

CLASS 9 • SOCIAL SCIENCE

PART 1 / EXPLORING SOCIETY: INDIA AND BEYOND

CHAPTER 02

SHAPING OF THE EARTH'S SURFACE

Forces within. Agents outside. A planet always in motion.

Earth is a dynamic planet

- Its surface is constantly being built, broken and reshaped.
- Internal forces drive volcanism and earthquakes.
- External forces weather rocks, erode material, carry it away and deposit it elsewhere.



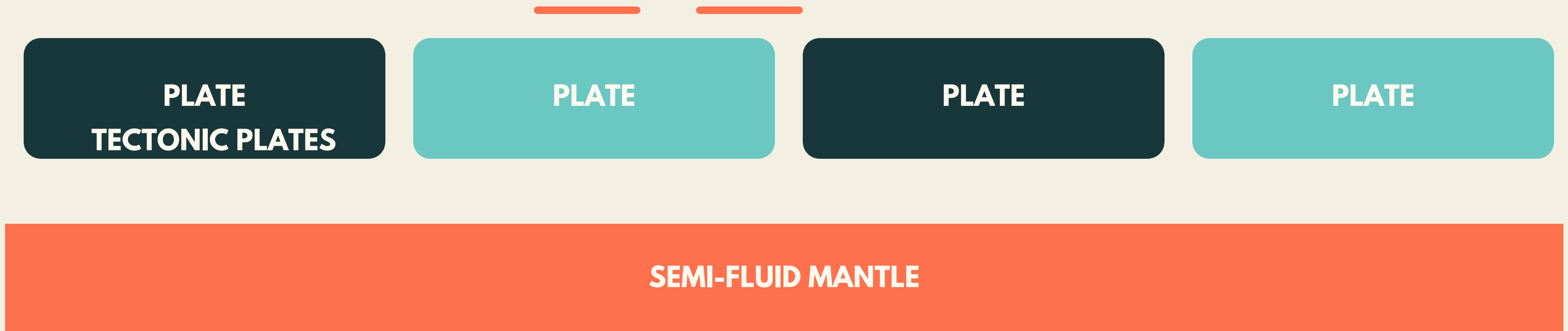
Crust. Mantle. Core.

- **CRUST** — thin, cool and solid outer skin.
- **MANTLE** — the thick, hot, semi-solid middle layer.
- **CORE** — extremely hot and metallic: a liquid outer core around a solid inner core.



The crust is a moving mosaic

- Large tectonic plates form Earth's crust.
- They float and move slowly over the semi-fluid mantle.
- Over millions of years, this motion reshapes oceans, continents and mountains.



Three ways plates meet

DIVERGENCE



- New crust forms at mid-ocean ridges

COLLISION



- Mountains rise from collision

SLIDING



- Faults slip and earthquakes strike

Seven major plates

- Pacific • North American
 - South American • African
 - Eurasian • Antarctic
 - Indo-Australian
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- They differ in size and shape.
 - Their boundaries concentrate volcanic earthquakes and mountain building.



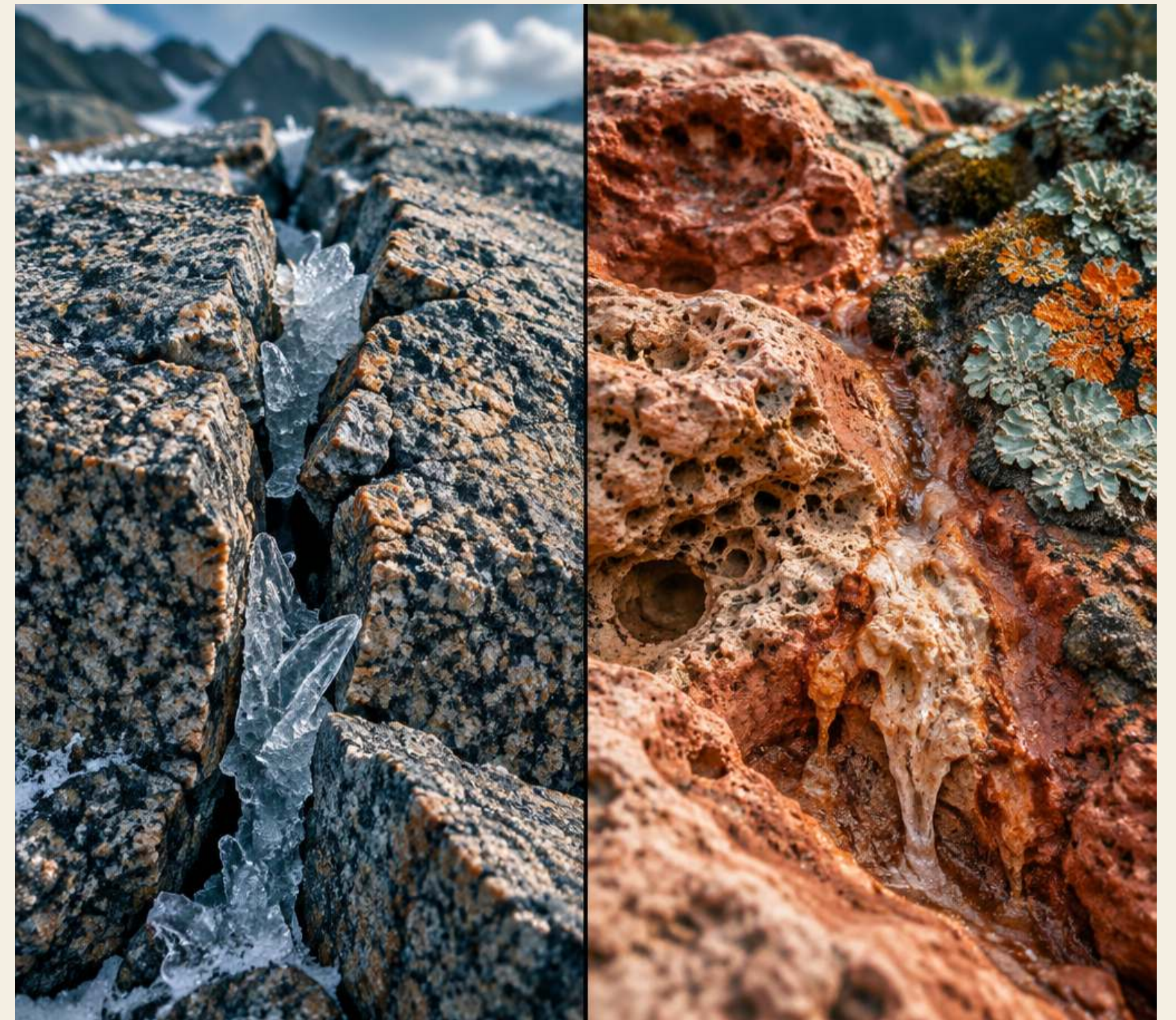
When stored energy breaks free

- Sudden movement along a fault releases energy as seismic waves, shaking the ground.
- Earthquakes are described by magnitude and intensity.
- Strong events can damage buildings, infrastructure and lives—especially where construction is vulnerable.



Rocks break down in place

- **MECHANICAL** — physical breaking without changing composition; caused by heating, cooling and frost action.
- **CHEMICAL** — minerals change through reactions with water, oxygen or acids, including acid rain.



Remove. Transport. Settle.

- **EROSION** removes and carries weathered material by water, wind or ice.
- **DEPOSITION** begins when the moving agent loses energy and drops its load.
- Together, they reshape landscapes over time.



Rivers are landscape engineers

- Rivers erode, transport and deposit.
- They wear down high areas and fill low areas, gradually smoothing the land.
- This long-term levelling process is called gradation.



Six signatures of a river



V-SHAPED VALLEY • WATERFALL • MEANDER • FLOODPLAIN • OXBOW LAKE • DELTA

The coast is never still

- Waves form as wind transfers energy to the water surface.
- Currents are continuous flows of ocean water in a particular direction.
- Both erode exposed coasts and deposit sediment in sheltered places.



Coasts carved—and rebuilt



SEA CLIFF • SEA CAVE • ARCH • STACK • BEACH • SAND BAR

Wind: the desert sculptor

- Wind lifts, carries and sorts sand and dust.
- It builds dunes and loess deposits.
- It carves mushroom rocks and excavates deflation hollows.
- In powerful storms, it moves dust across vast regions.



Ice moves like a slow river

- Glaciers are huge masses of moving ice.
- Their weight and embedded rock carve broad U-shaped valleys and cirques.
- As ice melts, it leaves moraines and can form glacial lakes.



Water's hidden architecture

- Groundwater dissolves soluble rock, especially limestone.
- It opens caves and sinkholes.
- Inside caves, mineral-rich drops slowly build stalactites downward from ceilings and stalagmites upward from floors.



When a slope gives way

- A landslide is the rapid downslope movement of rock and soil under gravity.
- Heavy rain, earthquakes, slope cutting and vegetation loss can trigger failure.
- Settlements and roads below steep slopes face the greatest risk.



Snow can become a fast-moving flow

- Avalanches suddenly send snow, ice and rock down mountain slopes.
- They occur in cold, steep terrain when a weak snow layer fails.
- The moving mass can bury everything in its path.



A lake can fail in minutes

- A glacial lake outburst flood begins when an ice or moraine dam collapses.
- The sudden surge races downstream, threatening settlements, bridges, roads and power infrastructure far from the glacier.



When dry soil takes flight

- Strong winds can lift huge amounts of loose dust from bare, dry ground.
- Dust storms are common in arid and semi-arid regions.
- They sharply reduce visibility and can harm breathing, transport and agriculture.



One surface. Two sets of forces.

INTERNAL

Plate movement
Volcanism
Earthquakes

EXTERNAL

Weathering
Erosion
Deposition

WATER • WIND • ICE • GRAVITY

Understanding processes helps us live wisely

- **PREDICT** / Recognise hazards and warning signs.
- **PLAN** / Choose safer land use and infrastructure.
- **PROTECT** / Conserve soil, water and vulnerable landscapes.



Read the landscape

MOUNTAINS + VALLEYS

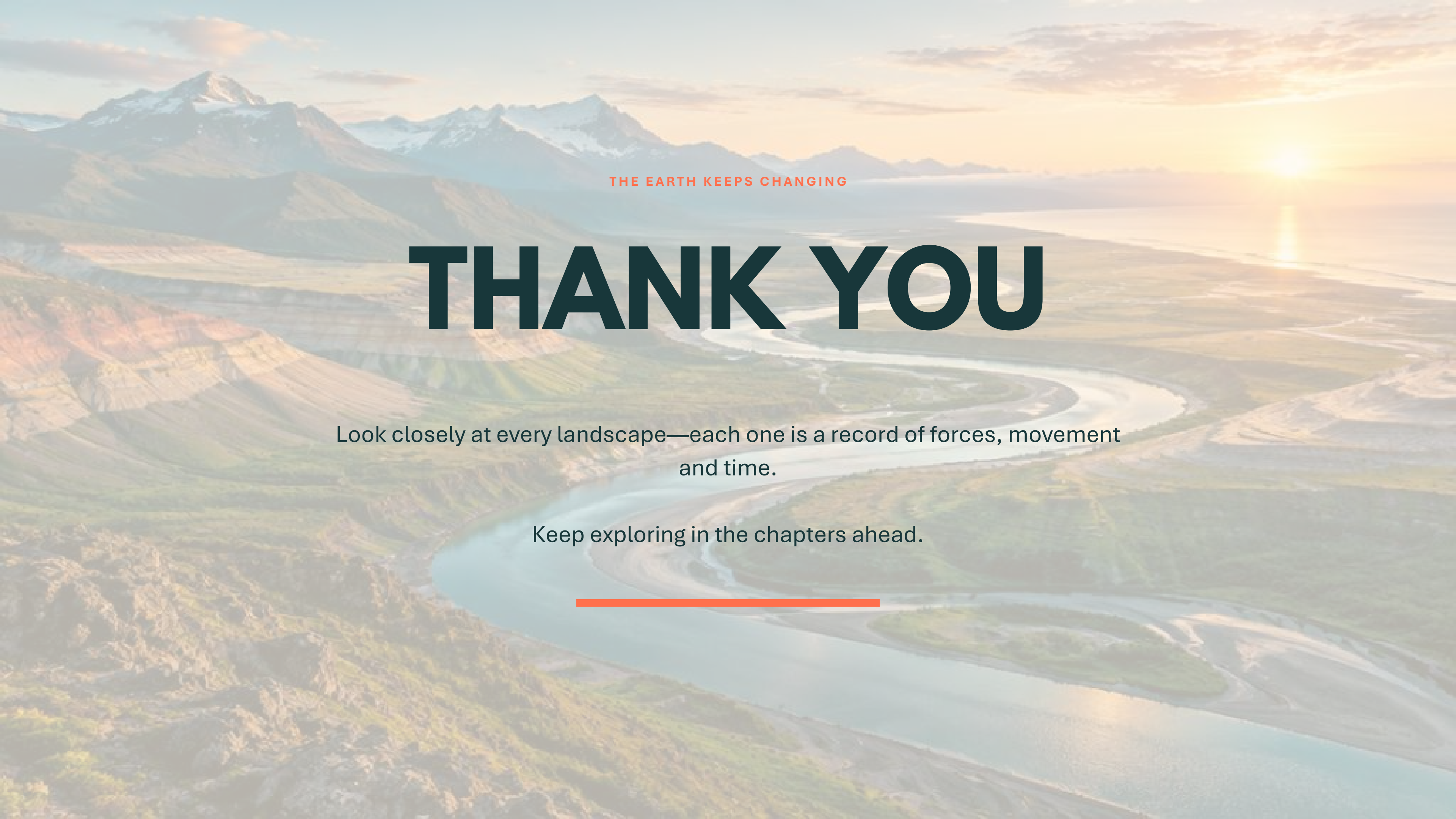
RIVERS + DELTAS

CLIFFS + ARCHES

DUNES + LOESS

CIRQUES + MORAINES

CAVES + SINKHOLES



THE EARTH KEEPS CHANGING

THANK YOU

Look closely at every landscape—each one is a record of forces, movement and time.

Keep exploring in the chapters ahead.
