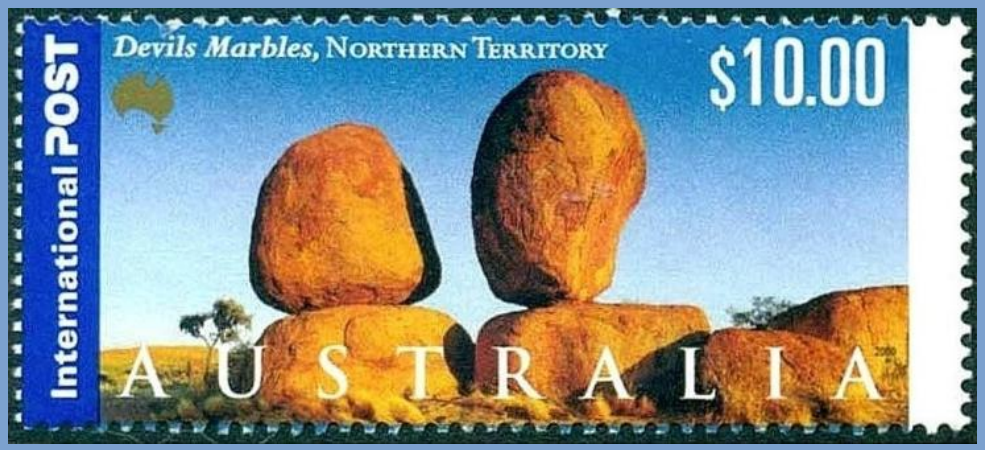
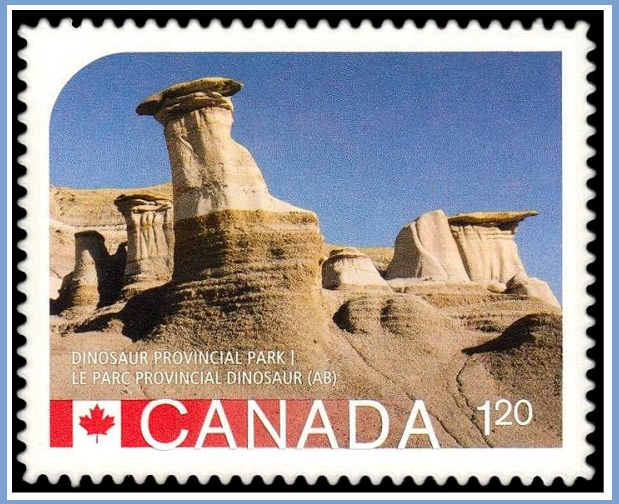
Geomorphology on Postage Stamps





Fred Haynes

February 27, 2025

Mountains

1900

1987

highest mountain in New Zealand (12,218')

Matterhorn (1965) - Switzerland

Nepal (1982)

ATA Checklist Topics

Mountains – 4182 entries

Volcanoes – 633 entries

Volcanoes

Mt. Fuji
Japan (1929)

artist depiction of August, 1883

Mt. Ranier (1935 NP set) - imperf

2016, photo of a recent eruption

There are approximately 1350 potentially active volcanoes, about 500 have erupted in recorded history (last ~5000 years). About 50 erupt every year.

In the US there are 170 potentially active volcanoes, 130 of them are in Alaska, 54 of which have erupted in recorded history. Don't worry, there are none in New York.

1862 first volcano stamp

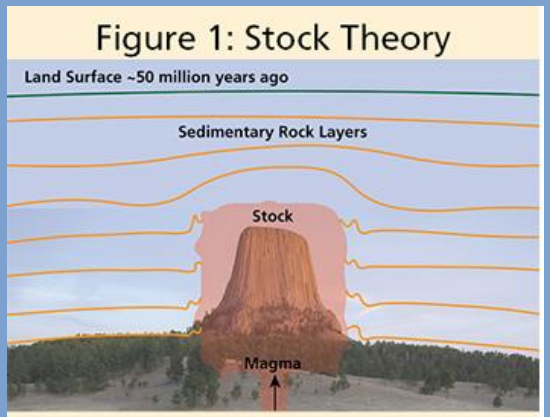
Mt. Momotombo (1900)

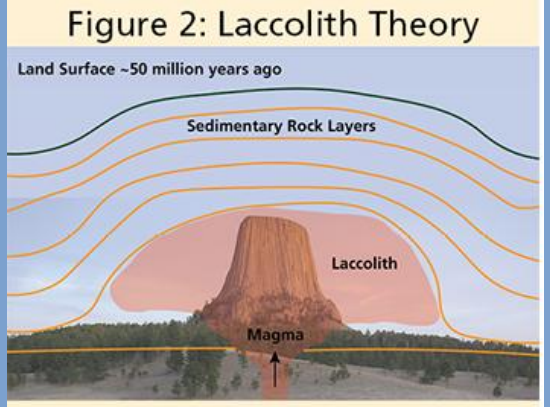
- In the fall of 1902 American politicians were actively debating whether to support a canal bridging the Atlantic and Pacific Oceans through Panama or Nicaragua. .
- Two years earlier, Nicaragua had issued this stamp depicting Mt. Momotombo, a stratovolcano in Nicaragua, and added smoke coming from its top.
- The leaders of Panama sent copies of this stamp to all US senators and also reminded them of the May 8, 1902 eruption of Mt. Pelee on the Caribbean island of Martinique that killed 30,000.

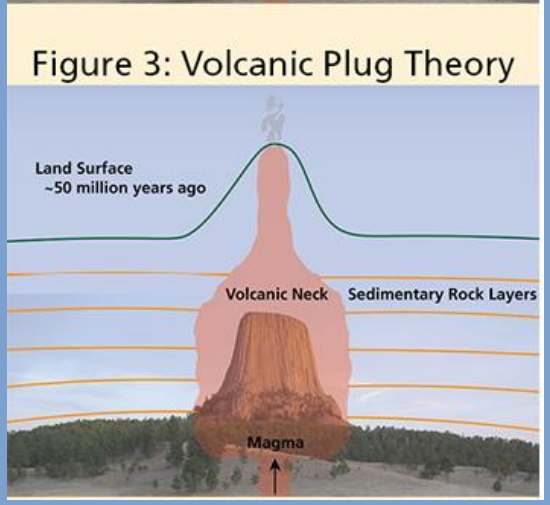
September, 1956

First US National Monument

National Park Services webpage







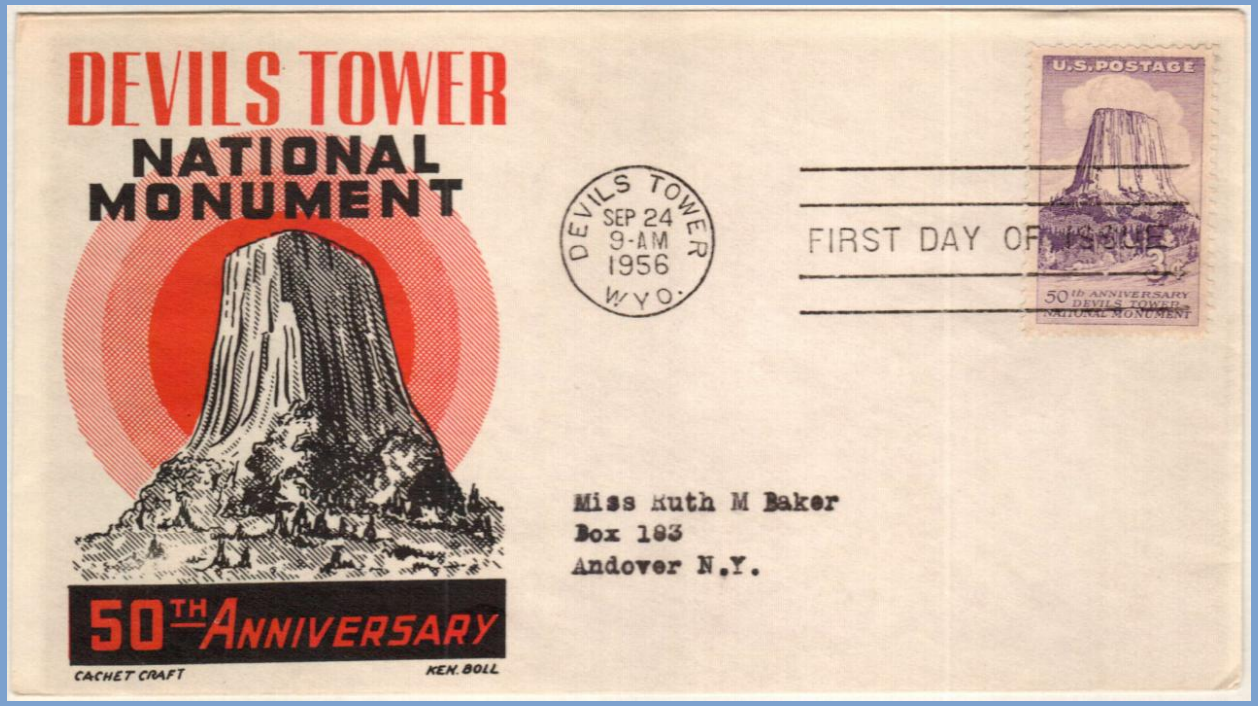
Giant's Causeway
Northern Ireland
Great Britain 2001

columnar jointing caused by cooling as magma solidifies within the crustal stress regime

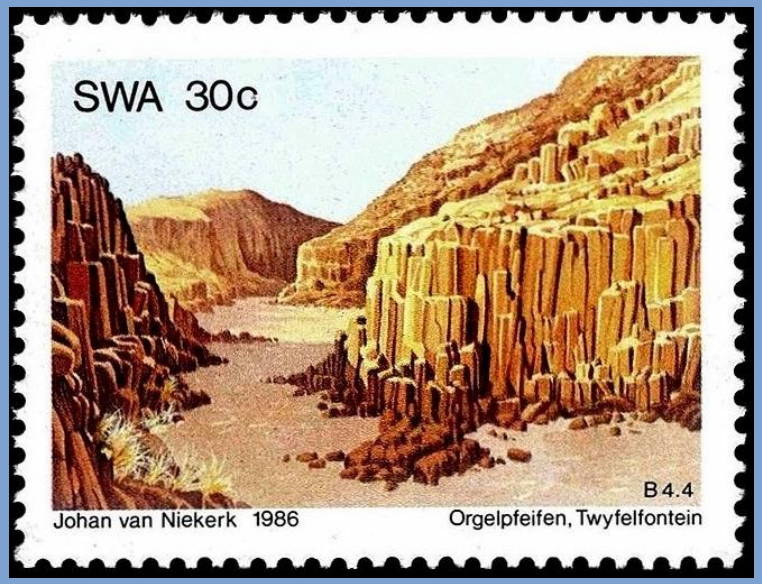
A first day cover or FDC featuring the Devils Tower stamp, a first day cancel from the site when the stamp was first issued and a cachet image, here a line drawing of the feature.

What is the rock type?

Phonolite porphyry with nepheline

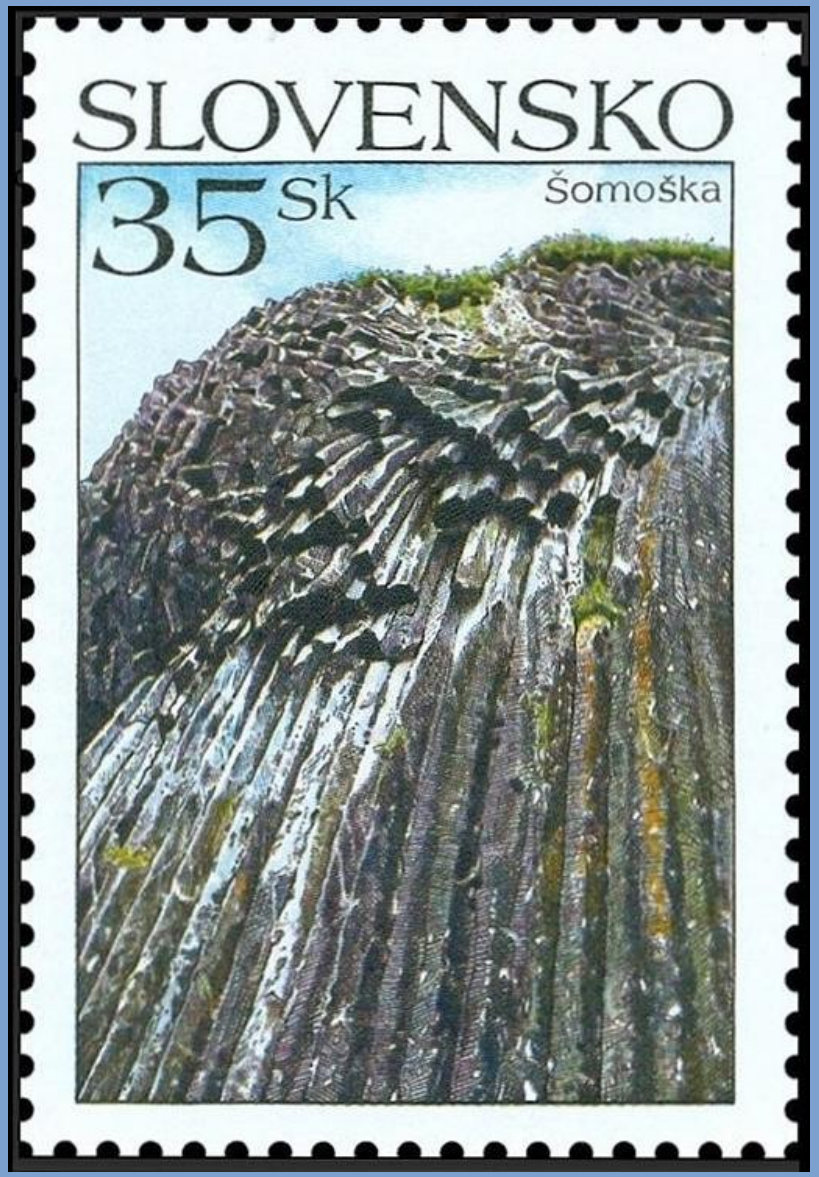


Ship Rock or Tse Bitai "winged rock" in Navaho is a volcanic neck where less resistant volcanic rock surrounding the central stock has eroded away.

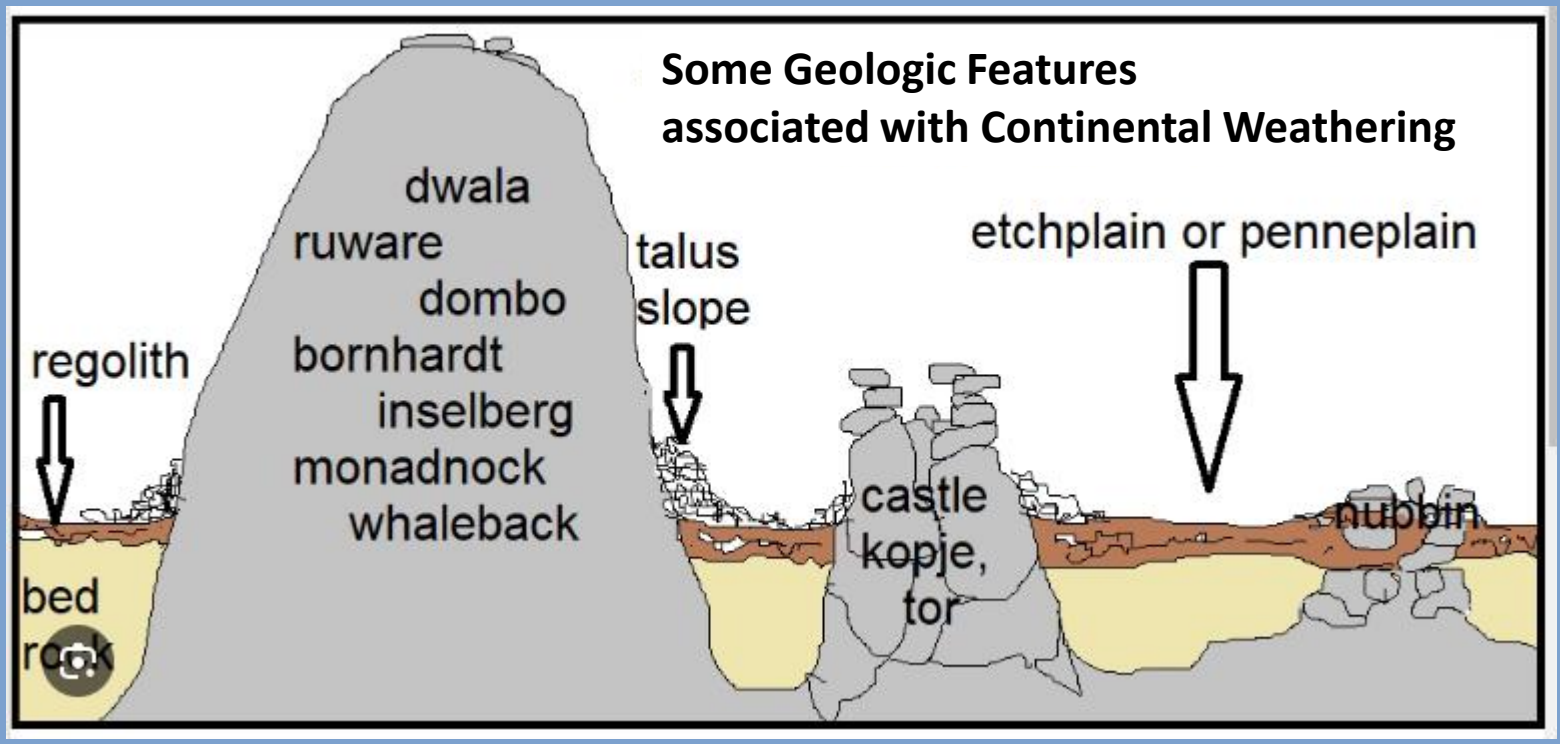


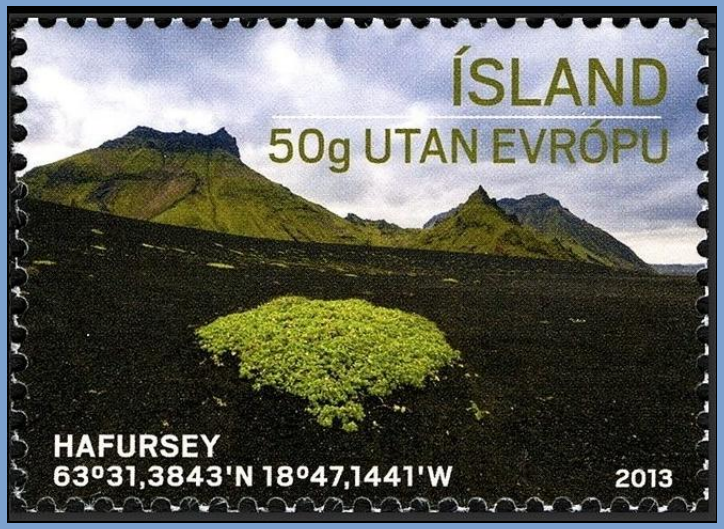
120-140 million year old basalt

10 my old basalt



Slovakia, 2006: Stone waterfall of Somaska just 4 million year old basalt





Hafursey: an inselberg (isolated mountain) made up of palagonite, an alteration product between volcanic glass and seawater.

generally kaolinite, illite, other clays and zeolites

Philagems Internatio

Gems, Minerals and Jewelry Study

American Topical Association

A quarterly bulletin featuring articles, reports and checklists covering all phases of gems, r

April-June 2024

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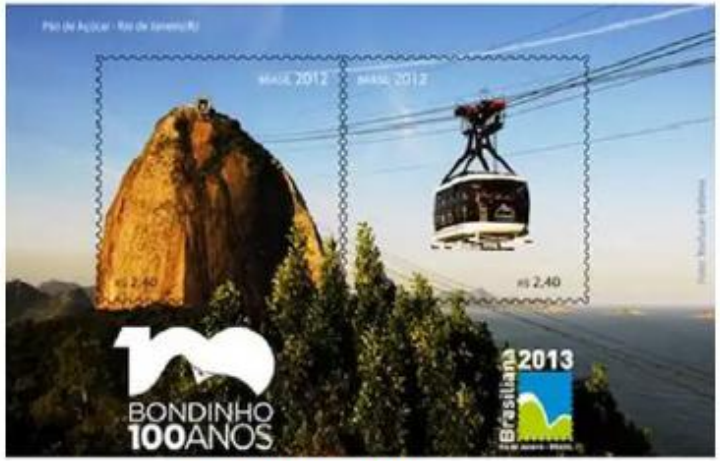
Bornhardts and Nubbins by Fred Haynes

Do you know what a bornhardt is? How about a nubbin? In full disclosure, and even as a geologist, I had not heard of either until I encountered them in a Facebook Geology Group and then found the Australian stamp shown in the title box in my collection. Bornhardts and nubbins are geomorphic terms. *Geomorphology is the study of landforms and their relation to geologic processes and structures.* In short, a bornhardt is a large rock formation with steep or vertical sides and a round or dome-shaped top and a nubbin is a small, gently-sloped hill with a bedrock core that is often dotted with erosionally-exposed, rounded, residual blocks. Both are subsets of the broader geologic landform known as an inselberg, an "island mountain" as directly translated from German. Bornhardts often degrade into nubbins as erosion proceeds in a desert environment. Both are typically made of granite, but this is not part of the definition.

Let's start with the largest of the two landforms. Bornhardts are named after Wilhelm Bornhardt (1864–1946), a German geologist and explorer of German East Africa, who first described the feature. However, arguably the most famous bornhardt in the world is across the South Atlantic from where Bornhardt worked. At the head of Guanabara Bay and overlooking Rio De Janeiro, Brazil, Sugarloaf Mountain rises 1300 feet above the Atlantic Ocean. Since 1912, cable cars have carried people to the top of this large bornhardt for a spectacular view of the city. In the summer over 1300 people are transported to the top each hour. Brazil is proud of the bornhardt overlooking its largest city and has featured it on at least two postage stamps. Both commemorate Brazilian tourism and both were issued as souvenir sheets.

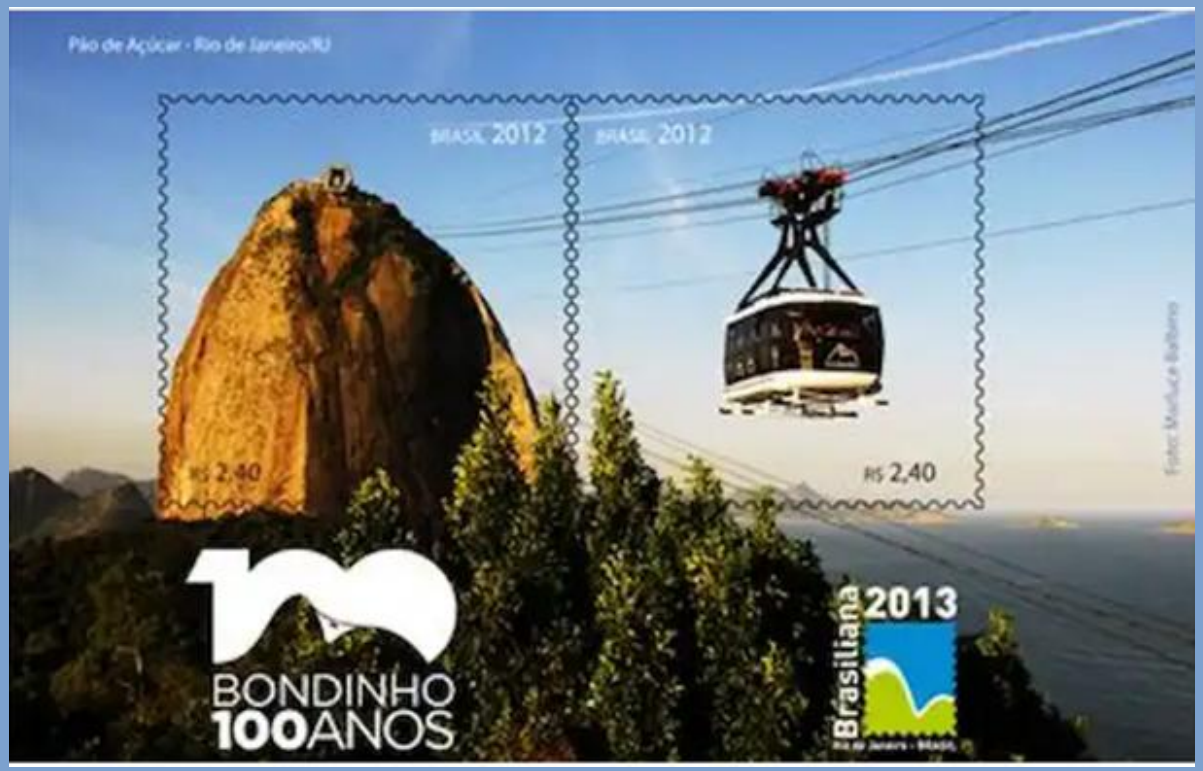


Scott 3232a, b (2012)

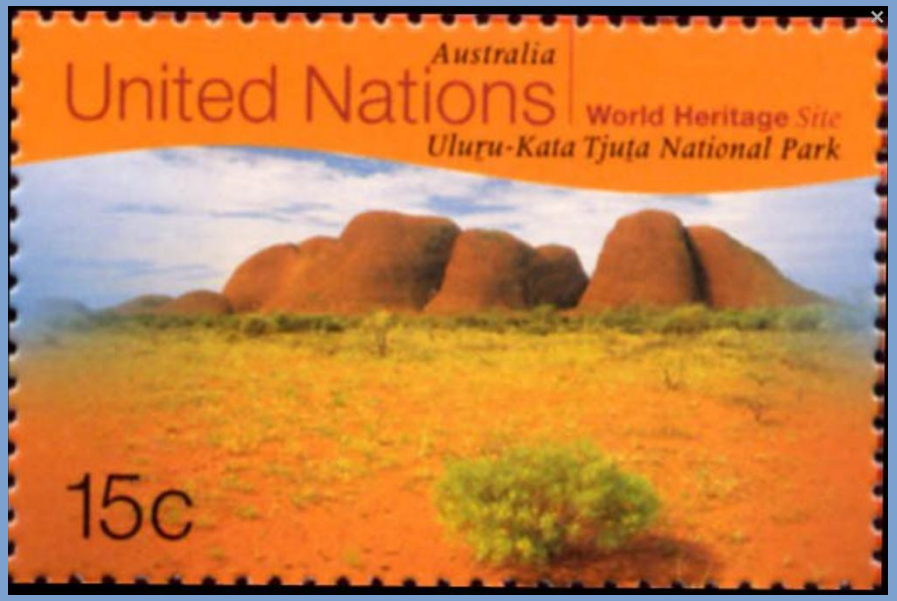
Scott 2397

A bornhardt is a dome-shaped rock formation with steep sides at least 50m tall and hundreds of meters wide. [Named afer German geologist Wilhelm Bornhardt]

Sugarloaf Mountain, at the head of Guanabara Bay in Rio De Janeiro may be the world's most famous bornhardt, rising 1300' above the bay.



Brazil has featured Sugarloaf Mountain on postage stamps twice (in 1992 and 2013). In both cases a pair of stamps are set into what is called a souvenir sheet.

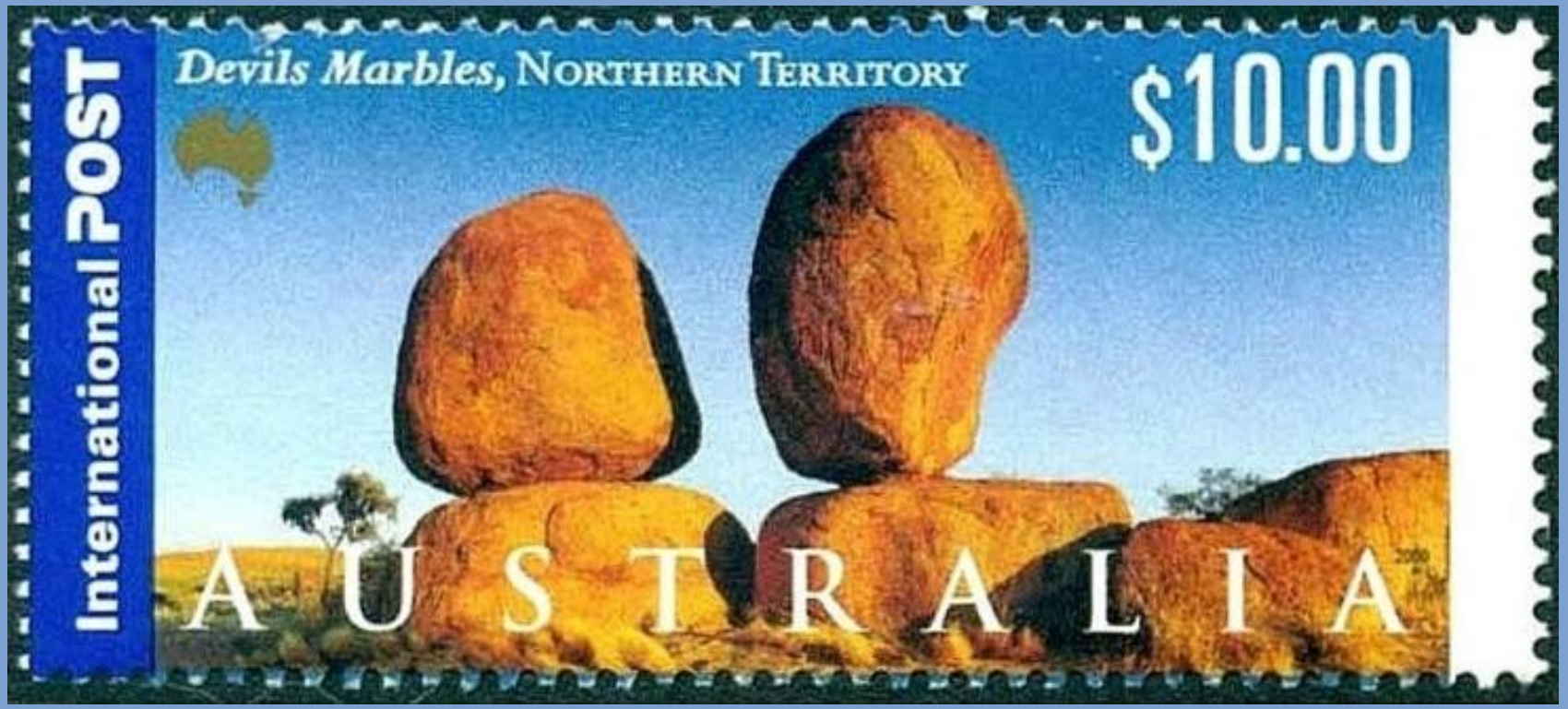


1999

1979

Australians are likely to disagree with the assignment of Sugarloaf Mountain as the world's most famous bornhardt. There are many noteworthy bornhardts in central Australia, particularly in Uluru-Kata Tjuta National Park.

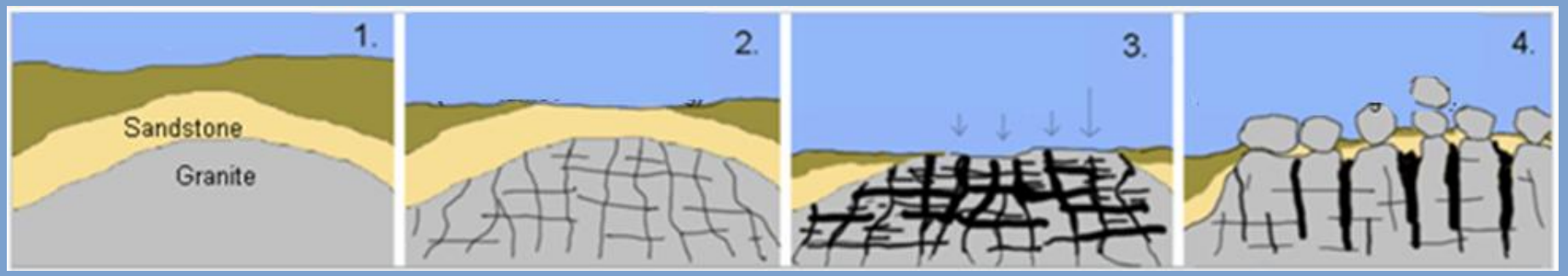
Although many bornhardts are intrusive igneous rocks that is not a strict part of the definition. These hills are arkosic sandstone and conglomerate, remnants of Cambrian alluvial fans.



These are nubbins: rounded residual blocks exposed by weathering, typically composed of intrusive igneous rock.

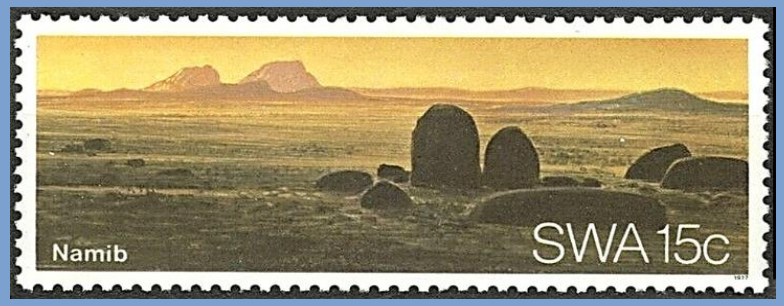
Australian explorer, John Ross, who is created with mapping the region in 1910, is said to have stated that it appears that the “devil himself emptied his bag of marbles”.

Geologists, however offer a different explanation.

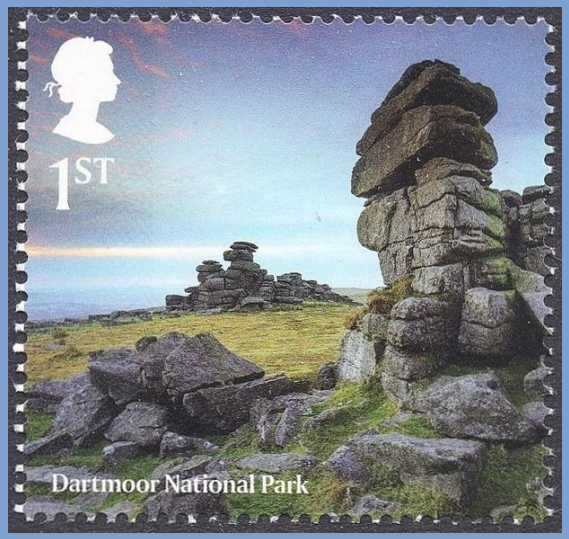


1. ~1700 million years ago, a granitic magma intruded older sedimentary rocks.
2. As the granite cooled, pressures and stresses within the Australian continental plate caused cracks (joints) to develop at right angles.
3. Over hundreds of millions of years the overlying rocks were eroded and the granite came closer to the surface. Groundwater filtered down the joints, converting some of the feldspars in the granite to clay. The weathering process was helped by the warm, humid climate. Weathering was greatest at the corners of the blocks where surfaces were exposed.
4. Eventually, the overlying rocks were eroded away and the granite was exposed. The softer weathered granite at the edges of the blocks was washed away leaving boulders perched on one another and strewn across the rock platform.

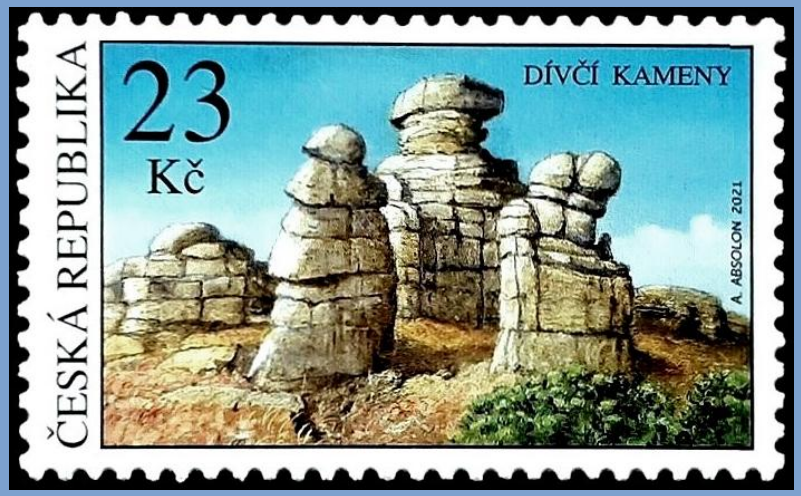
Devil's Marbles were born!



kopje-small rocky hill in a flat area



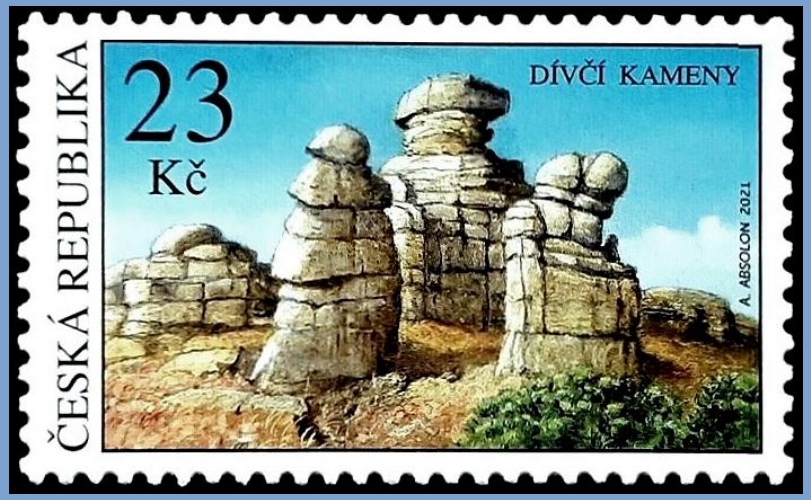
Tor



Granite outcrops on moorland , often found atop inselbergs or pediments. They provide evidence that glaciers did not cover the areas on which they are

Czech Republic (2021) – fractured Paleozoic granite carved by erosion and weathering in the Giant Mountains . So what are these?

Believe it or not, Wikipedia describes it as a combination of a kopje and a tor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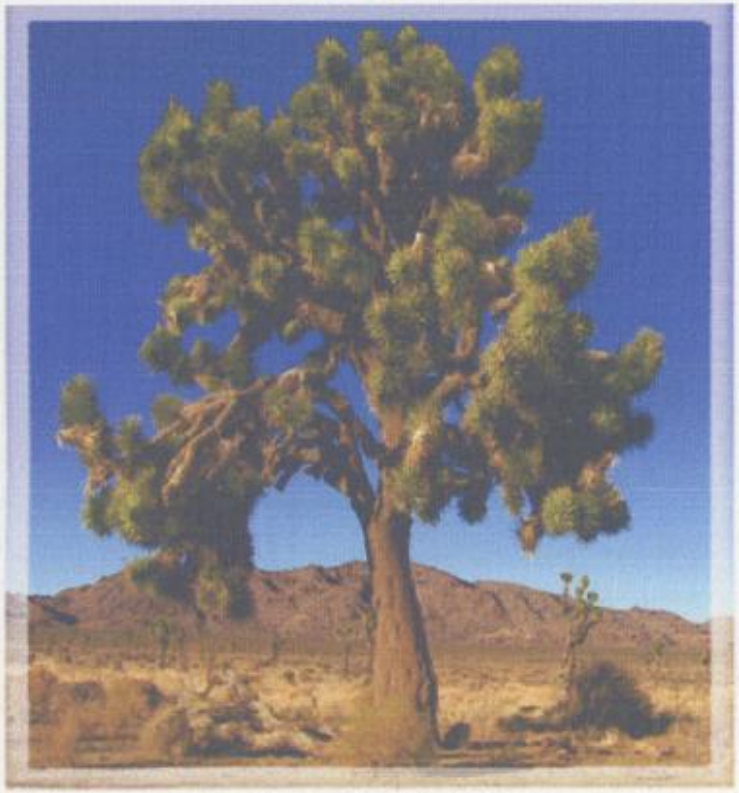
23
Kč
DÍVČÍ KAMENY
A. ABSOLON 2021



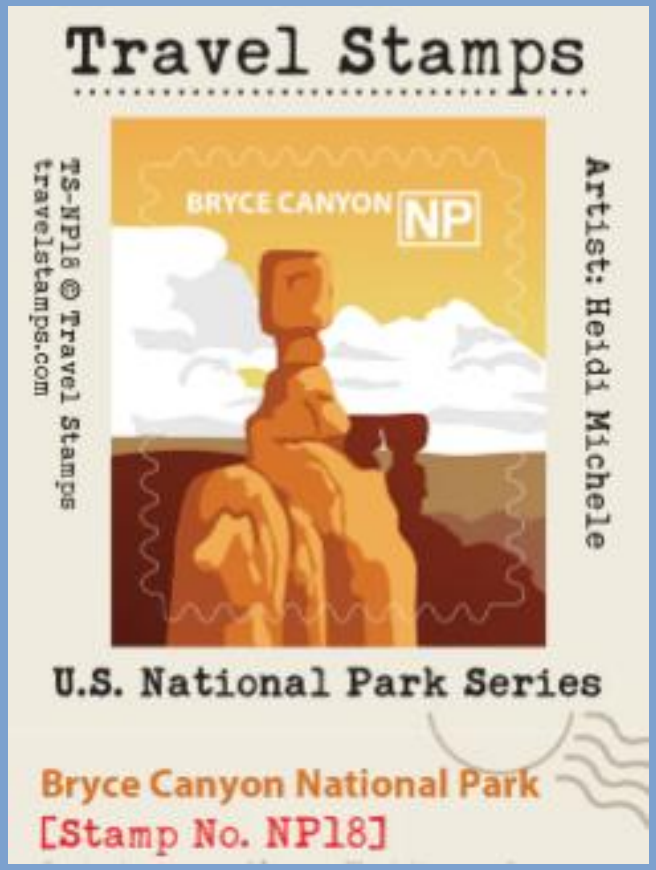
Joshua trees provide food and shelter to a variety of animals in the American Southwest.

Joshua Tree

FIRST DAY OF ISSUE • JANUARY 27, 2019 • KANSAS CITY, MO 64108

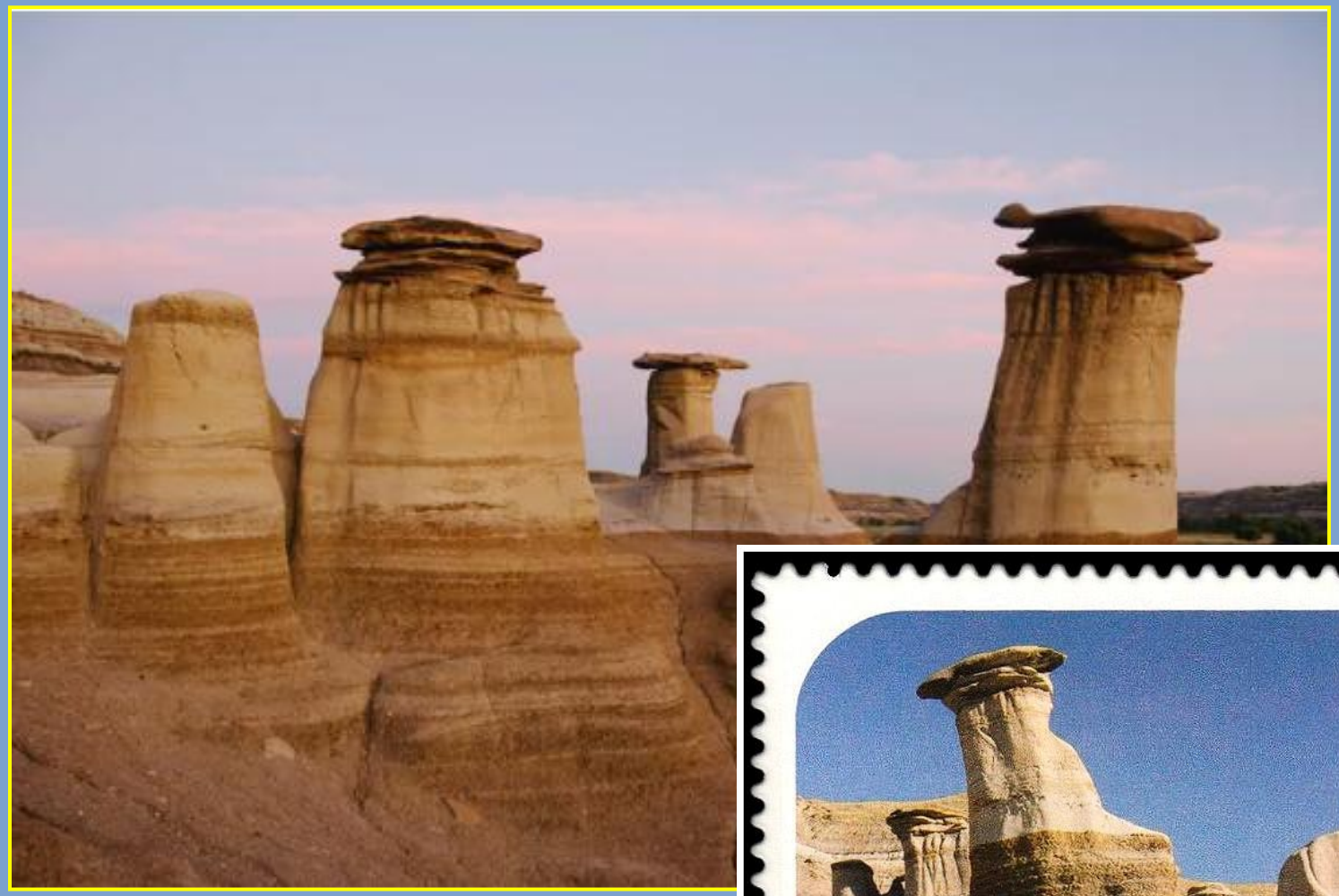
Too small to be a bornhardt, perhaps a kopje, perhaps with continued weathering the rocks will separate and they will be nubbins.

Hoodoos are thin spires or columns of rock with a harder cap rock



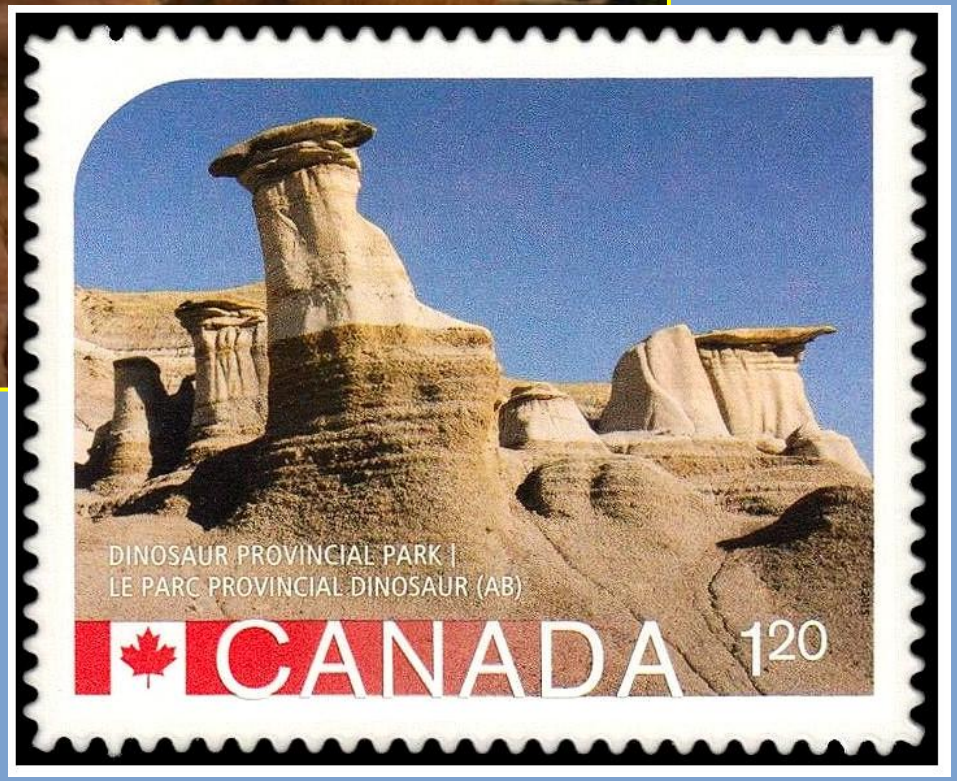
2006 United States
International Postal rate (63 cents)

Domestic 1 oz. rate was 39 cents



Drumheller hoodoos, Alberta, Canada
(Cretaceous shale/silt capped by calcite-cemented sandstone)

Canada 2015 World Heritage Site Stamp Issue



More Hoodoos

Italy (1999) – "earth pyramids" of Segonzano, erosional remnants of moraines from Quaternary glaciation, cemented caprock

Serbia (2008) – Djavolja Varos in the Radan Mountains, Neogene volcanic tuffs capped by a resistant dark andesitic lava flow

Argentina (2003)
Ischigualasto Provincial Park, San Juan
Triassic badlands and sculpted rocks know for their dinosaur fossils

Yup, one more hoodoo

Thailand (2004) – Laku is a natural canyon located in Sa kaeo Province. The hoodoos here are created by erosion of weakly consolidated laterite formation beneath a more cemented, resitive unit.

Arches National Park, Moab, Utah

Arches form when erosive forces work on each side of cliff or fin under a more resistive cap rock

Delicate Arch – Jurassic Entrada Formation

The opening is 16 meters high and 10 m wide

1996 – 100 year anniversary of statehood

There are a reported 2000 natural stone arches in the 120 square mile park, but to my knowledge this is the only one that has been rewarded with a postage stamp.

French Southern and Antarctic Territories

Kerguelen Islands, ~3000 equidistant kilometers from Madagascar, Australia (Perth), and Antarctica in the southern Indian Ocean.

Explored in 1840 by James Clark Ross on a two sailboat expedition to the isolated stratavolcano comprised of Tertiary flood basalts and a central core of plutonic rocks.

There are no pictures of this arch, only this line drawing from the expedition because it collapsed in a storm in 1910.

The sea stacks that remain are now part of L'Arche des Kerguelen National Monument within the French Southern and Antarctic Lands after leaving the jurisdiction of Madagascar in 1955.

Darwin's Arch, Galapagos Island

Located 60 miles north of the main Galapagos Island Group, Darwin's Arch was featured on an Ecuador stamp in 2018.

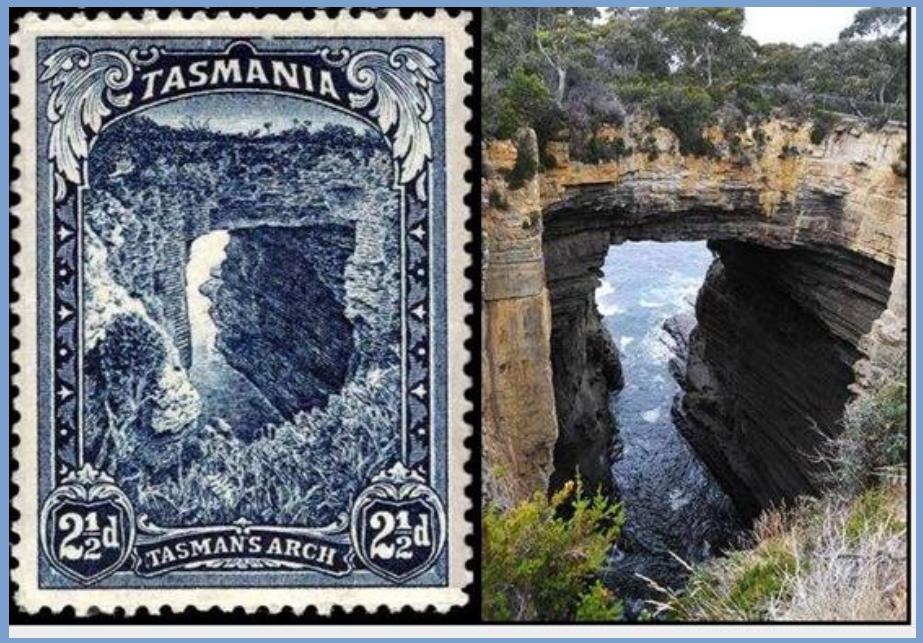
The arch collapsed at 11:20 AM on May 17, 2021, an event witnessed by a group of divers who were nearby.

The two columns of interbedded volanic lava flows have now been appropriately christened the "The Pillars of Evolution"

Natural Bridges

a subset of arches where the overlying resistant unit is accessible and level enough for a trail or road.

Tasman's Arch was featured on a Tasmania stamp in 1899. Tasmania issued its own postage stamps from 1852 until it was incorporated into Australia in 1901.



Jurassic dolerite (i.e. diabase)

Burdah Rock Bridge (arch or natural bridge?) is a full day's ride in a 4x4 to a protected desert wilderness Area called Wadi Rum.
It made it onto a Jordan stamp in 2016

Fenster

When arch or natural bridge just don't seem to apply to a hole through a geologic formation, the word fenster is used. Fenster is the German word for window.

Perce Rock, Gaspe Bay Peninsula, Quebec

Bogenfel's Arch, Namibia 1931

More arches, bridges and fensters on stamps

on Puerto Rico's
Atlantic Coast

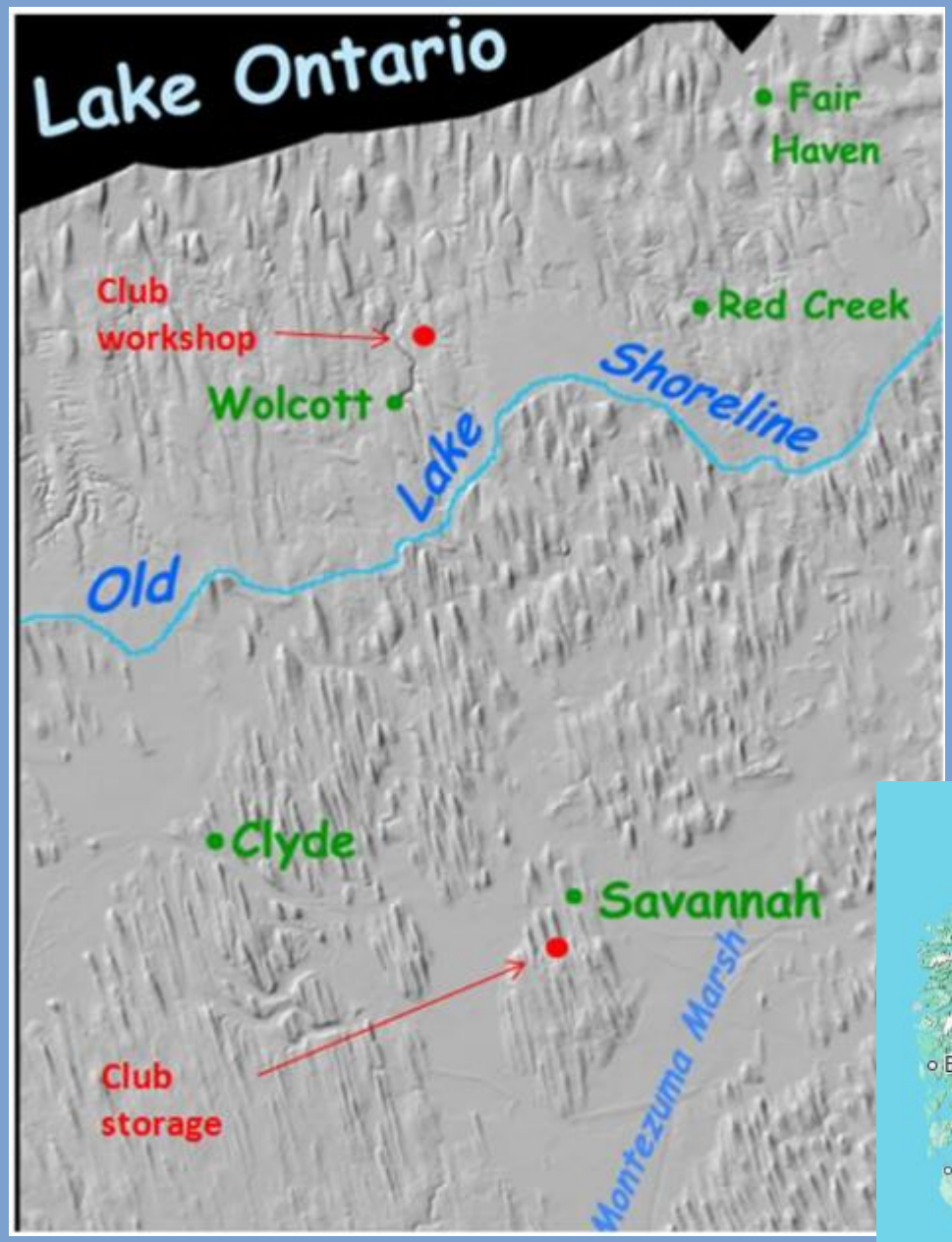
arch in recent lava,
north coast of Iceland

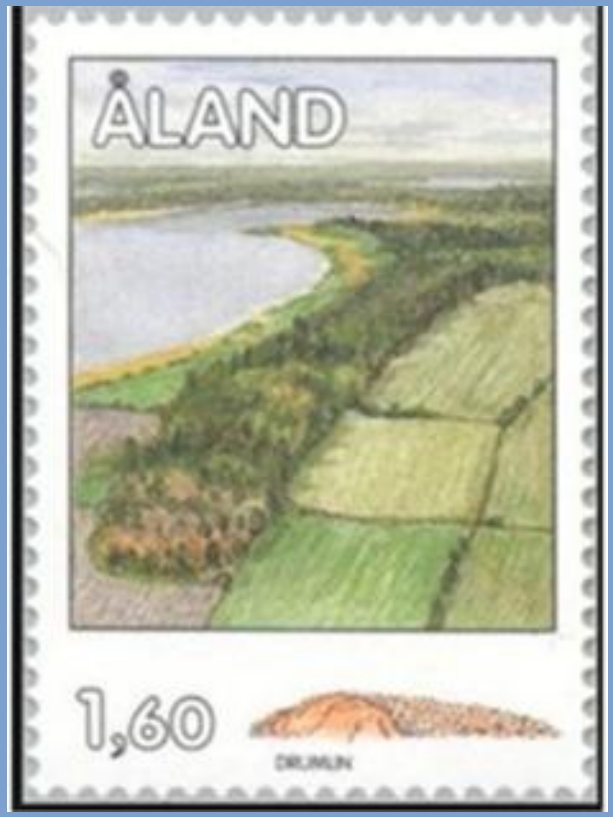
Green Bridge of Wales,
Pembrokeshire Coast NP
(Great Britain, 2021)

Faroe Islands

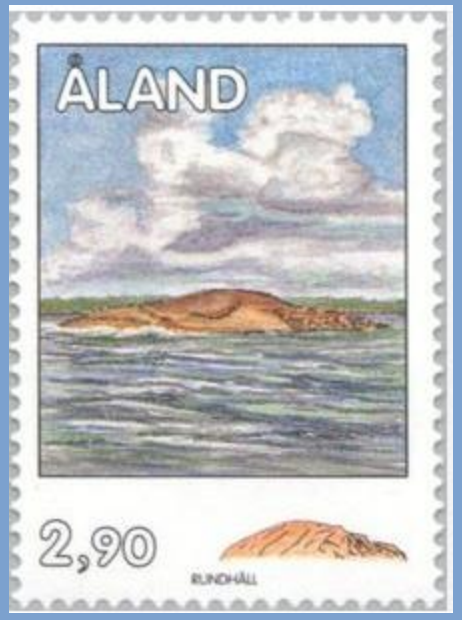
Czech Republic

Drumlins

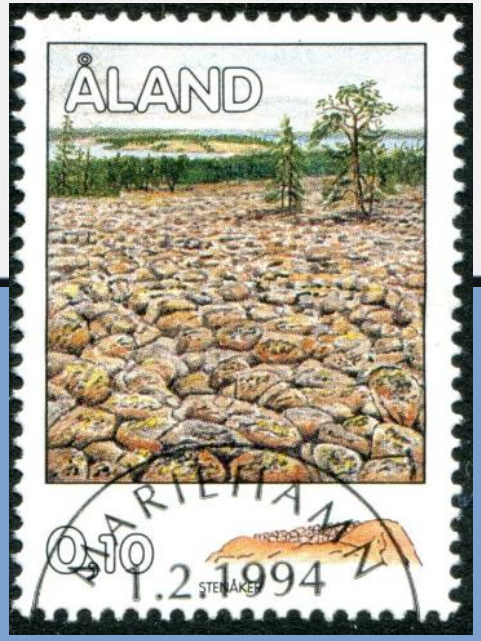

Lake Ontario
Fair Haven
Club workshop
Red Creek
Wolcott
Lake Shoreline
Old
Clyde
Savannah
Club storage
Montezuma Marsh


ÅLAND
1,60


Trondheim
Sweden
Ålesund
Finland
Tampere
Bergen
Oslo
Turku
Helsinki
Uppsala
Stockholm
Tallinn
Stavanger
Baltic Sea
Estonia
Gothenburg



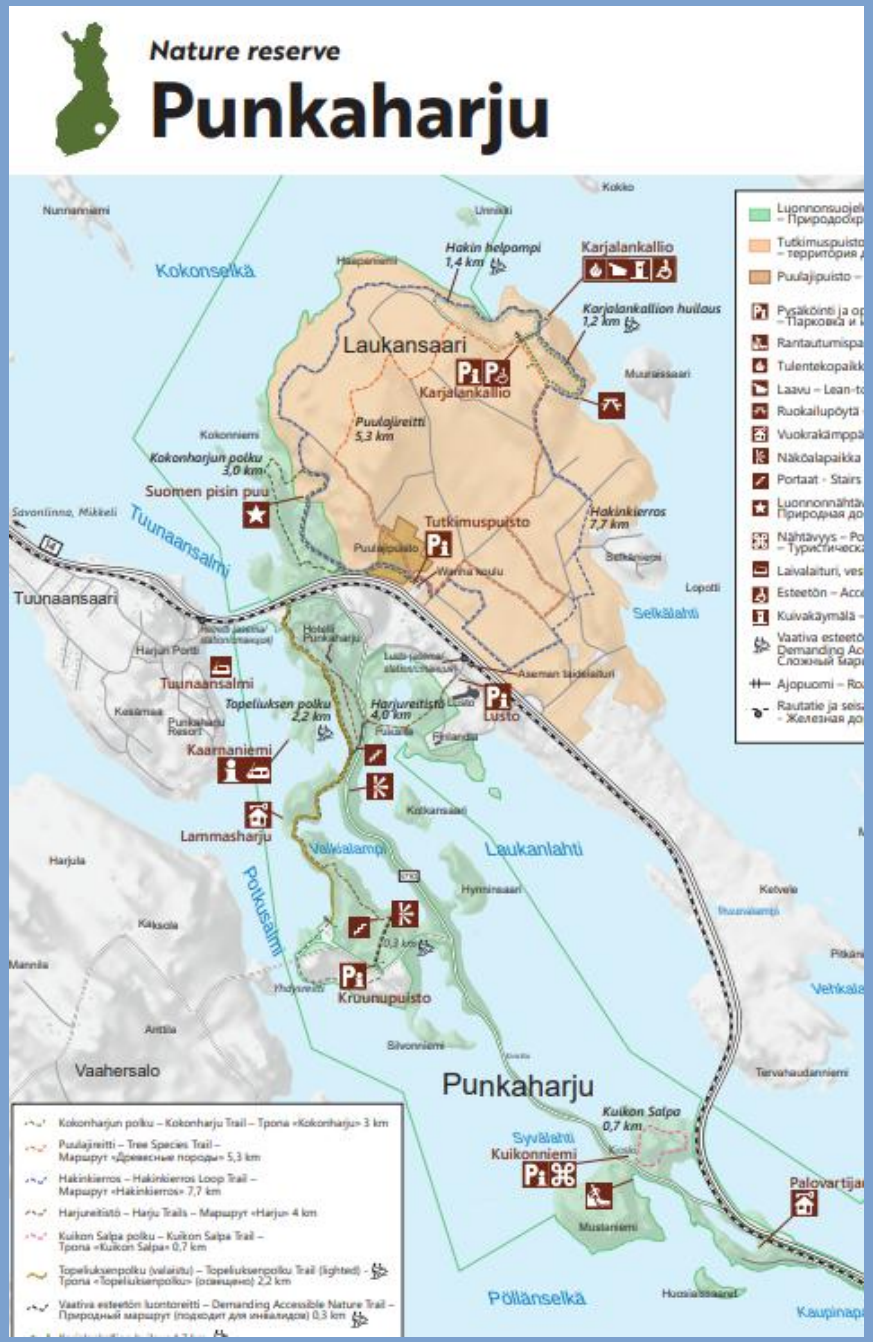
roche moutonnee (or sheepback) rock formation caused by glacial ice passing over bedrock with abrasion on the upstream side and plucking on the downstream side



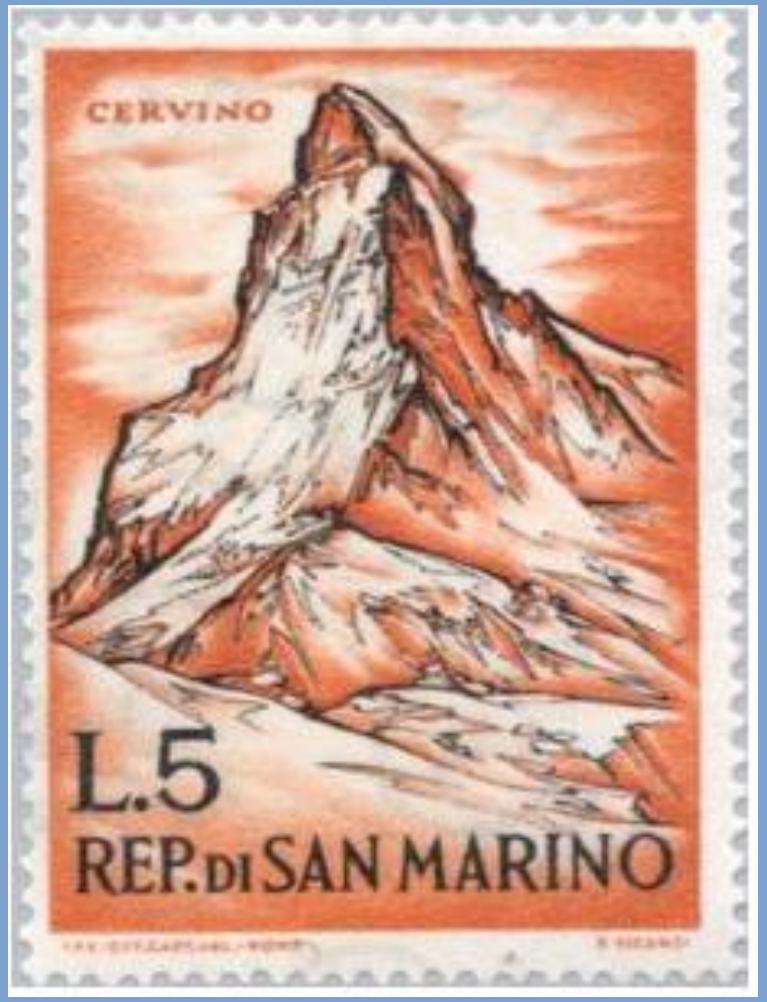
boulder field

glacial eratic

Esker Finland 1969



A Karling ?



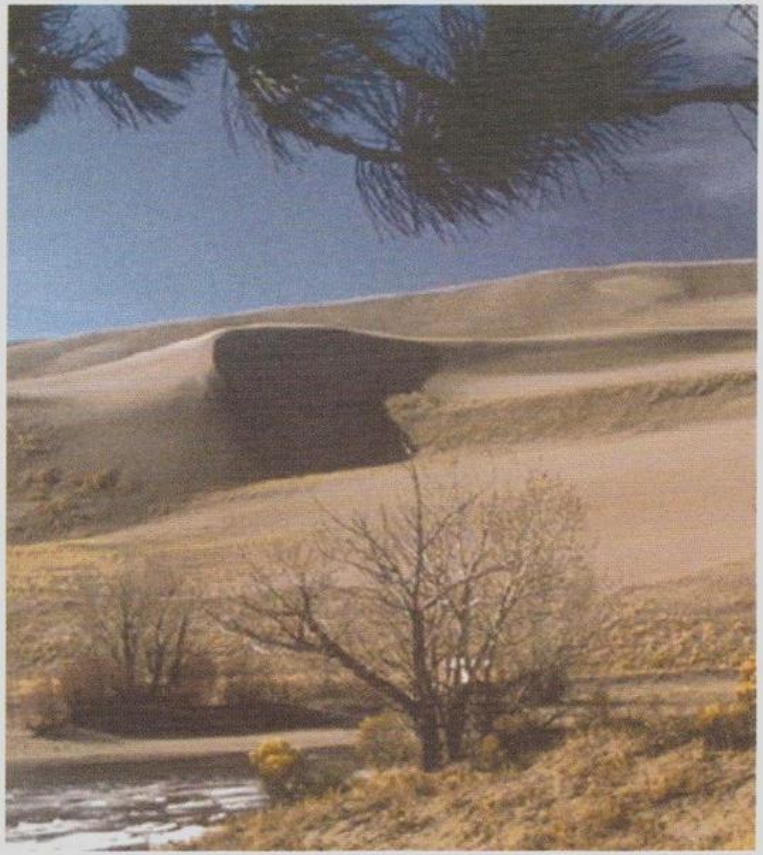
1962

The Matterhorn's pyramidal shape was caused by the glacial erosion of three separate glaciers which carved cirques into the massive resistant gneiss. The rocks at the peak are remnants of Africa from continental collision 50-60 million years ago. Paleozoic gneissic rocks have been thrust over Mesozoic marine rocks at the base.

Although generally referred to as a "horn", hence the popular name , the Matterhorn is actually a **karling**

"an angular peak with steep walls and sharp ridges undercut on all sides by glaciers."

Sand Dunes



At 750 feet above the San Luis Valley, Colorado, the Great Sand Dunes are the tallest dunes in North America.

Wonders of America:
Great Sand Dunes

WONDERS of America

FIRST DAY OF ISSUE
May 27, 2006
Washington, DC 20066

Issued on January 21, 2018 this was the highest denomination U.S. regular stamp in history. Priority Mail Express Rate

January 22, 2024

Beach dunes immediately adjacent to Lake Michigan reach 110’ tall in central Michigan.

Perched dunes are thinner blankets of wind-blown sand sitting atop glacial deposits a bit further inland and their collective height exceeds 460’ above Lake Michigan

2020 stamp

Athabasca Sand Dunes, extreme NW corner of Saskatchewan on Lake Athabasca

South West Africa 1989 Namib Desert Sand Dunes
These stamps show different types of sand dunes.
Barchan dunes are crescent-shaped sand dunes that form when wind blows from one direction in a flat landscape with no vegetation.
Transverse dunes form when the main axis of a group of barchan dunes lies perpendicular to the wind direction.

Spanish Sahara

Saudia Arabia

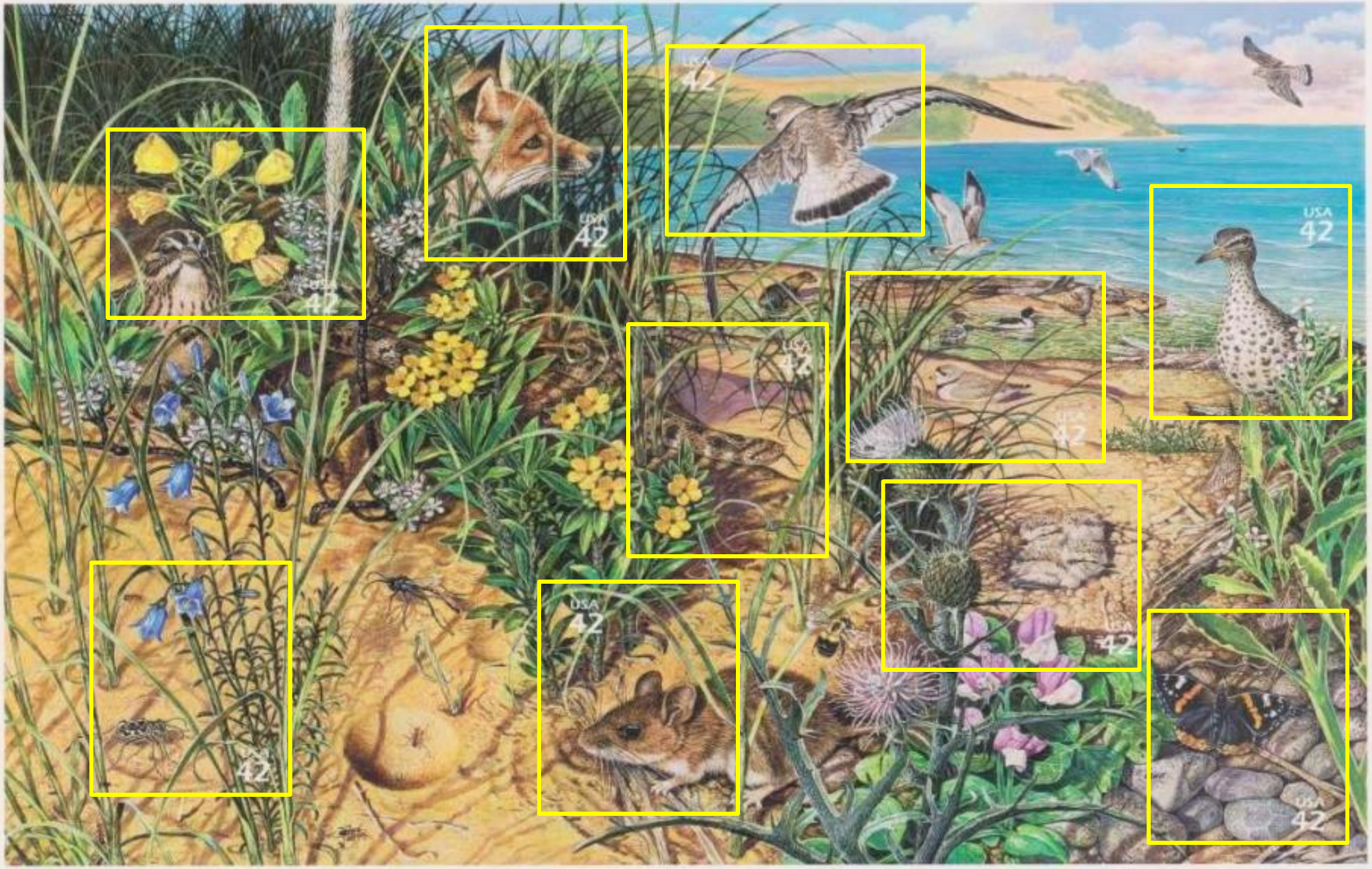
GREAT LAKES DUNES

TENTH IN A SERIES

NATURE OF AMERICA

GREAT LAKES DUNES

TENTH IN A SERIES



NATURE OF AMERICA

Moeraki Boulders – Septarian Nodules

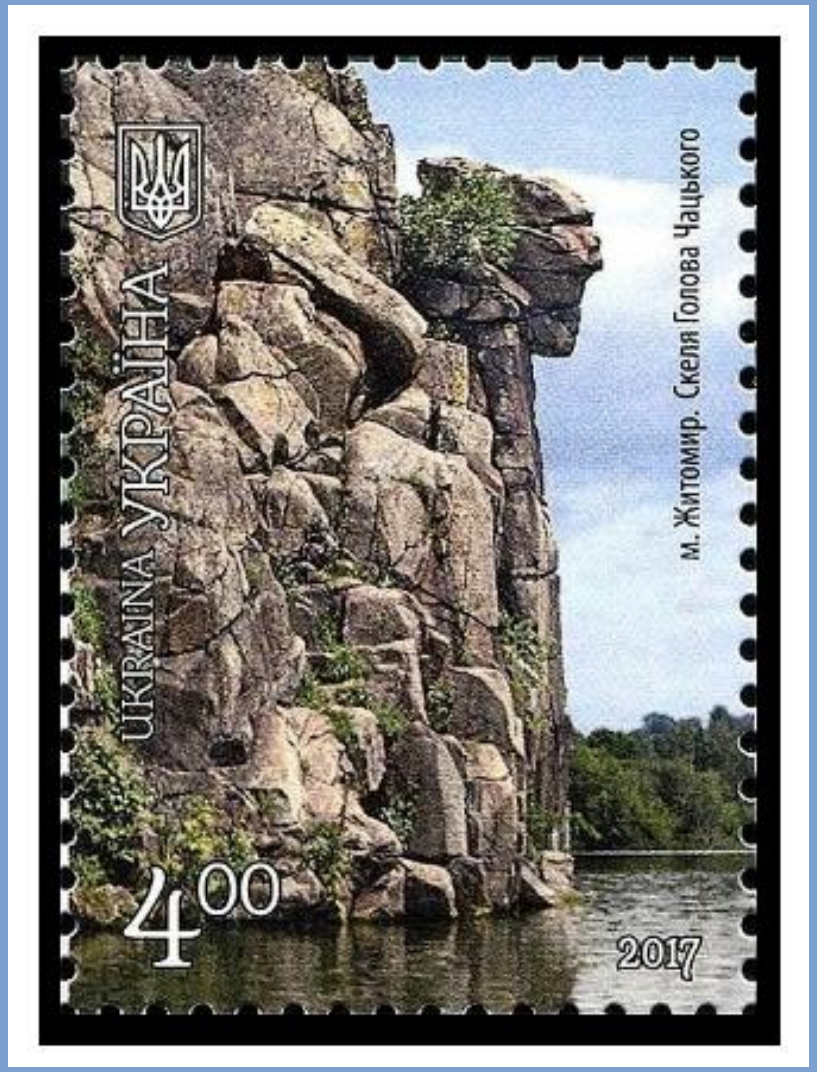
calcite-cemented marine mudstone, similar compositon to host rock, spherical shape suggests mass diffusion, suspected millions of years to grow

1969

2014

May 3, 2003 in New Hampshire

1955 1988



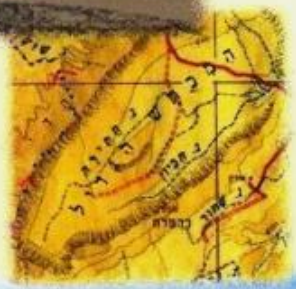
Chatsky Head on the Teterev River near Zhytomyr, Ukraine (Precambrian granite)

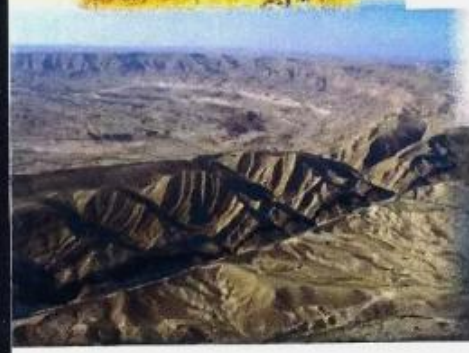
Makhtesh

A makhtesh is formed through a sequence of geological events, starting with tectonic uplift, which pushes layers of rock upward. Millions of years of erosion, driven by wind and water, strip away the softer sedimentary rock, exposing older, more resilient formations. The result is a steep-walled, bowl-shaped valley open at one end.

Makhtesh Ramon, located in Israel's Negev Desert is the largest erosion crater or "makhtesh in the world. The rocks exposed at Makhtesh Ramon are Triassic, ~200 million years old. Israel featured three makhteshs on stamps in 2014.

יום ההוצעה
DAY OF ISSUE

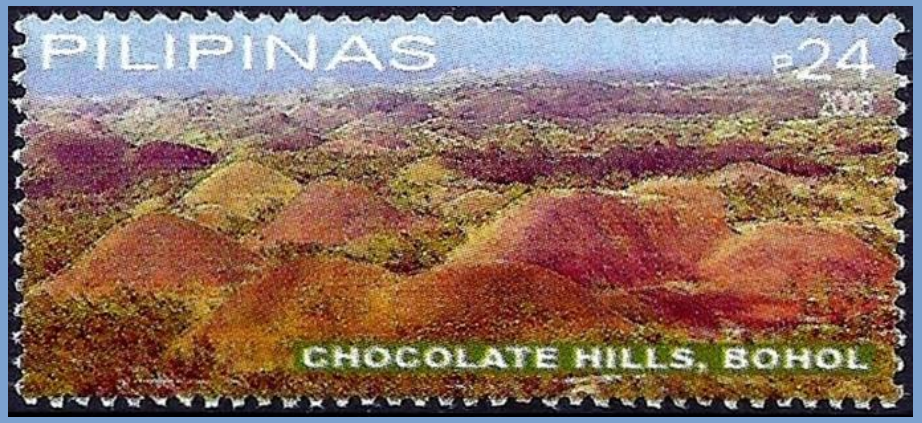




מכתשים בישראל
Makhtesh - Ancient Erosion Craters in Israel

FIRST DAY COVER FOR SPECIAL SHEET

מעטפת יום ראשון עבור גיליון מיוחד



The end
Thank you