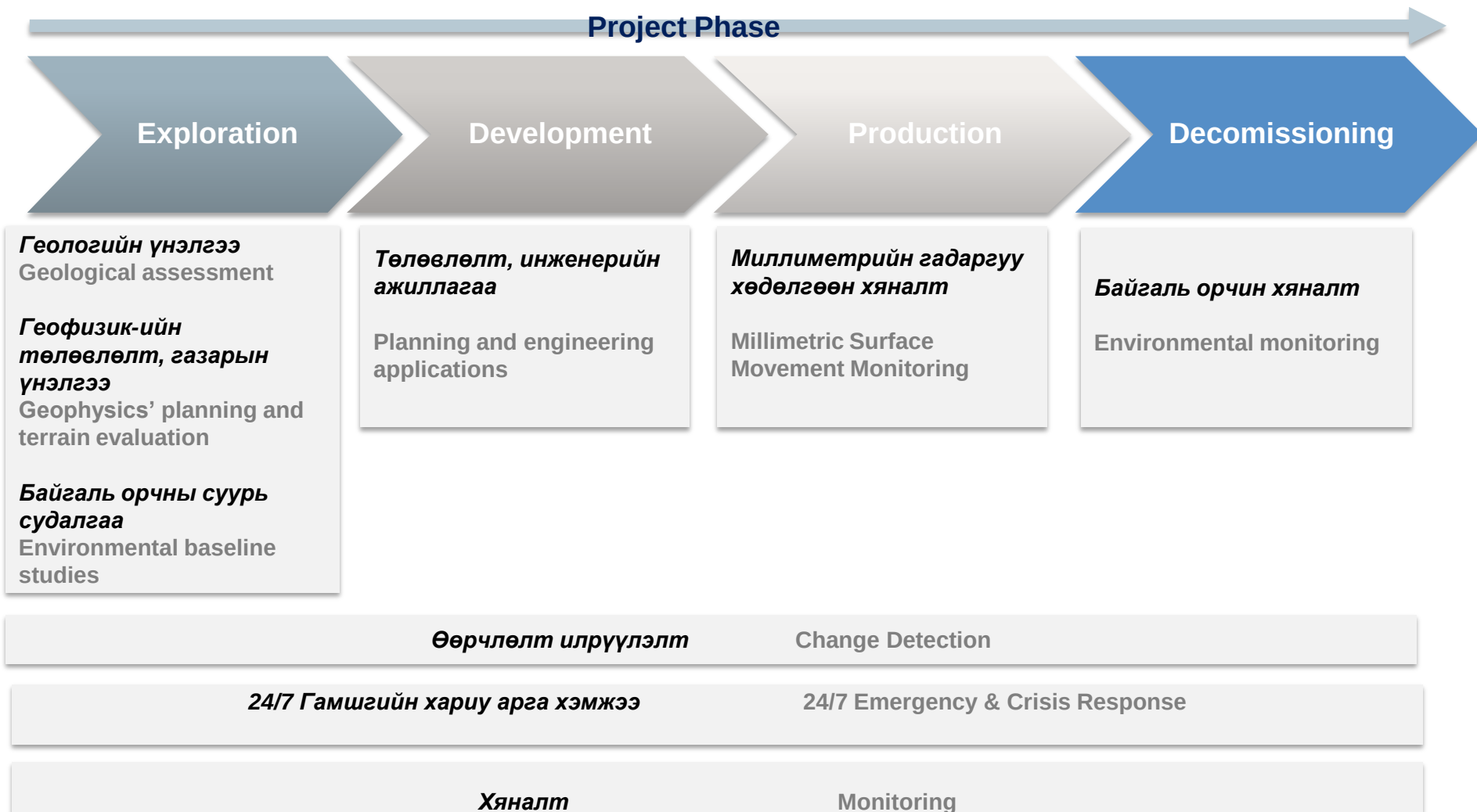
Satellite Imagery – The Airbus DS Constellation

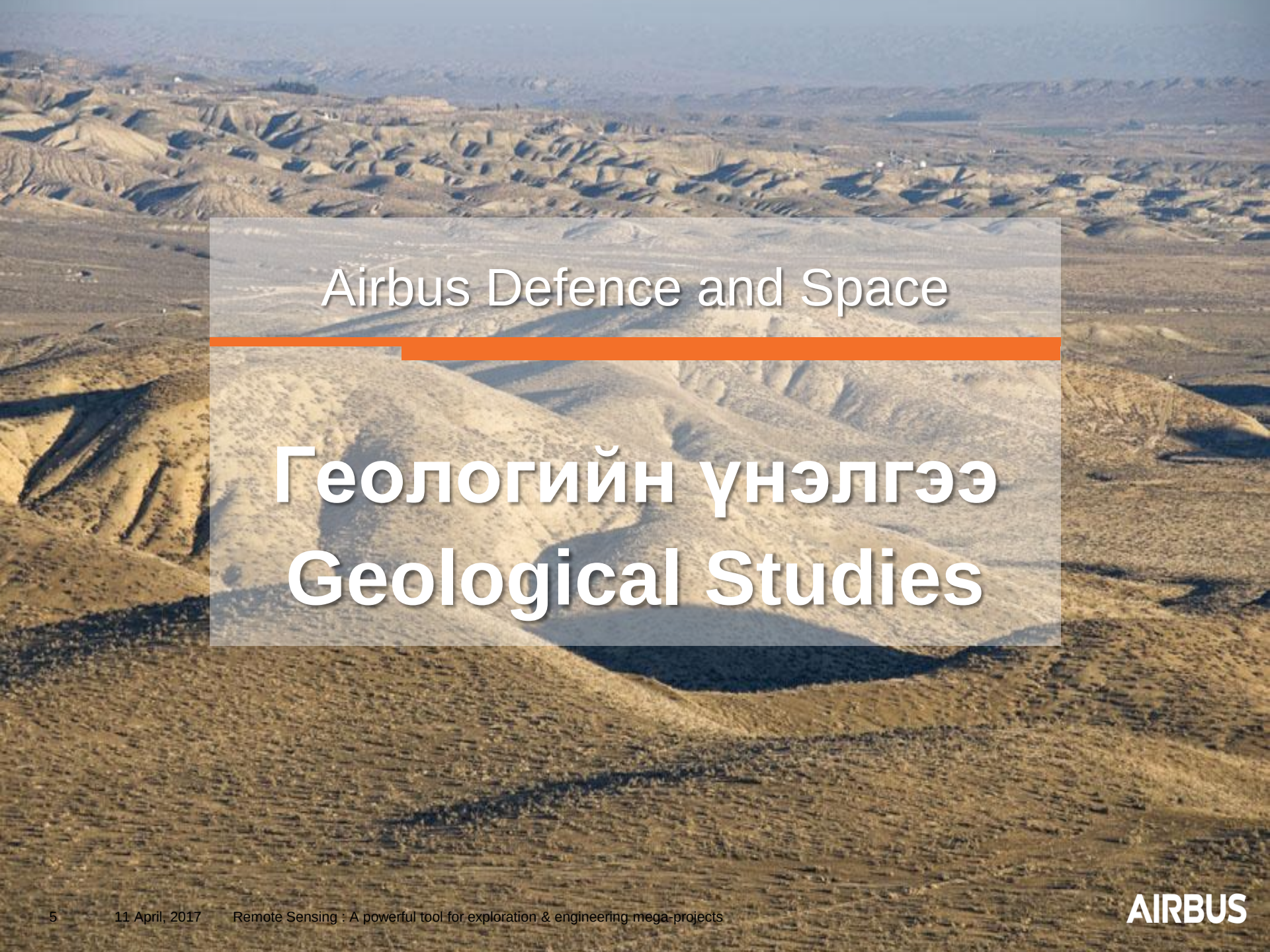




Зайны тандан судалгаа хийх

Remote Sensing Contribution for Mega-Projects





Airbus Defence and Space

Геологийн үнэлгээ Geological Studies

Geological Assessment – Project Progression

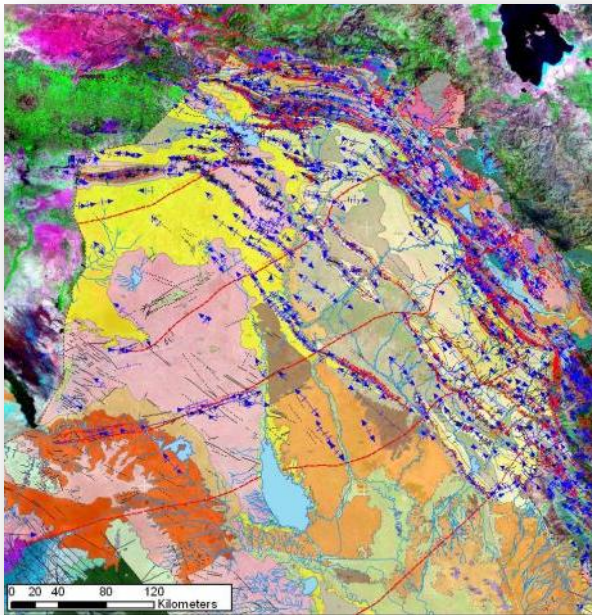
Regional



Sub-Regional

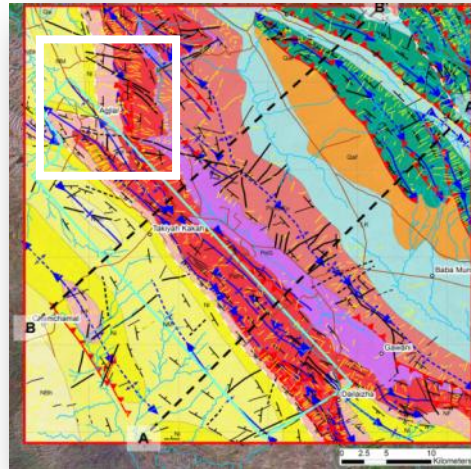


Licence Block



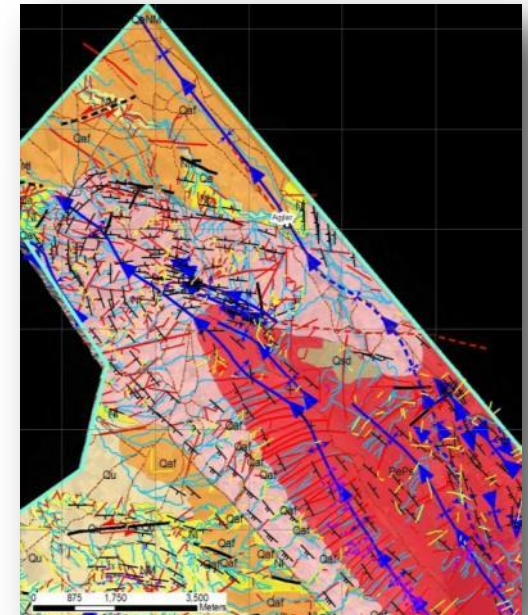
1:50,000 – 1:100,000

Landsat 15m/SRTM 90m



1:25,000

SPOT 1.5m/WorldDEM



1:10,000

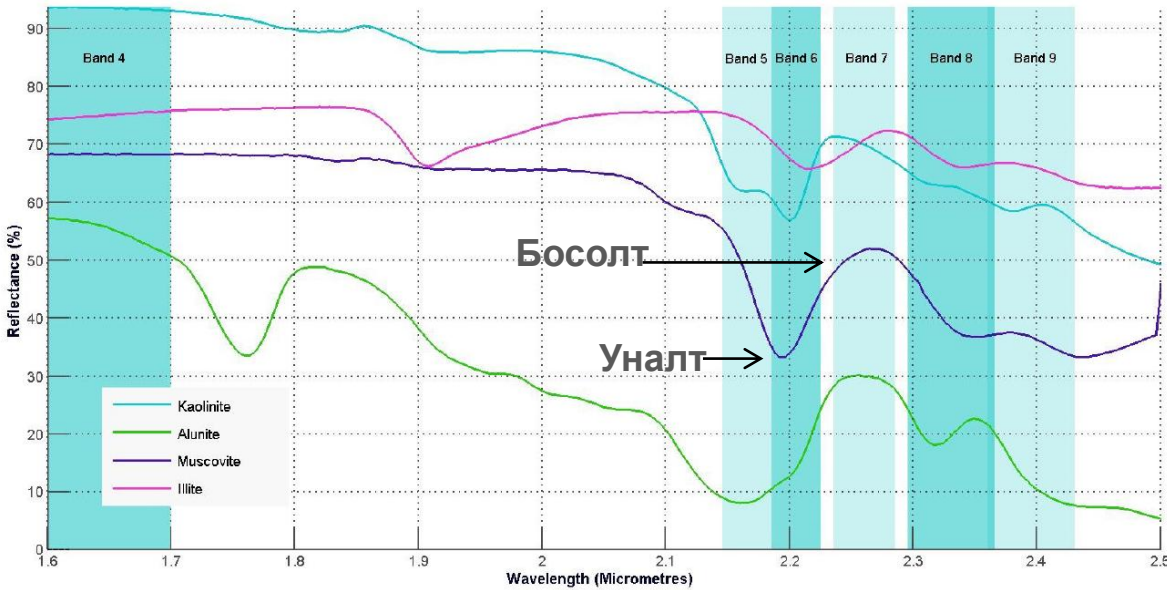
Pleiades 0.5m/ DEM 1m

Ашигт малтмалын зураглал/ Mineral mapping

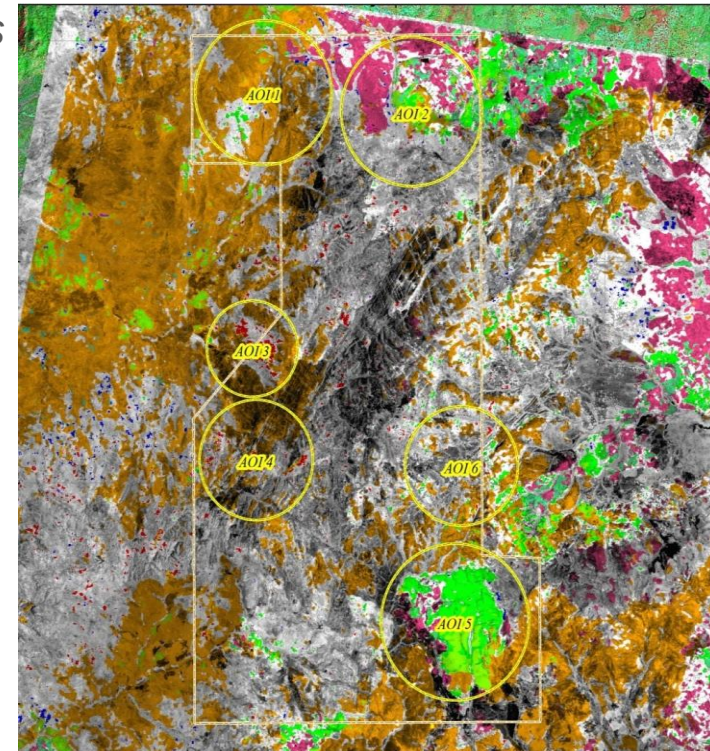


Чулуу тус бүрийн өвөрмөц спектрын хээ

Unique spectral fingerprinting of minerals



ASTER mineral map and anomalies



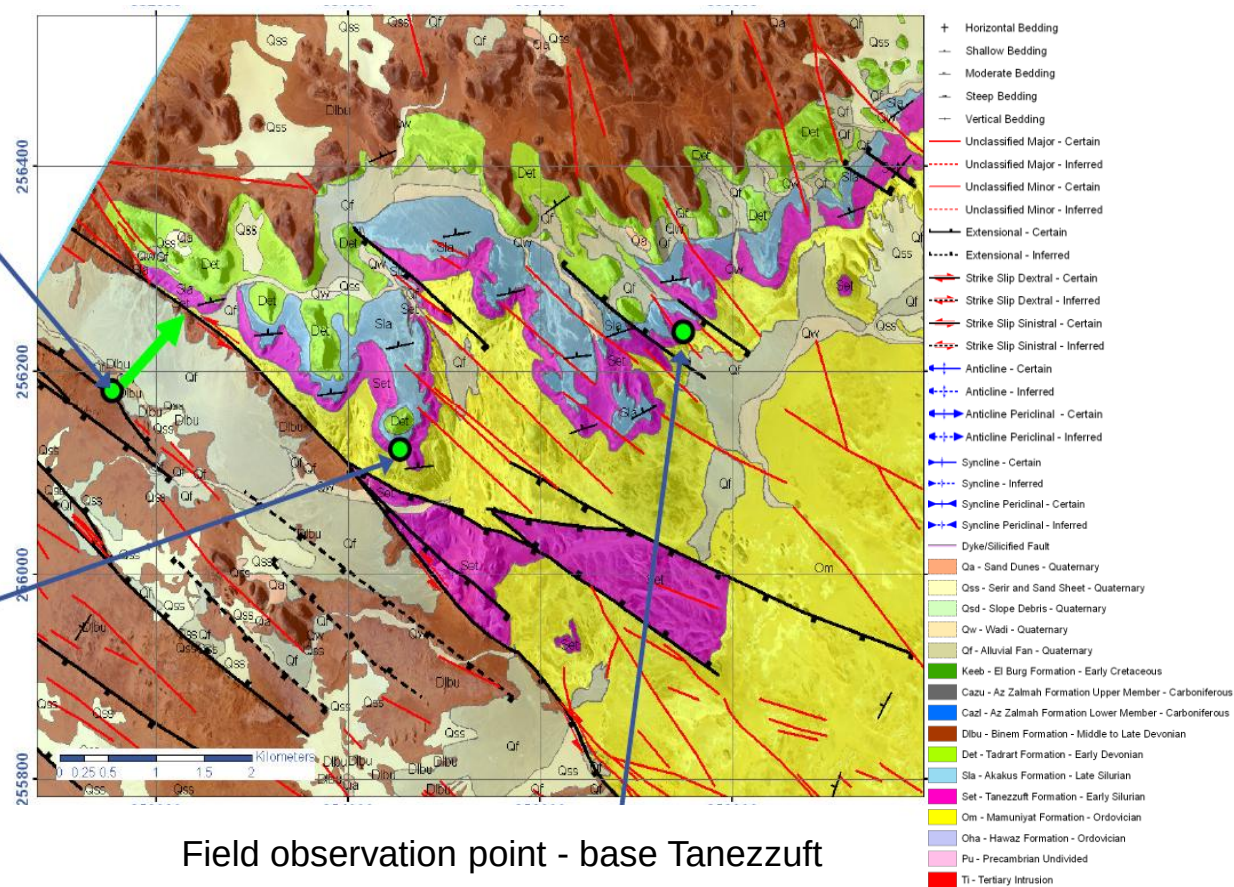
Detailed Interpretation – North Africa



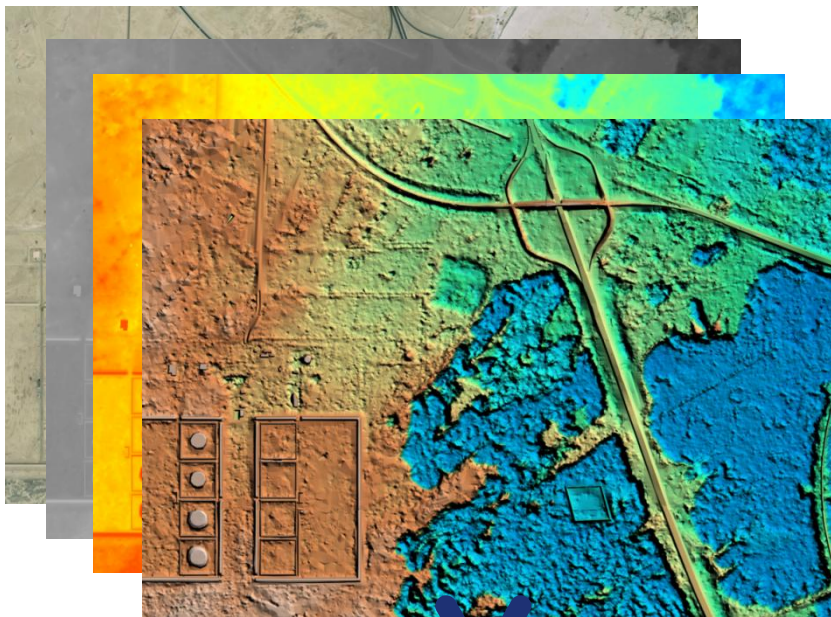
Photograph locality – Tanezzuft
sandwiched between massive
Cambro-Ordovician and Devonian
sandstones



Photograph locality – Tanezzuft
Formation

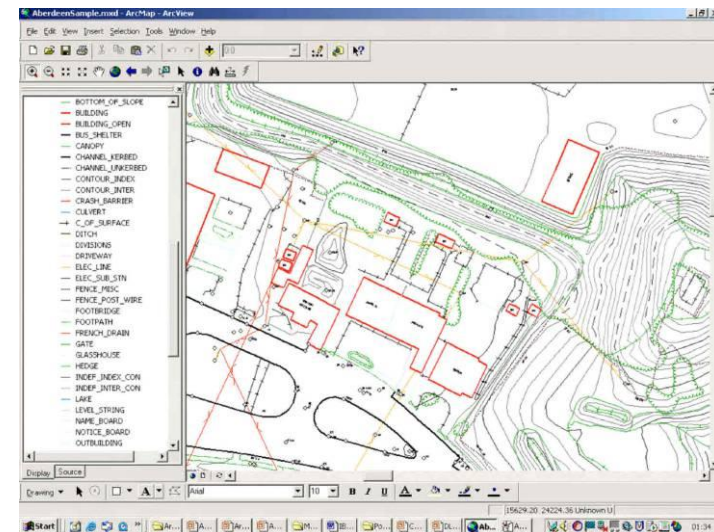


0.5m Imagery/1m DEM– Derived Layers

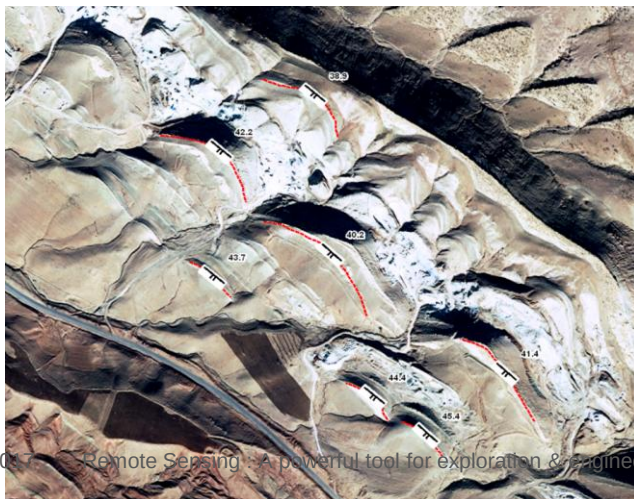


Topographic Mapping

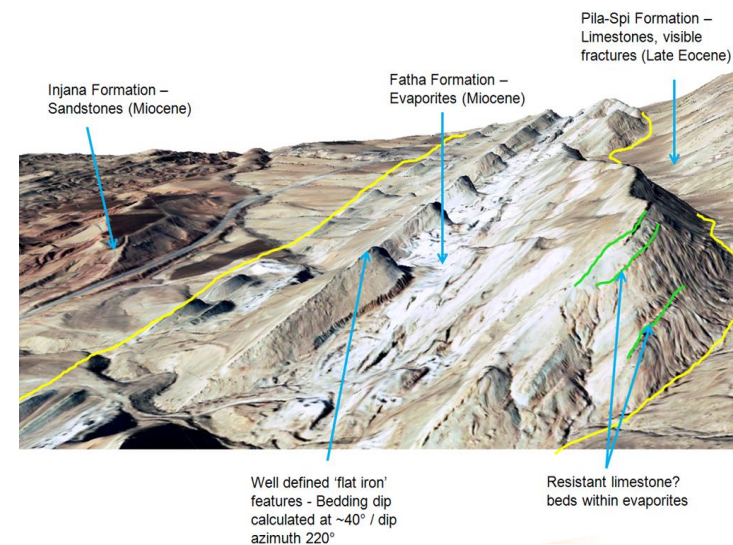
1:5 000 scale



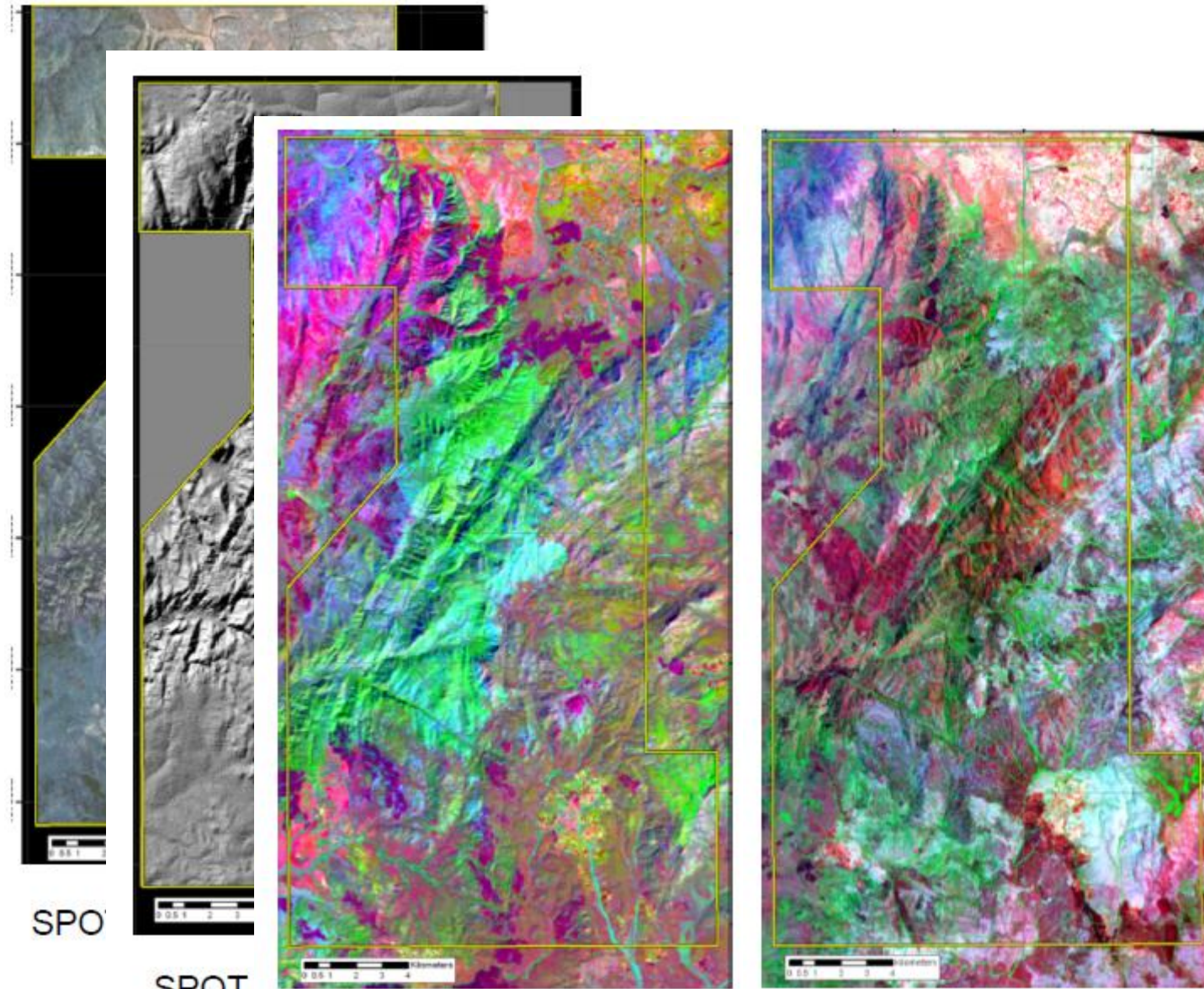
Analyse strike/dip



Visualisation



Mineral Mapping - Gold Exploration Project North Africa Example



SPO

SPOT
Remote Se

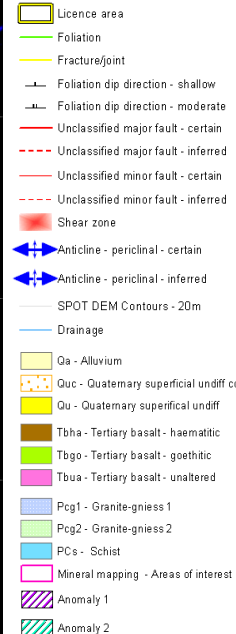
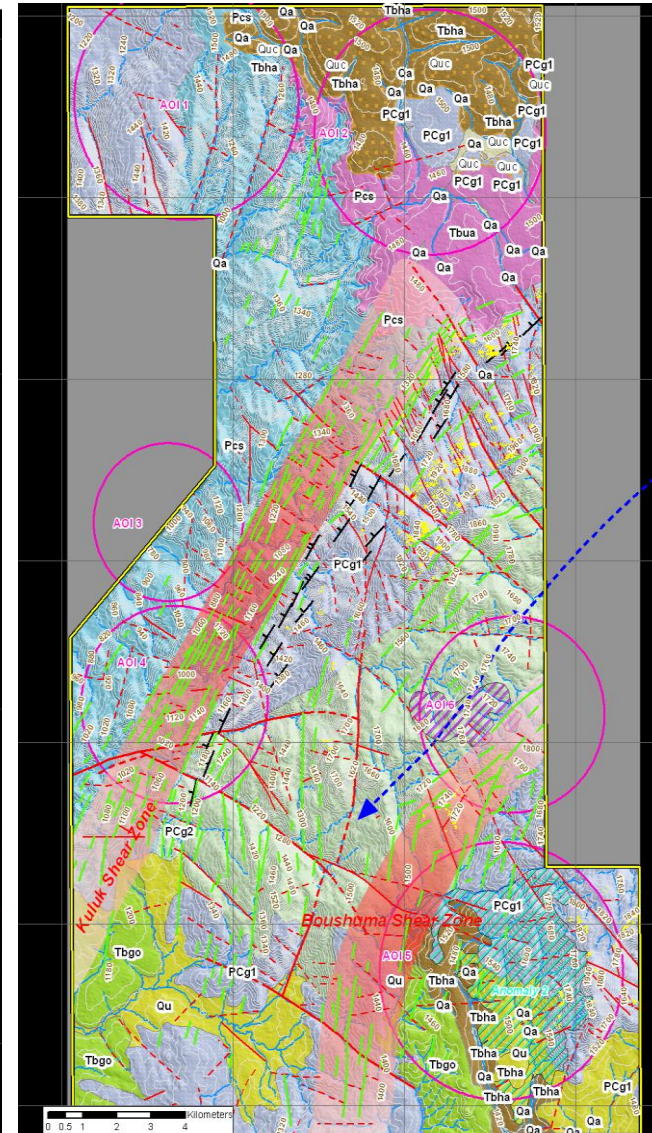
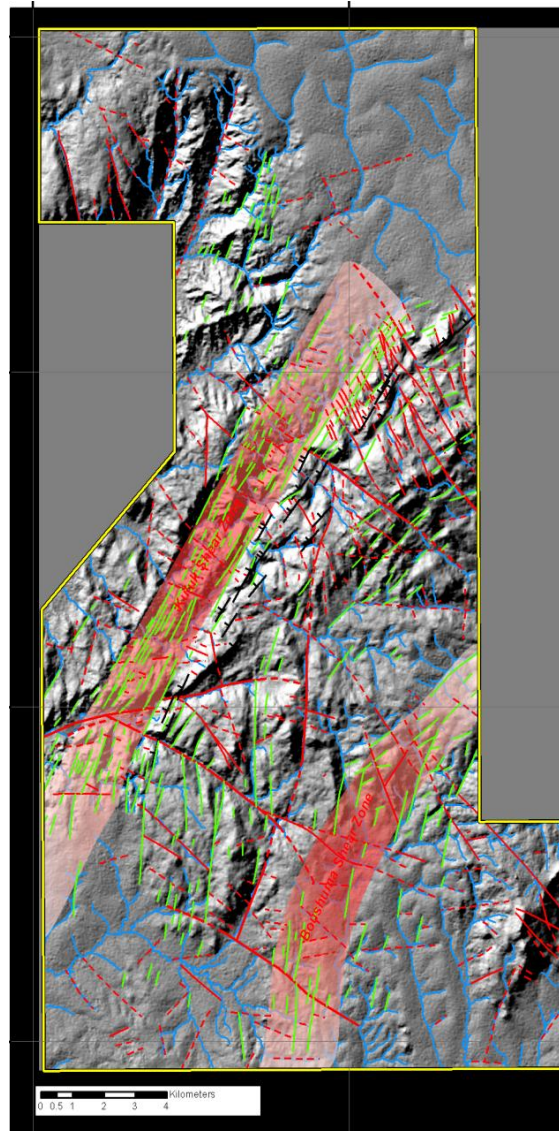
Landsat 8 DC 753

ASTER 731 (SWIR4-NIR-G)

Mineral Mapping - Gold Exploration Project North Africa Example

- Чулууны бүтэц ба агууллагын зураглал
Structural and lithological interpretation

- Хоёр ширхэг хувьралтай ба гидротермалыны өөрчлөлтөй бүс
Two strongly foliated zones can be identified, which present potential areas of mineralisation

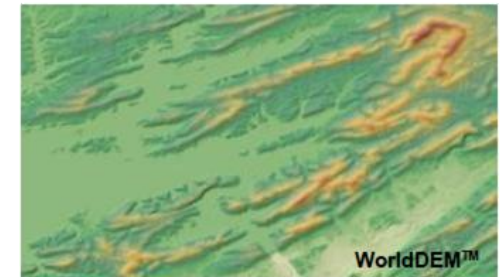
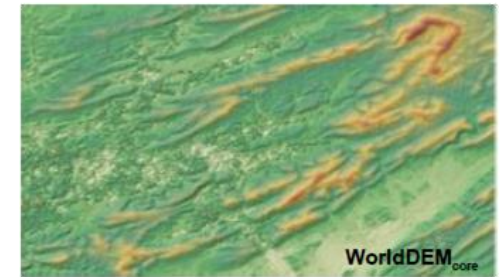
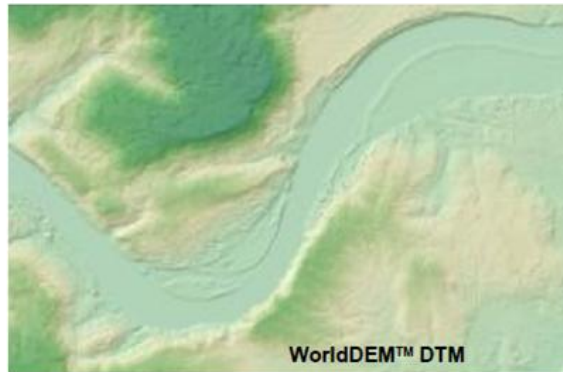
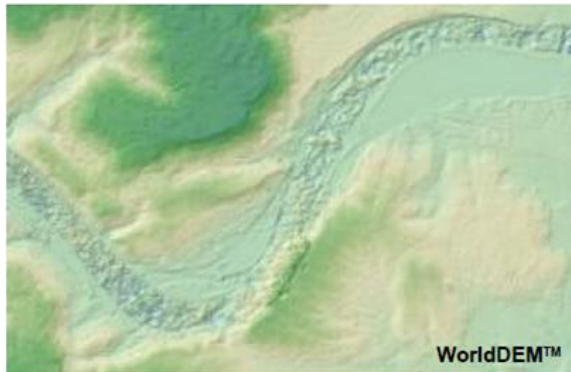
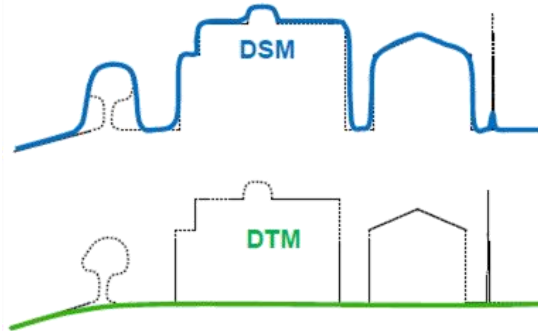


Airbus Defence and Space

Дамжуулах Хоолой / Төмөр
Замын төлөвлөлт
Pipeline / Railway Planning

Digital Elevation Models

- Digital Surface Model (DSM)
Дижитал газрын саадын өгөгдөл
- Digital Terrain Model
Дижитал газрын гадаргын өгөгдөл

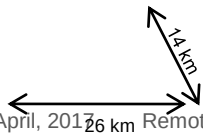


WorldDEM™ – Level of Detail

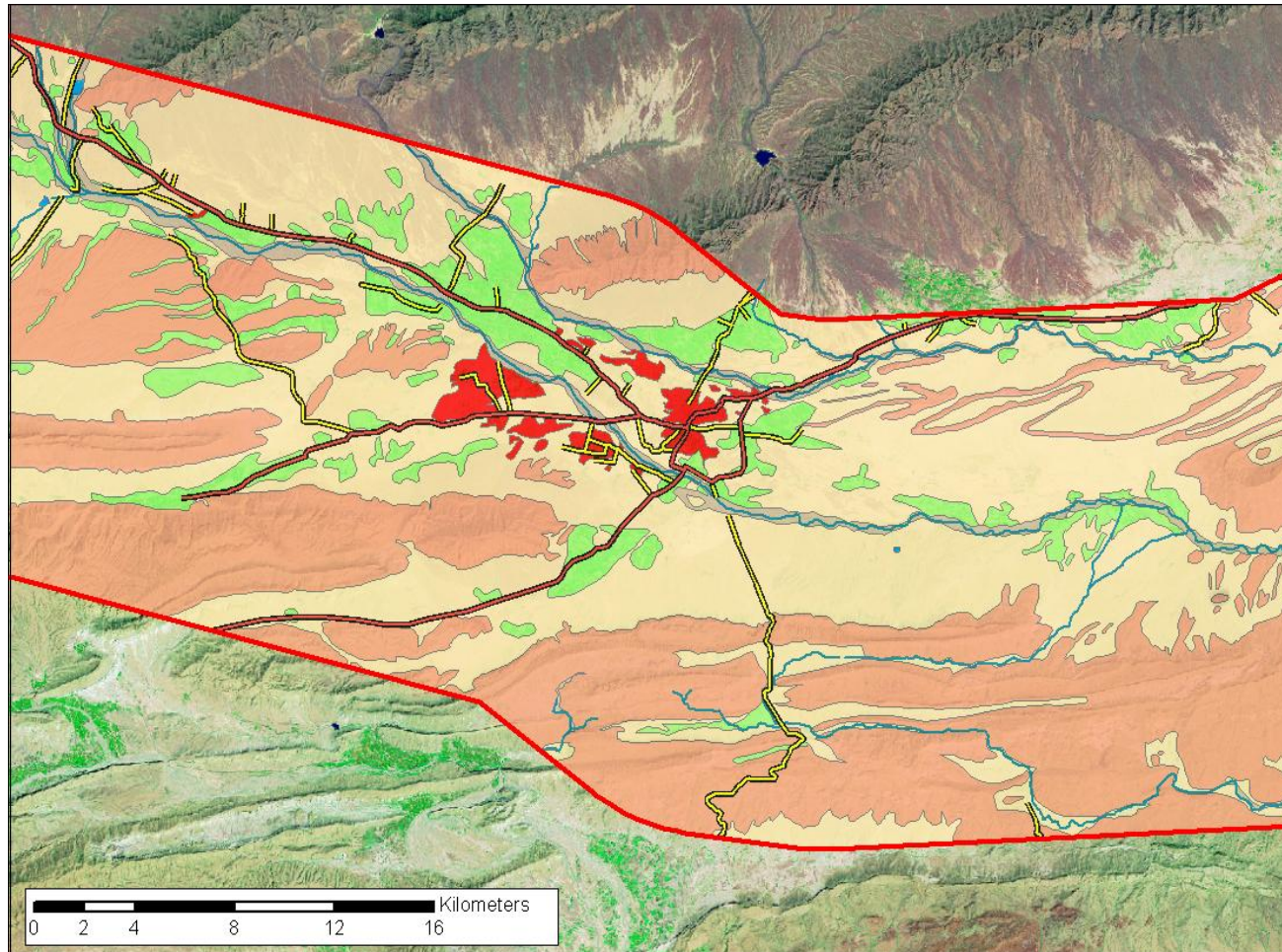
Paraguay, NW of Filadelfia



Viewing Scale: 1: 50,000



Feasibility Studies



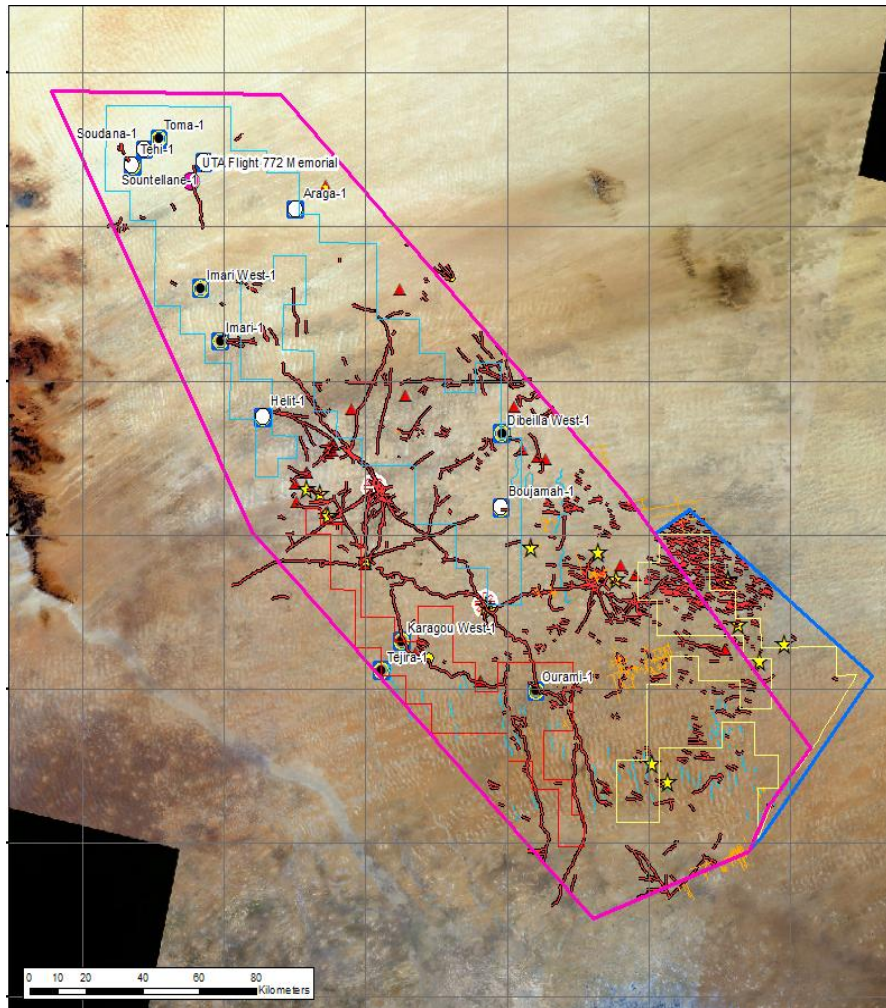
Landsat 8
imagery
and SRTM DEM



Airbus Defence and Space

**Байгал орчны суурь
судалгаа
Environmental Baseline**

Байгаль орчны суурь судалгаа / Environmental Baseline Central Africa Case Study



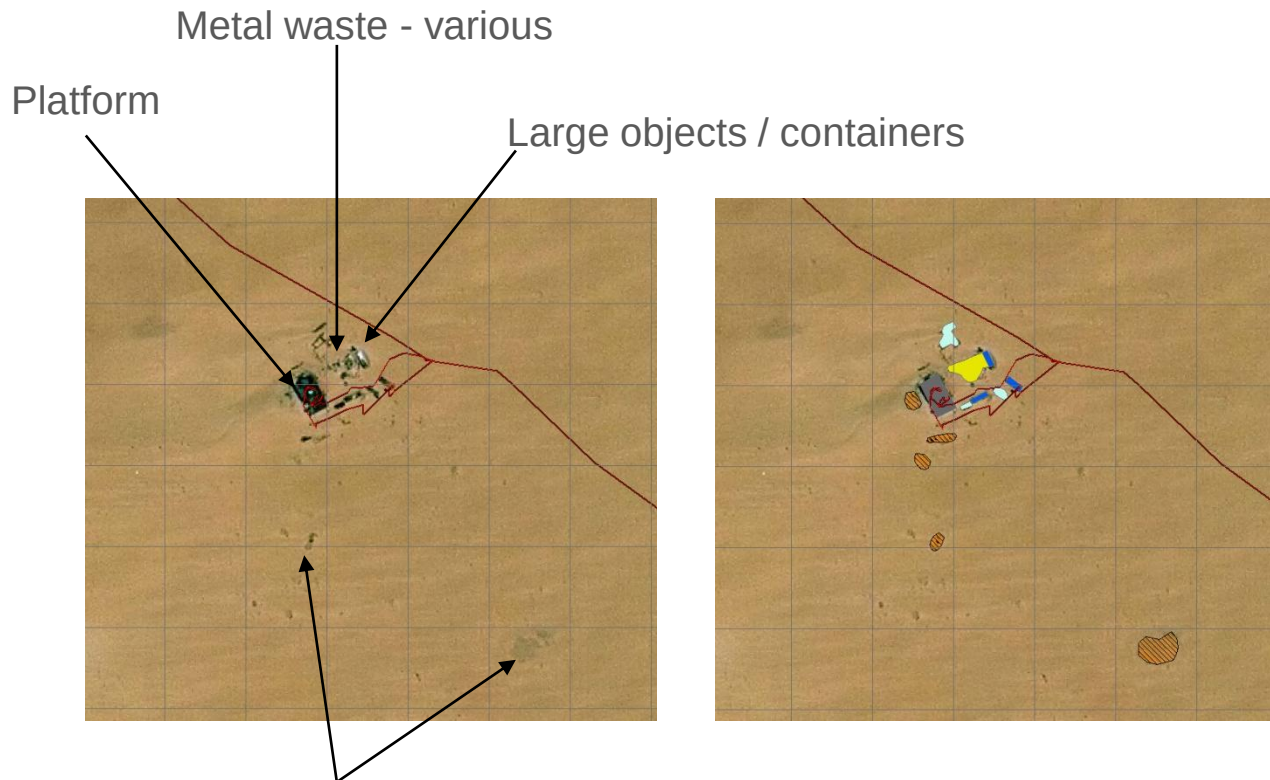
Legend

- | | |
|--|---|
| AOI | 5 Monument |
| R4 | Ephemeral drainage |
| R3 | well_pad |
| R1_R2 | Supplied well locations |
| Seismic line | Supplied well location 5km x 5km - circular |
| Track | Supplied well location 5km x 5km - square |
| Other feature of interest | Settlement |
| Possible oil impacted ground - polygon | Vigorous vegetation |
| Flaring | Weathered bedrock - brown |
| Possible oil impacted ground - point | Dune sand |
| Embankment | Vegetated dune |
| Building/facility - polygon | Interdune |
| Building point | Salt pan |

Landcover not shown for clarity – AOI extension shown by the dark blue line

Detailed Interpretation – Abandoned Platform

- Evidence of large quantities of debris surround the unused platform
- Dark areas adjacent to the platform have the potential to be oil impacted



Possible oil impacted ground

Environmental Monitoring



(June 2013) Landsat 8 ETM+ Imagery 15m Resolution ($\sim 1:50\,000$ scale) 3,B
4,3,2 R,G,B

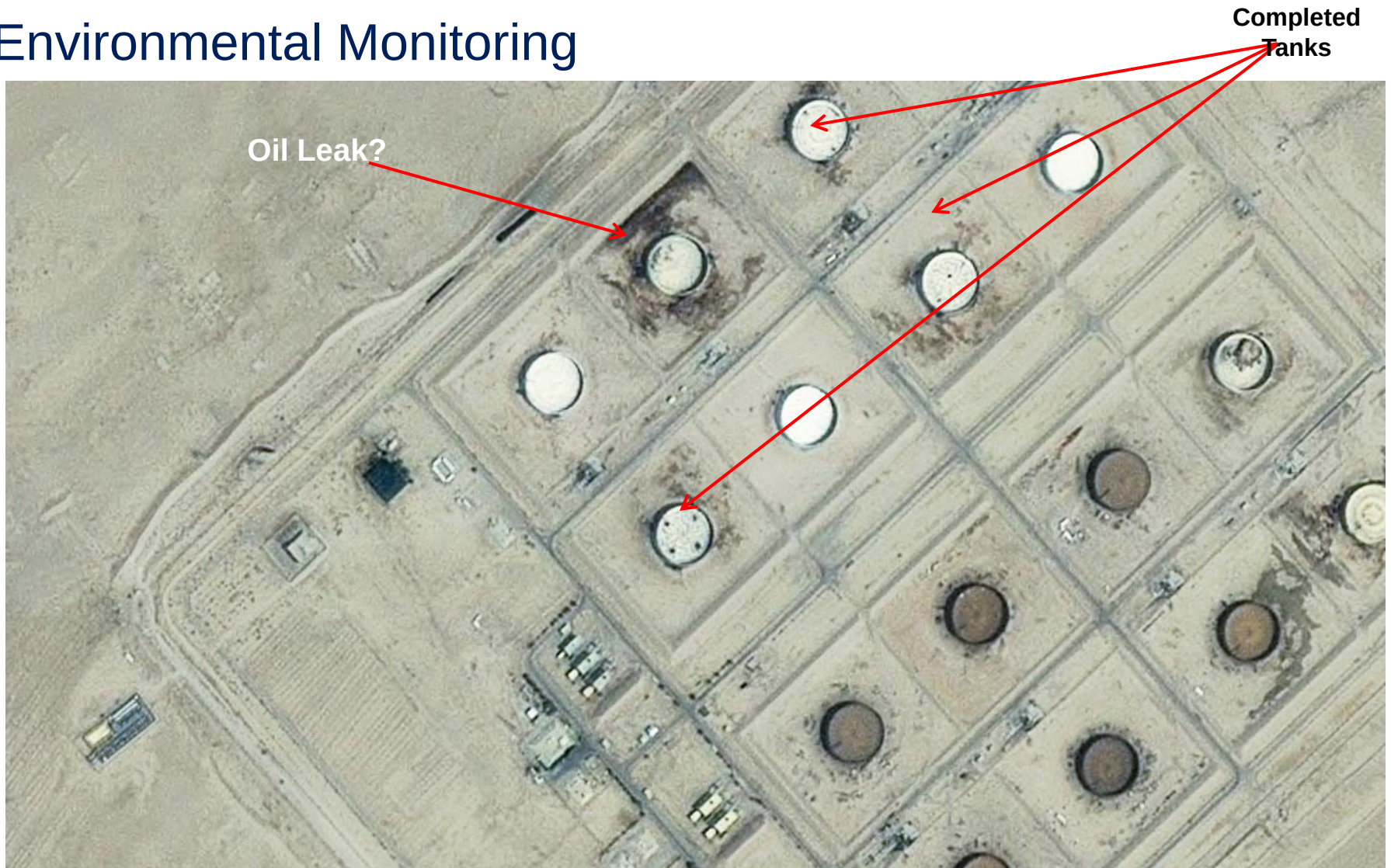
Environmental Monitoring



Tanks
under
constructi
on

(February 2012) Pléiades Imagery at 0.5m Resolution (~1:5 000 scale)

Environmental Monitoring



(April 2013) SPOT 6 Imagery at 1.5m Resolution (~1:5 000 scale)



Airbus Defence and Space

Change Detection

Change Detection - Area of dense activity



Pléiades 0.5m Resolution
October

Change Detection - Area of dense activity



Change Detection - Area of dense activity



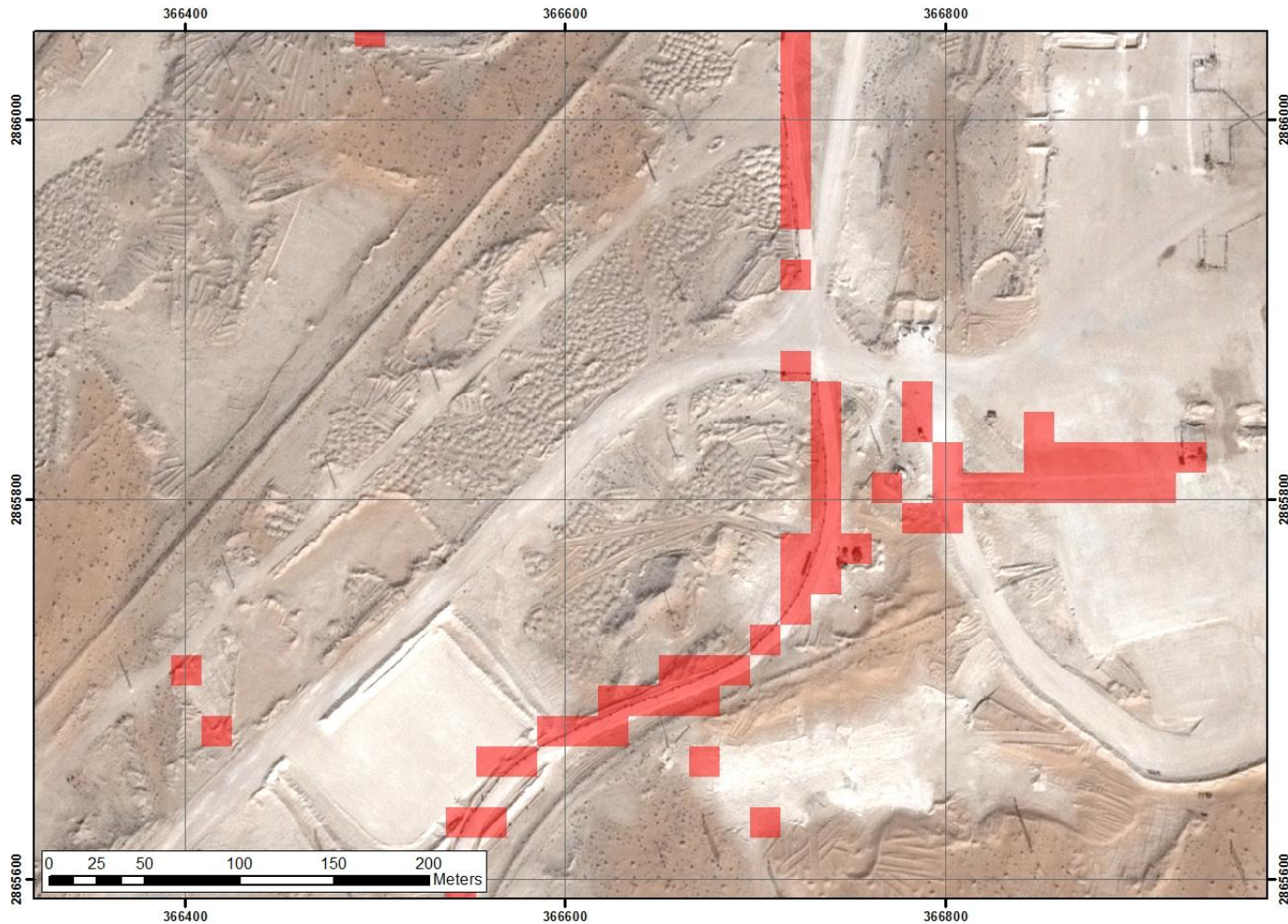
Pleiades North T0 Subset



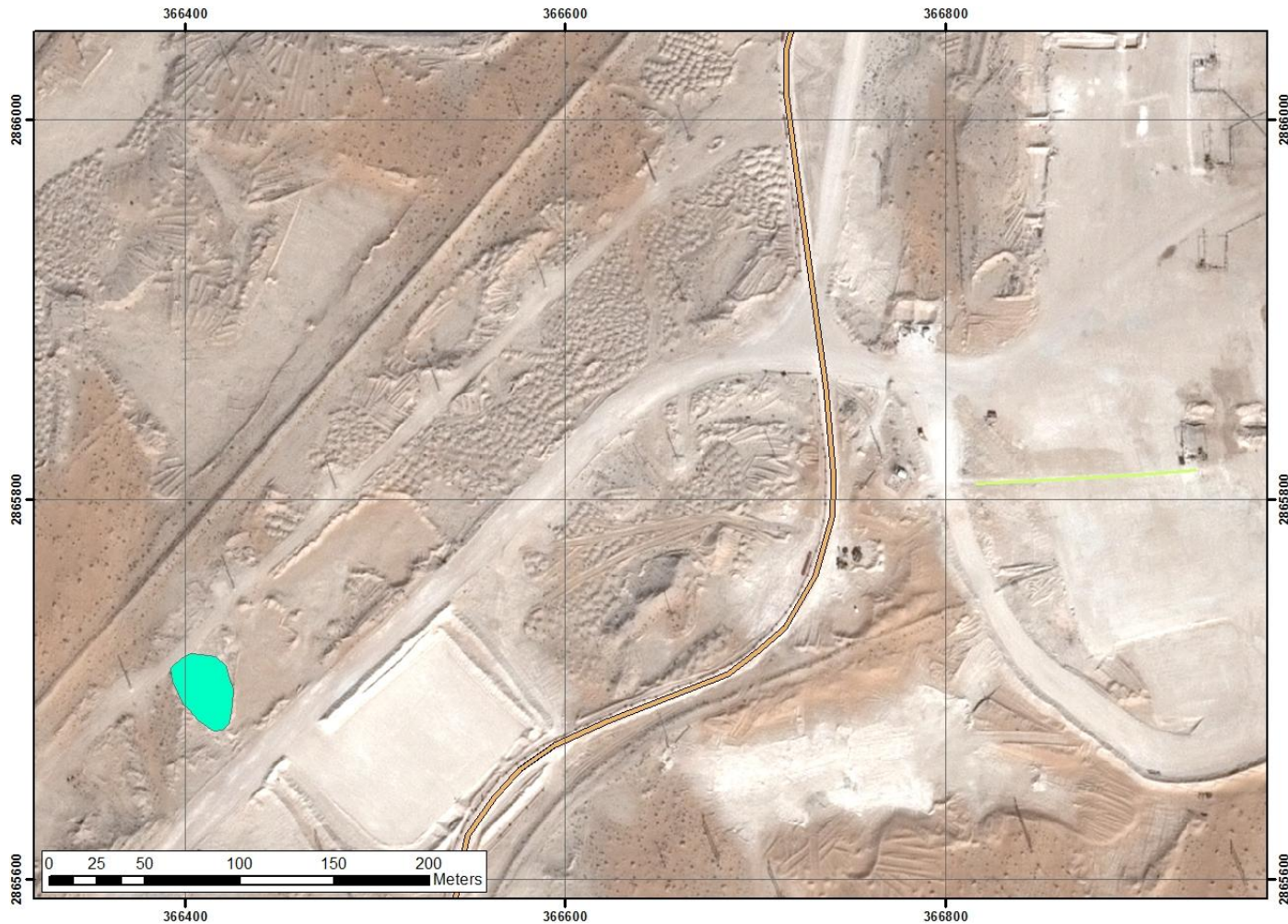
Pleiades North T1Subset



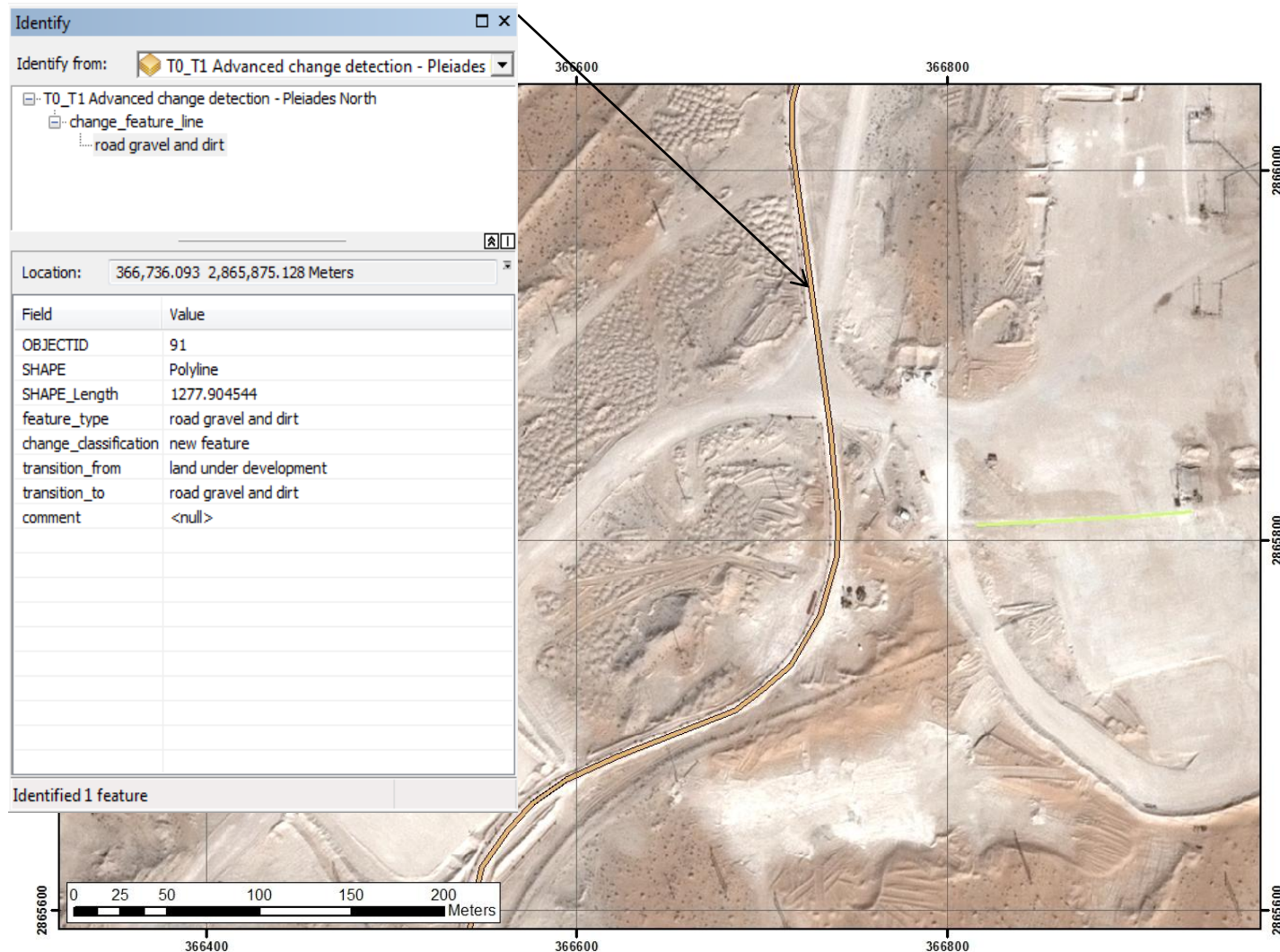
Pleiades North Standard Change Detection



Pleiades North Advanced Change Detection



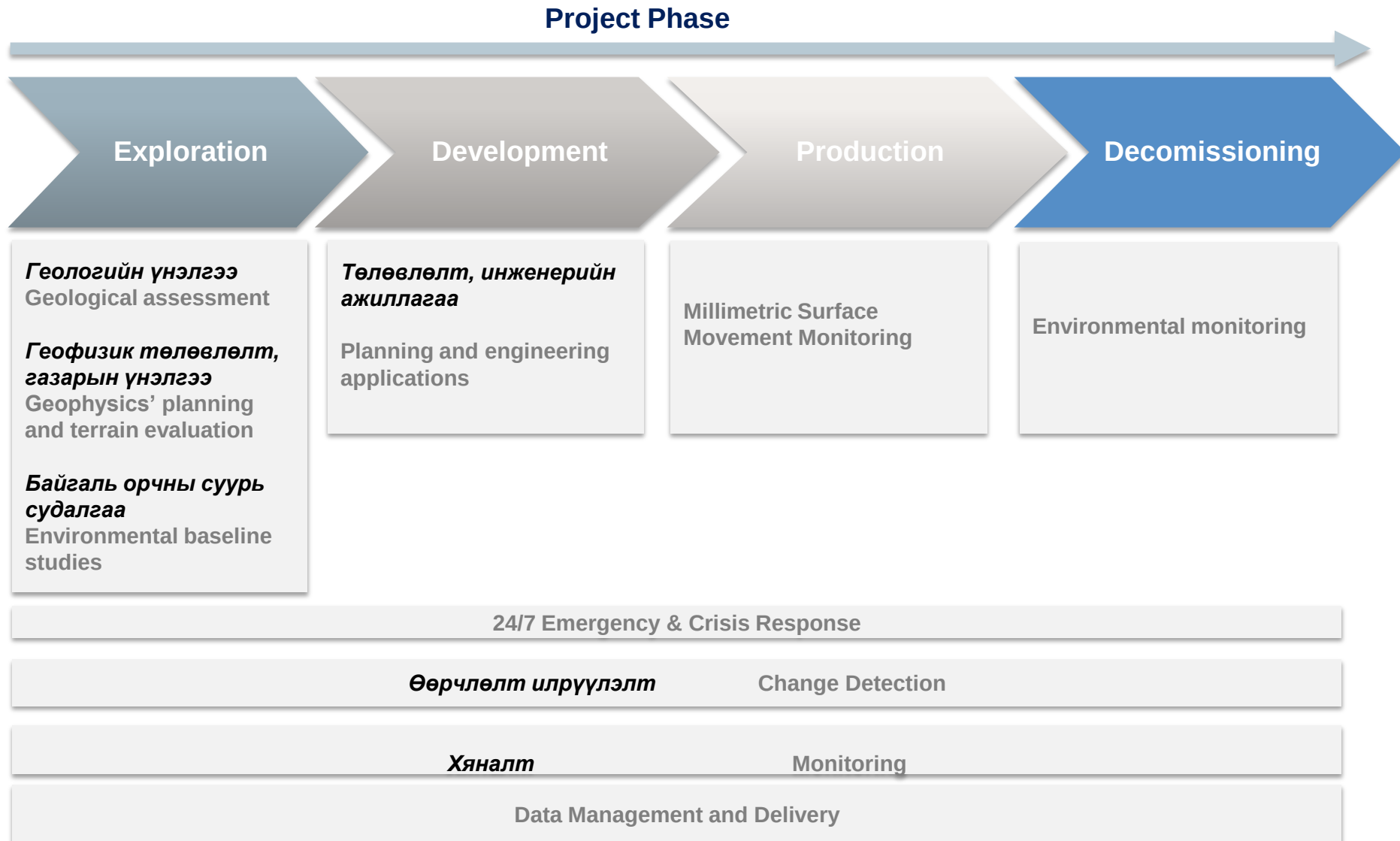
Pleiades North Advanced Change Detection - Attribution



Volume Change Calculations



Remote Sensing Contribution for Mega-Projects



Анхны Зайнаас Тандан Судалгааны Баатар Early Remote Sensing Hero



Баярлалаа
Thank you