1 | Sebelum wujudnya daratan Melaka

Before Melaka's land emerged

Bagaimana dasar laut menjadi batuan?

How does the seabed become rock?



Sedimen tertimbus oleh endapan baharu. Tekanan beban dan penyimenan mengikat butiran menjadi batuan. Bahan asal yang lembut akhirnya menyimpan rekod persekitaran laut purba.

Sediment is buried beneath new deposits. The weight of overlying material and cementation bind the grains into rock. Once-soft material eventually preserves a record of ancient marine environments.

1 | Sebelum wujudnya daratan Melaka

Before Melaka's land emerged

Mengapa batuannya kini berupa syis?

Why does the rock now occur as schist?



Selepas pemendapan, batuan mengalami suhu, tekanan dan canggaan. Mineral tersusun semula dan membentuk foliasi. Maka, usia sedimen asal dan masa pembentukan foliasi ialah dua peristiwa berbeza. Batuan metamorf Tanjung Tuan membantu kita membaca sejarah berlapis ini.

After deposition, the rock experienced heat, pressure and deformation. Minerals reorganised to form foliation. The age of the original sediment and the time when foliation formed therefore represent different events. The metamorphic rocks at Tanjung Tuan help us read this layered history.

2 | Dua blok, dua rekod pemendapan

Two blocks, two sedimentary records

Dari manakah bahan volkanik datang?

Where did the volcanic material come from?



Selain pasir dan lumpur, bahan daripada aktiviti gunung berapi boleh masuk ke lembangan dan mendap bersama sedimen. Kehadirannya menunjukkan sumbangan bahan volkanik; ia tidak bermakna gunung berapi mesti berada tepat di lokasi singkapan hari ini.

Alongside sand and mud, material from volcanic activity can enter a basin and settle with sediment. Its presence indicates a volcanic contribution; it does not mean that a volcano stood exactly where the outcrop is found today.

2 | Dua blok, dua rekod pemendapan

Two blocks, two sedimentary records

Mengapa lapisan batuan berlainan?

Why are the rock layers different?



Perubahan bekalan bahan dan tenaga air menghasilkan lapisan dengan saiz butiran serta komposisi berbeza. Sedimen pada Blok Malaya Timur dan Sibumasu merekodkan sejarah awal yang berlainan sebelum kedua-duanya bercantum.

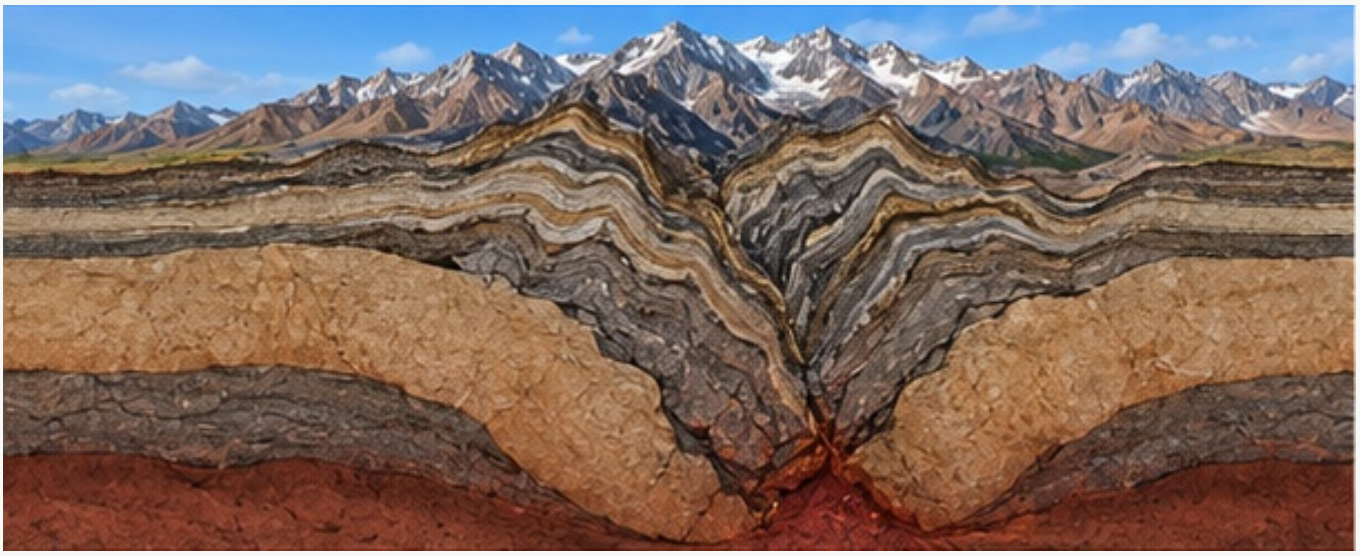
Changes in sediment supply and water energy produce layers with different grain sizes and compositions. Sediments on the East Malaya and Sibumasu blocks record different early histories before the two blocks joined.

3 | Pertembungan mengubah kerak Bumi

Collision reshapes Earth's crust

Apakah kesan dua blok menghampiri?

What happens as two blocks converge?



Penutupan lautan di antara blok membawa kepada pertembungan. Kerak dimampatkan dan menebal, manakala batuan mengalami lipatan serta metamorfisme. Zon Sutura Bentong–Raub menandakan sejarah penyatuan ini.

Closure of the ocean between the blocks leads to collision. The crust is compressed and thickened, while rocks undergo folding and metamorphism. The Bentong–Raub Suture Zone marks this history of amalgamation.

3 | Pertembungan mengubah kerak Bumi

Collision reshapes Earth's crust

Granit tidak membeku sebagai lava

Granite does not solidify as lava



Magma yang merejah kerak menyejuk di bawah permukaan. Penghabluran membentuk granit; hakisan kemudian menyingkapkannya. Granit terdapat di pesisir Tanjung Bidara serta pulau seperti Undan dan Besar. Granit pantai hari ini pernah berada lebih dalam.

Magma intruding into the crust cools below the surface. Crystallisation forms granite, which is later exposed by erosion. Granite occurs along the Tanjung Bidara coast and on islands such as Undan and Besar. The granite seen on today's coast was once buried more deeply.

4 | Rekahan menyimpan episod baharu

Fractures preserve later events

Apa yang berlaku selepas batuan perumah wujud?

What happens after the host rock has formed?



Magma boleh memasuki rekahan batuan yang lebih tua lalu membeku sebagai aplit berbutir halus. Hubungan aplit yang memotong granit membantu menentukan urutan kejadian. Contohnya direkodkan di Pulau Besar, Pulau Lalang dan Batu Mandi.

Magma can enter fractures in older rock and solidify as fine-grained aplite. Aplite cutting across granite helps establish the order of geological events. Examples are recorded at Pulau Besar, Pulau Lalang and Batu Mandi.

4 | Rekahan menyimpan episod baharu

Fractures preserve later events

Adakah semua jalur putih itu aplit?

Is every white band aplite?



Tidak. Telerang kuarza terbentuk apabila mineral mengendap daripada bendalir dalam rekahan. Aplit ialah batuan igneus dengan beberapa mineral. Kedua-duanya boleh kelihatan cerah, tetapi mewakili proses berbeza. Tanjung Tuan memperlihatkan hubungan kuarza dengan syis.

No. Quartz veins form when minerals precipitate from fluids within fractures. Aplite is an igneous rock containing several minerals. Both can look pale, but they represent different processes. Tanjung Tuan shows the relationship between quartz and schist.

5 | Iklim dan air membentuk Melaka kini

Climate and water shape Melaka today

Luluhawa mengubah batuan di tempat asal

Weathering alters rock in place



Air dan iklim tropika membantu penguraian mineral. Sebahagian bahan larut dibawa keluar, manakala mineral besi boleh terkumpul dan memberi warna merah-perang kepada laterit. Laterit jauh lebih muda daripada batuan induk yang diubahnya.

Water and a tropical climate help break down minerals. Some dissolved material is removed, while iron minerals may accumulate and give laterite its reddish-brown colour. Laterite is much younger than the parent rock from which it develops.

5 | Iklim dan air membentuk Melaka kini

Climate and water shape Melaka today

Hakisan memindahkan bahan ke tempat baharu

Erosion moves material to new places



Bahan terluluhawa dibawa oleh sungai dan ombak, kemudian dimendapkan semula. Endapan pasir, lodak dan lempung menutupi sebahagian batuan lama. Endapan sungai dan pesisir Melaka menunjukkan bahawa landskap hari ini masih terus berubah.

Weathered material is transported by rivers and waves, then deposited again. Sand, silt and clay cover some older rocks. River and coastal deposits in Melaka reveal a landscape that continues to change.

RUJUKAN / REFERENCES

Draf Dossier Permohonan Aspiring Melaka Geopark (2026).
Sejarah Bumi Melaka. Panel 2, Galeri Melaka Geopark.