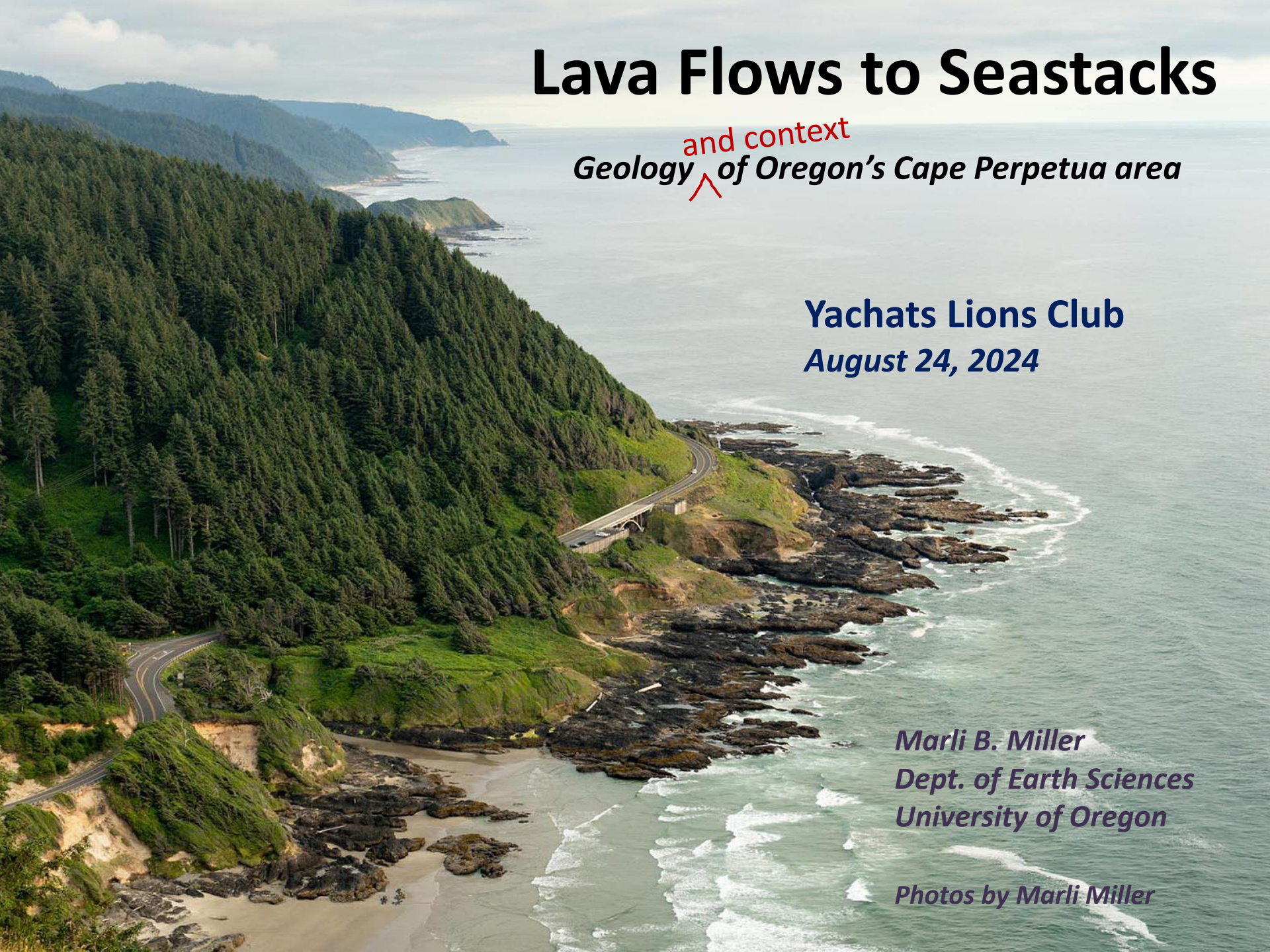


Lava Flows to Seastacks

Geology and context of Oregon's Cape Perpetua area

Yachats Lions Club

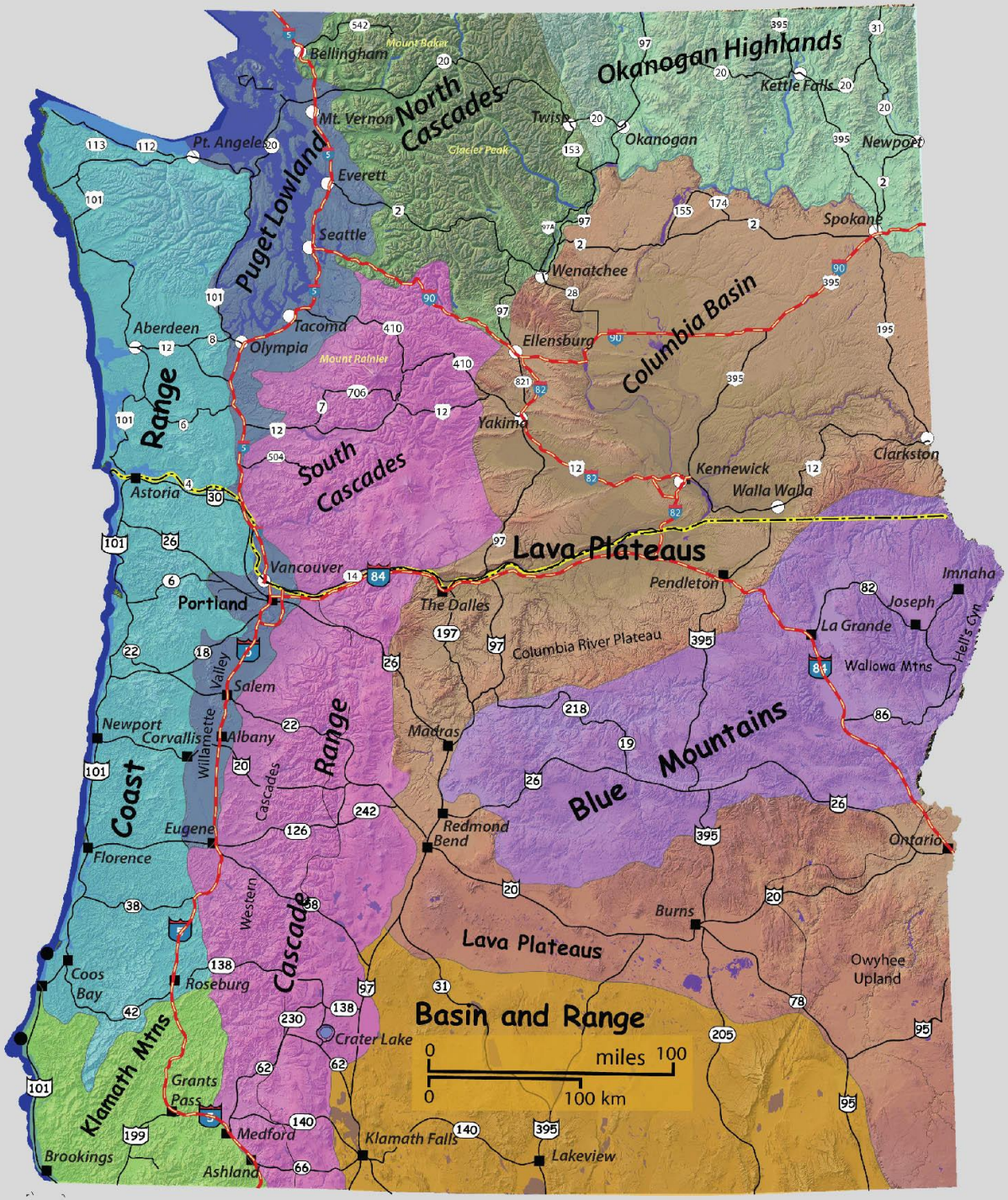
August 24, 2024

Marli B. Miller
Dept. of Earth Sciences
University of Oregon

Photos by Marli Miller

Alvord Desert

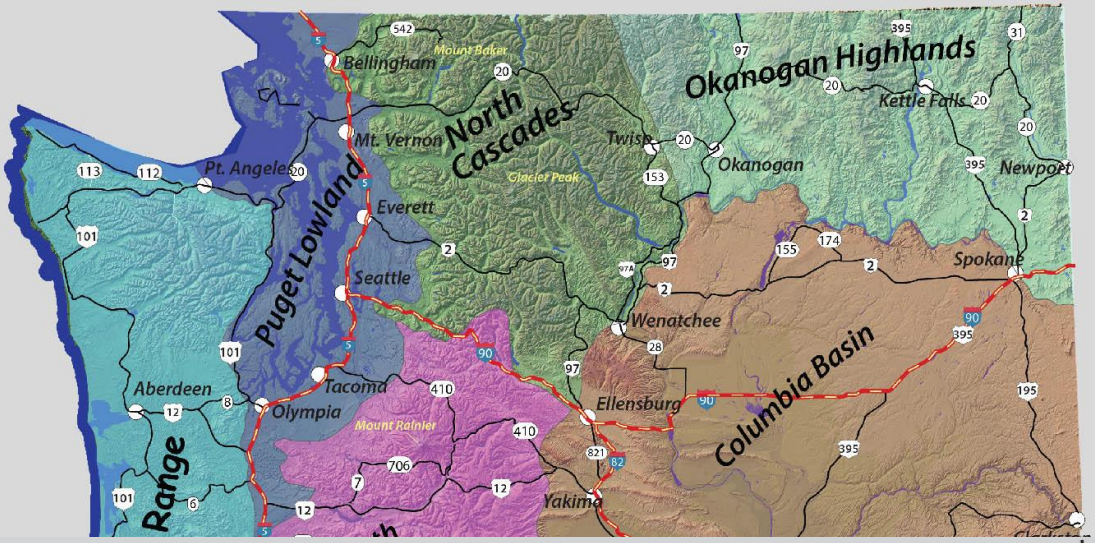
Alvord Desert and Steens Mountain

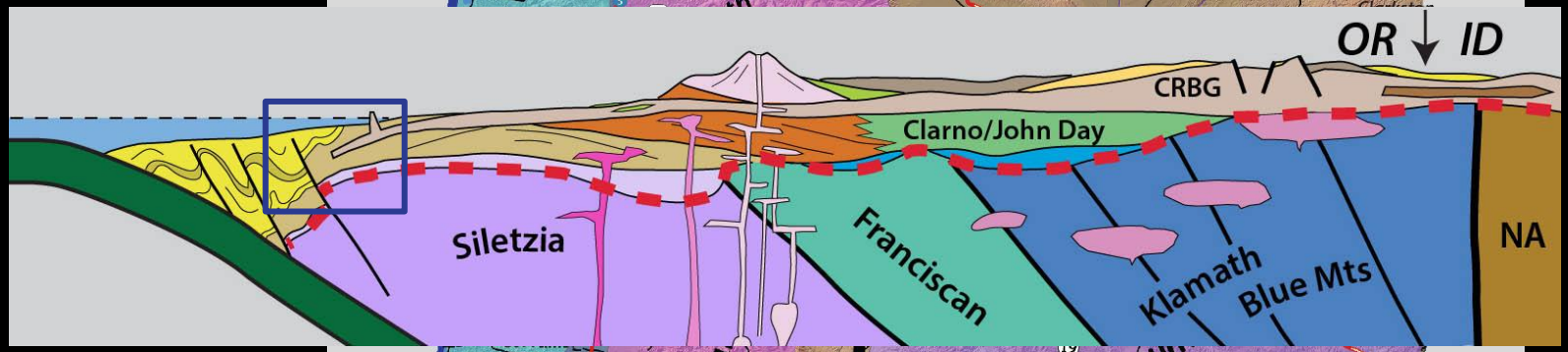

Bellingham
Mount Baker
North Cascades
Okanogan Highlands
Kettle Falls
Twisp
Okanogan
Newport
Mt. Vernon
Glacier Peak
Pt. Angeles
Everett
Puget Lowland
Seattle
Spokane
Wenatchee
Columbia Basin
Aberdeen
Tacoma
Olympia
Mount Rainier
Ellensburg
Coast Range
South Cascades
Yakima
Clarkston
Kennewick
Walla Walla
Astoria
Lava Plateaus
Vancouver
Pendleton
Imnaha
Portland
The Dalles
Joseph
La Grande
Hells Gyn
Columbia River Plateau
Wallowa Mtns
Willamette Valley
Salem
Newport
Corvallis
Albany
Madras
Blue Mountains
Cascades
Coast Range
Eugene
Redmond
Bend
Ontario
Florence
Western Cascade
Burns
Lava Plateaus
Owyhee Upland
Coos Bay
Roseburg
Basin and Range
Crater Lake
0 miles 100
0 100 km
Klamath Mtns
Grants Pass
Medford
Klamath Falls
Lakeview
Brookings
Ashland

Siletzia

Coast Range's basement

Columbia River Basalt Group

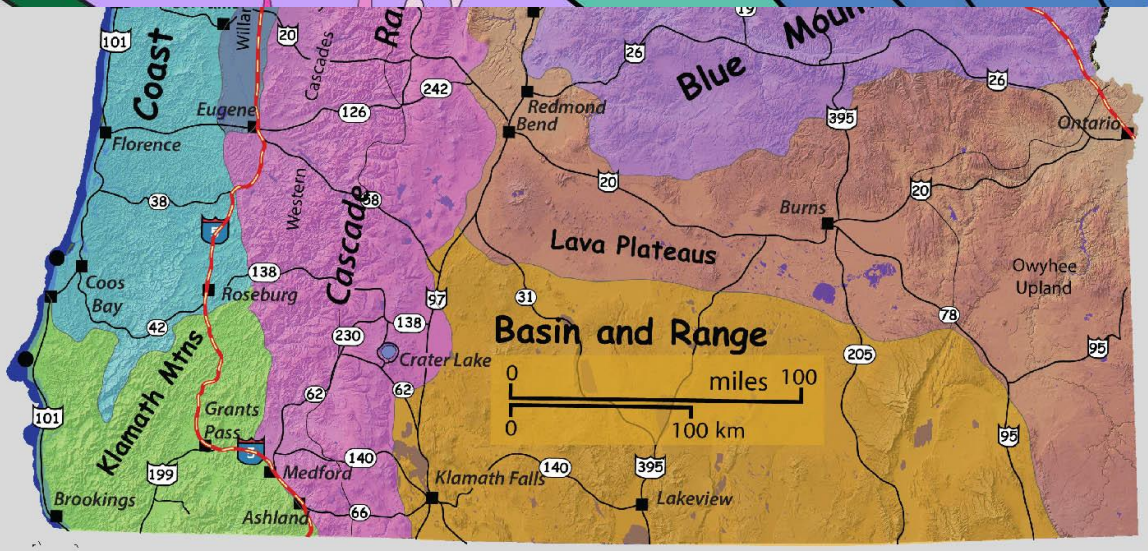


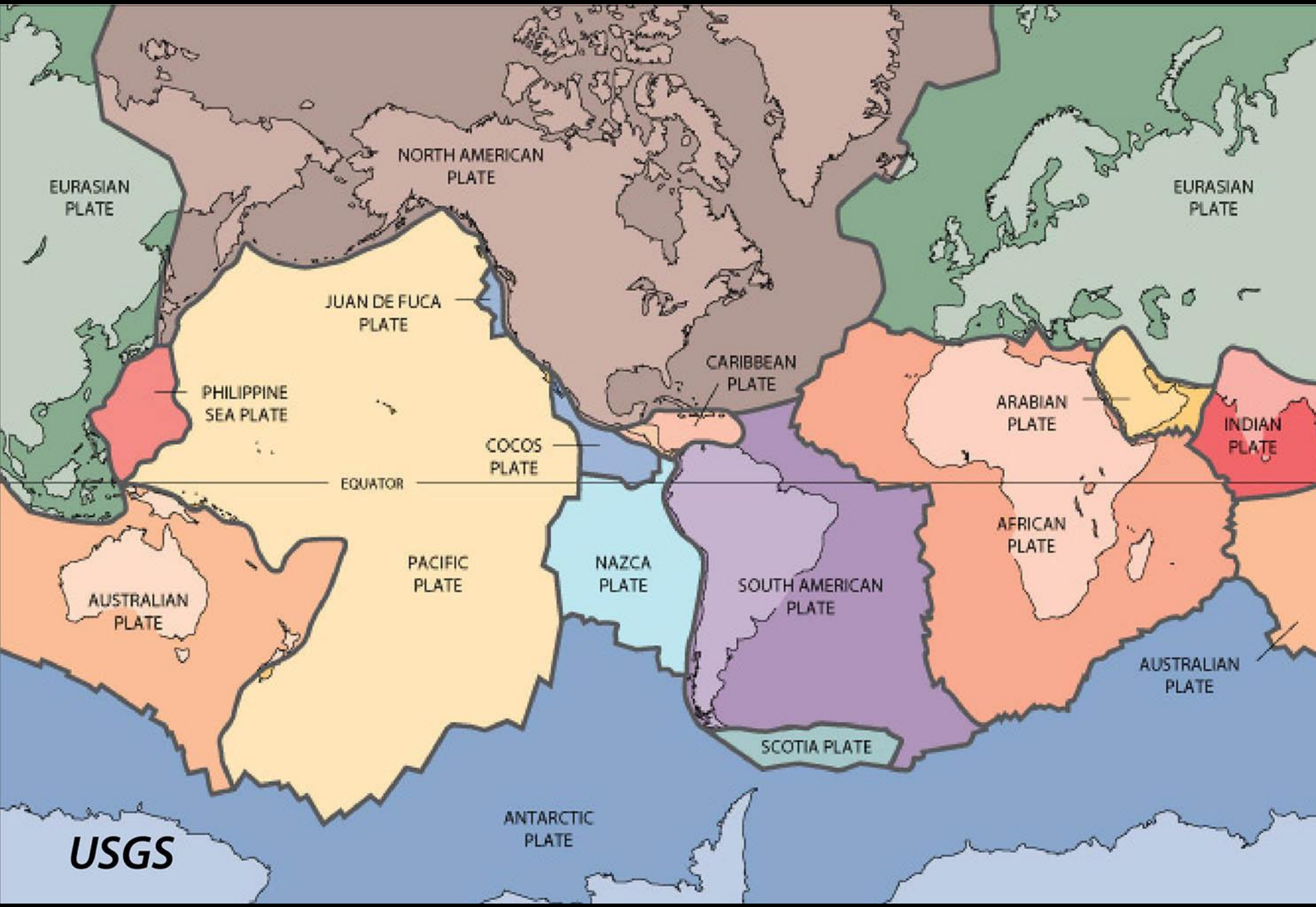


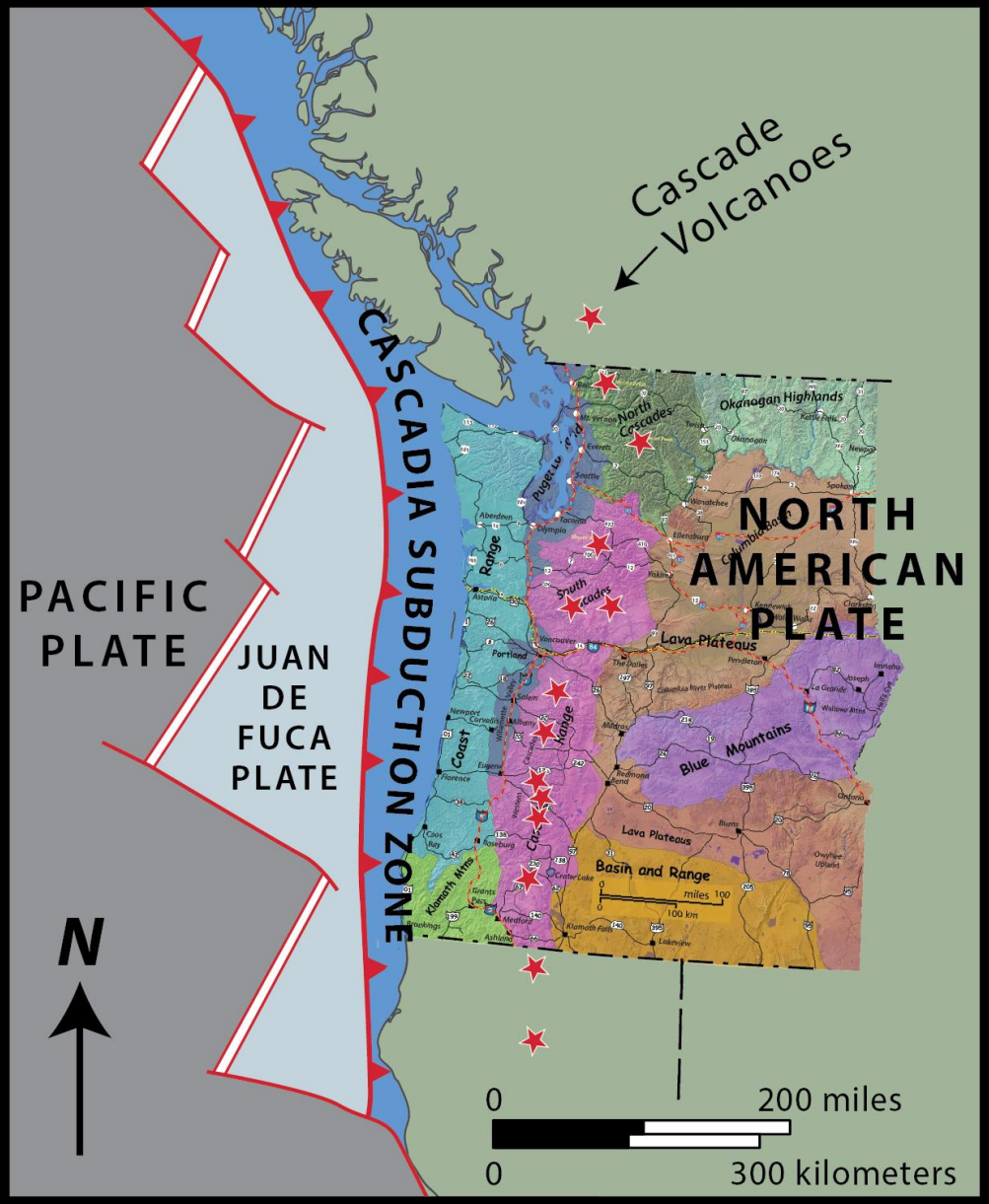
Yachats Basalt

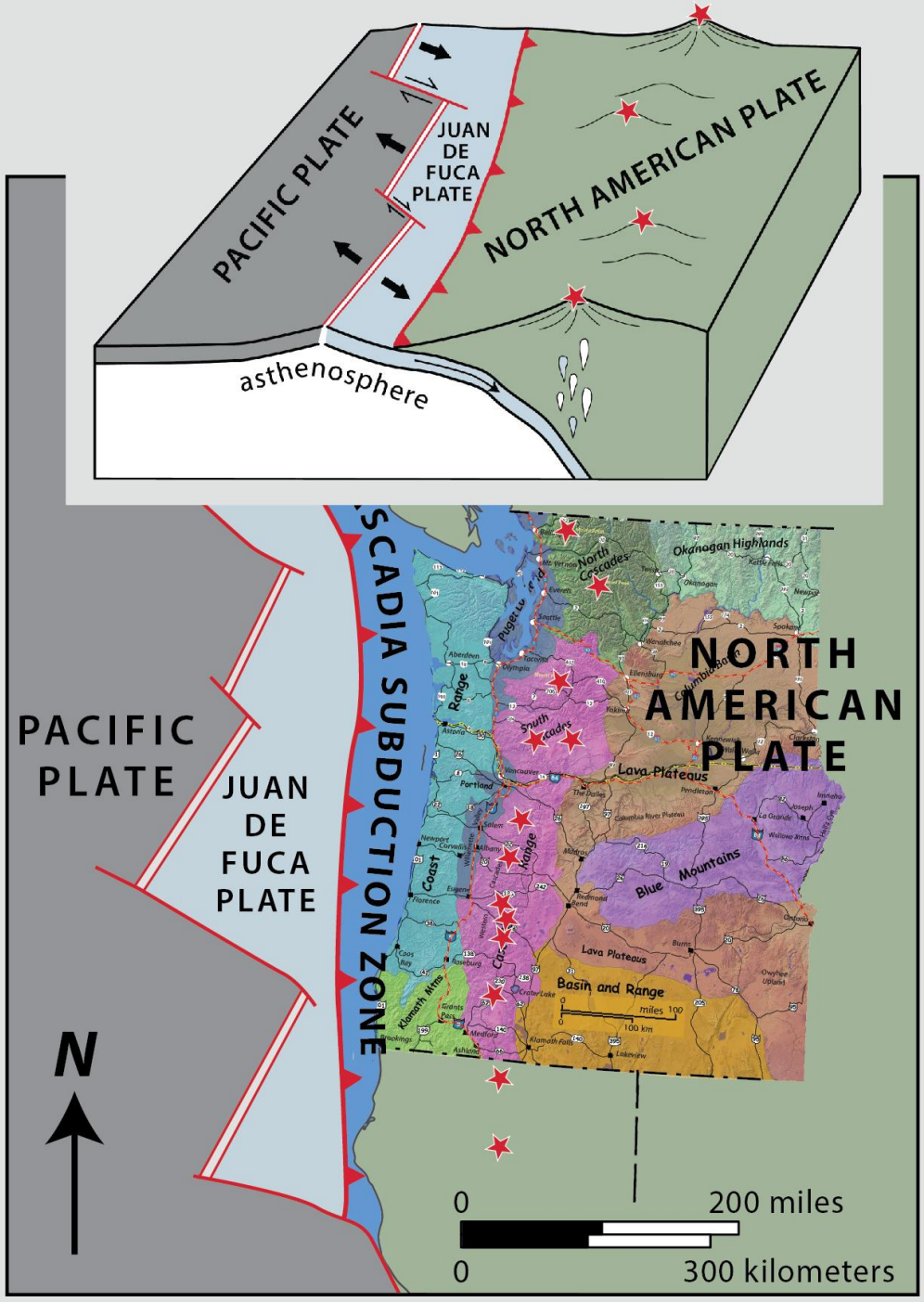
Rock of Cape Perpetua

Erosion and Uplift



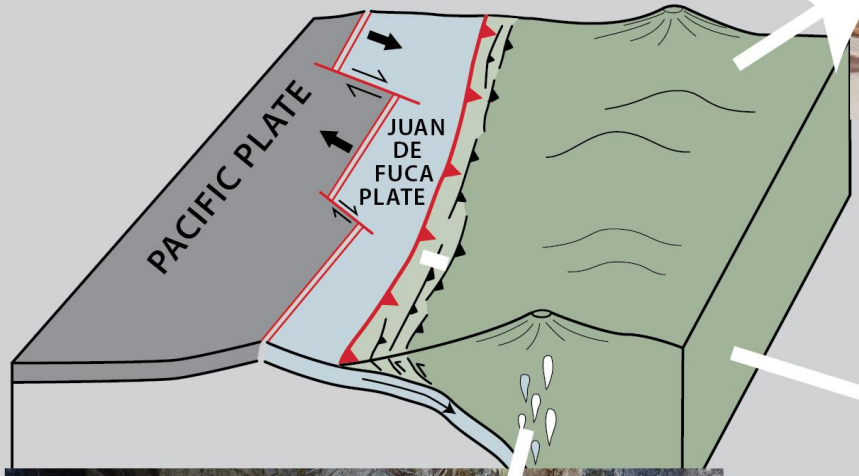

EURASIAN PLATE
NORTH AMERICAN PLATE
EURASIAN PLATE
JUAN DE FUCA PLATE
CARIBBEAN PLATE
PHILIPPINE SEA PLATE
ARABIAN PLATE
INDIAN PLATE
COCOS PLATE
EQUATOR
AFRICAN PLATE
PACIFIC PLATE
NAZCA PLATE
SOUTH AMERICAN PLATE
AUSTRALIAN PLATE
AUSTRALIAN PLATE
SCOTIA PLATE
ANTARCTIC PLATE
USGS

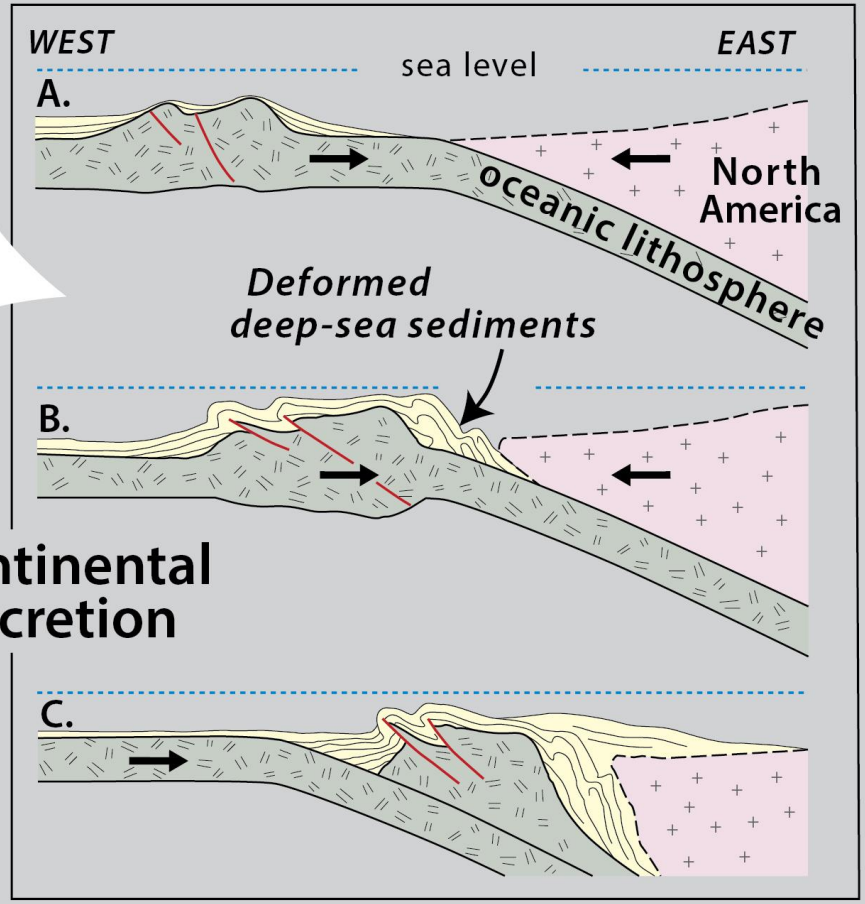

Cascade Volcanoes
CASCADIA SUBDUCTION ZONE
PACIFIC PLATE
JUAN DE FUCA PLATE
NORTH AMERICAN PLATE
N
Okanogan Highlands
North Cascades
Coast Range
South Cascades
Lava Plateaus
Blue Mountains
Basin and Range
0
200 miles
0
300 kilometers


PACIFIC PLATE
JUAN DE FUCA PLATE
NORTH AMERICAN PLATE
asthenosphere
PACIFIC PLATE
JUAN DE FUCA PLATE
CASCADIA SUBDUCTION ZONE
NORTH AMERICAN PLATE
Okanogan Highlands
North Cascades
Puget Lowland
Coast Range
South Cascades
Lava Plateaus
Columbia River Plateau
Blue Mountains
Lava Plateaus
Basin and Range
Klamath Mts
N
0
200 miles
0
300 kilometers

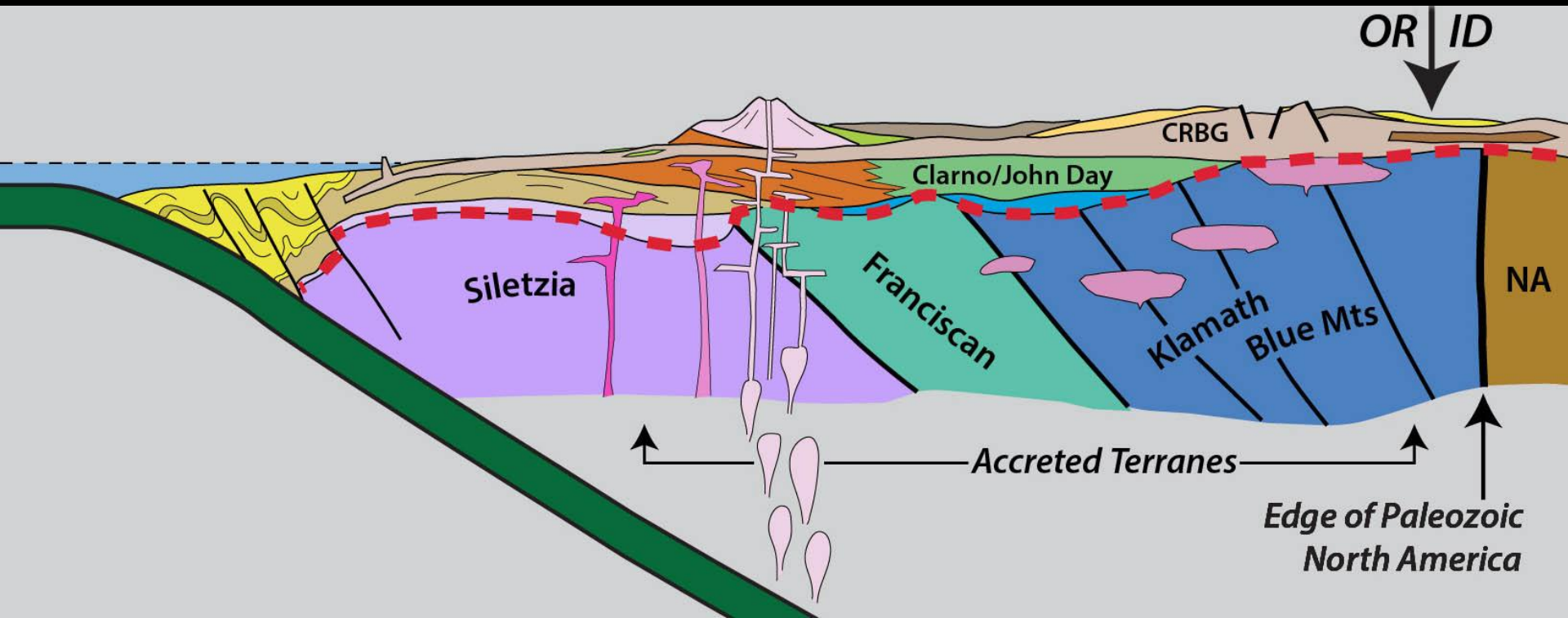
PNW's plate tectonic setting explains much of its geology

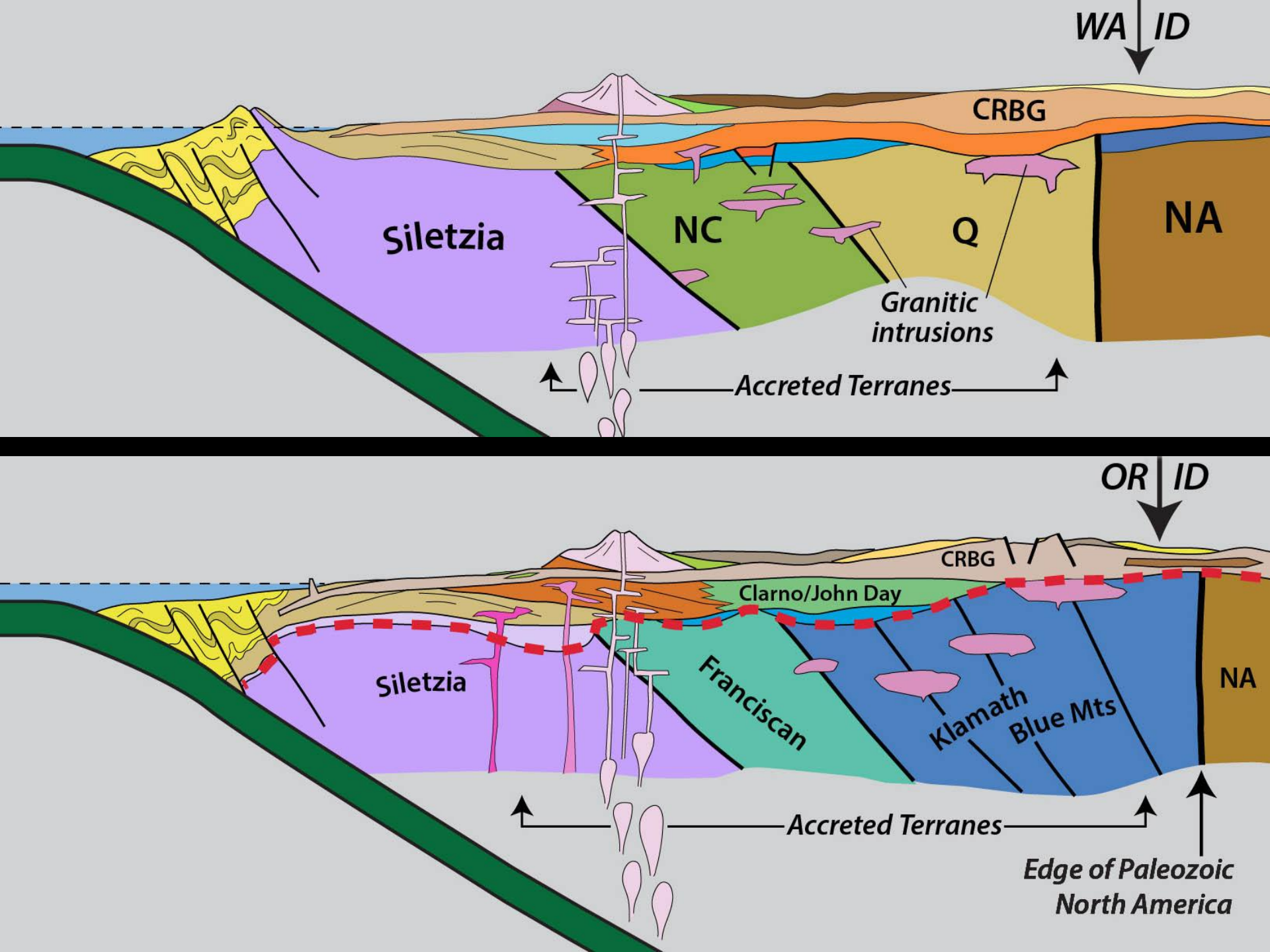
--present and past



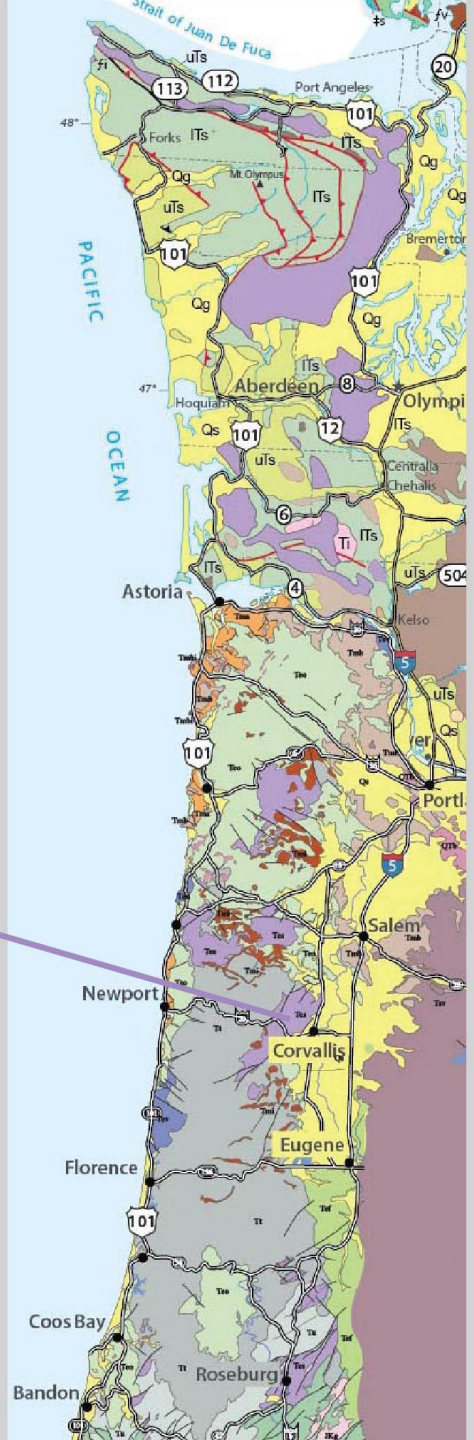


Continental Accretion


OR
ID
CRBG
Clarno/John Day
Siletzia
Franciscan
Klamath
Blue Mts
NA
Accreted Terranes
Edge of Paleozoic
North America


WA
ID
CRBG
Siletzia
NC
Q
NA
Granitic intrusions
Accreted Terranes
OR
ID
CRBG
Clarno/John Day
Siletzia
Franciscan
Klamath
Blue Mts
NA
Accreted Terranes
Edge of Paleozoic North America

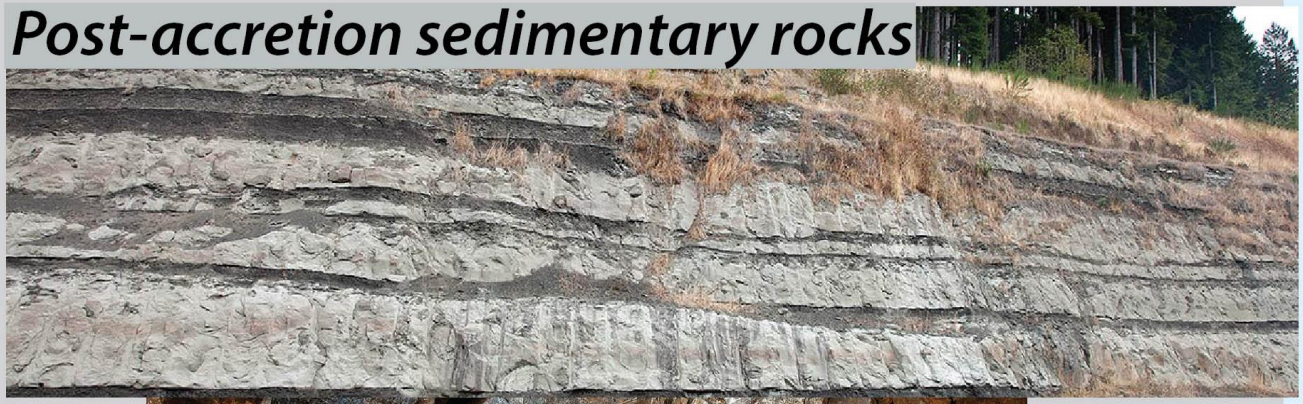
WA
ID
CRBG
Siletzia
NC
Q
NA
Granitic intrusions
Accreted Terranes
OR
ID
CRBG
Clarno/John Day
Franciscan
Klamath
Blue Mts
NA
Accreted Terranes
Edge of Paleozoic North America

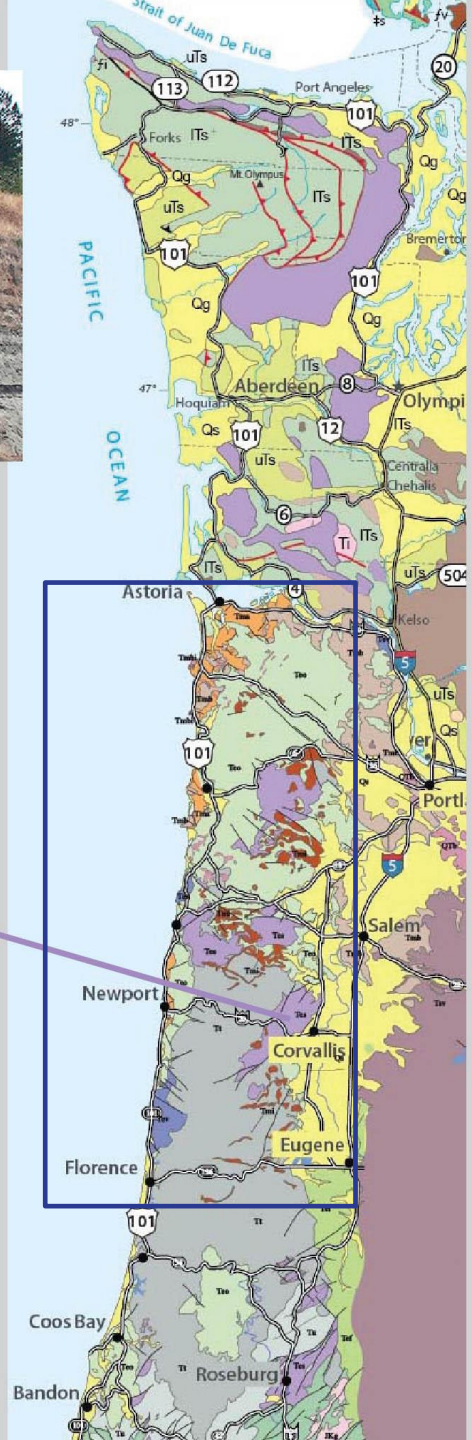


Siletzia

--Accreted 51-49 million years ago

Post-accretion sedimentary rocks



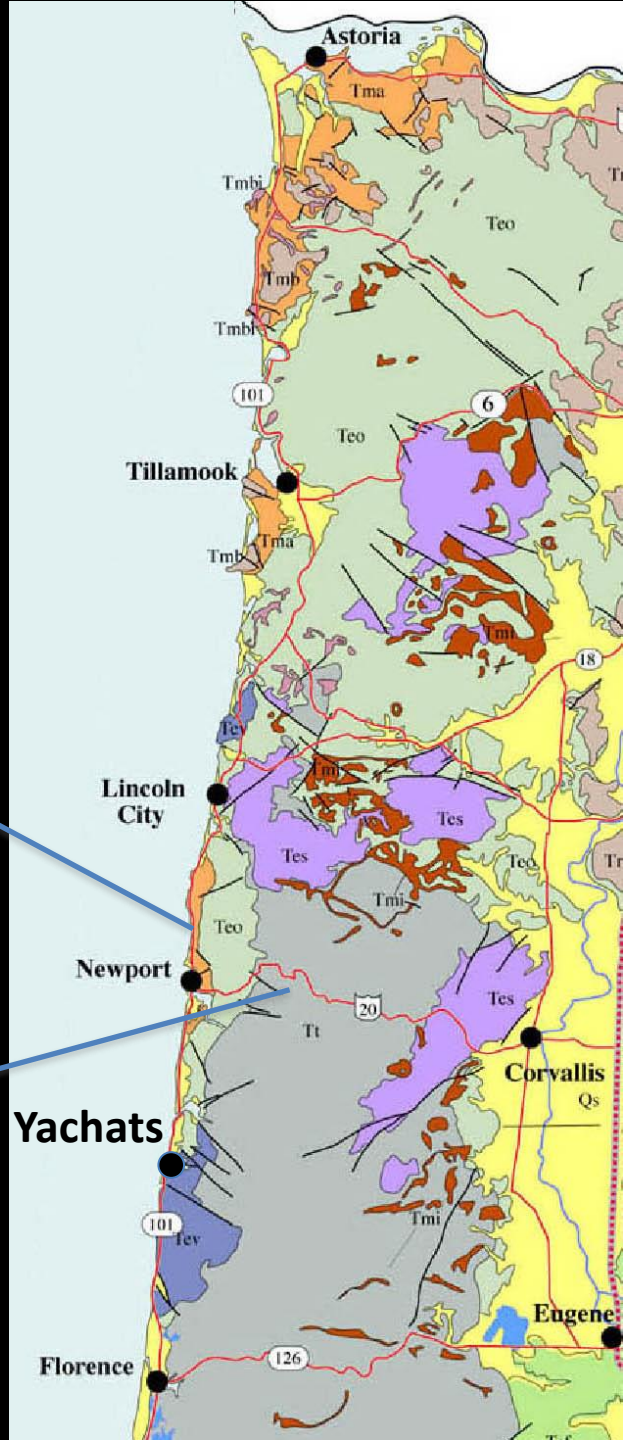


Siletzia

--Accreted 51-49 million years ago

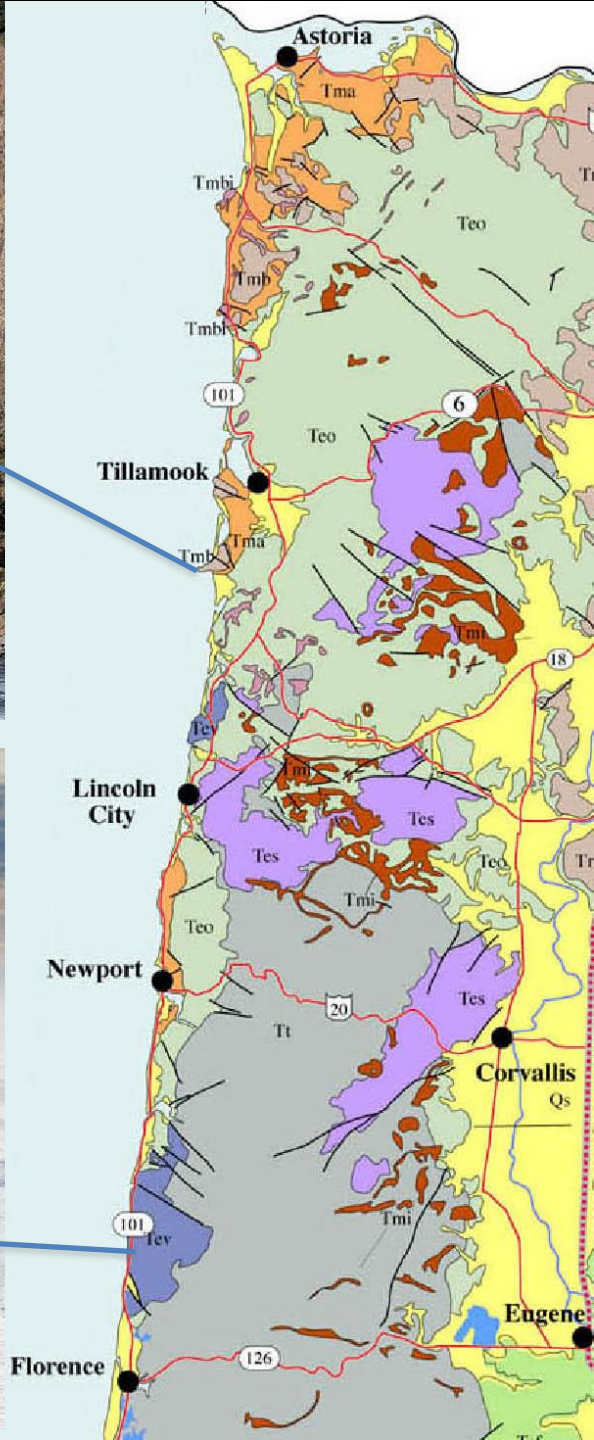
Astoria Fm (sandstone) ~17 m.y.

Tyee Fm (sandstone) ~45 m.y.



Columbia River Basalt Group ***17-6 m.y.***

Yachats Basalt ***~35 m.y.***

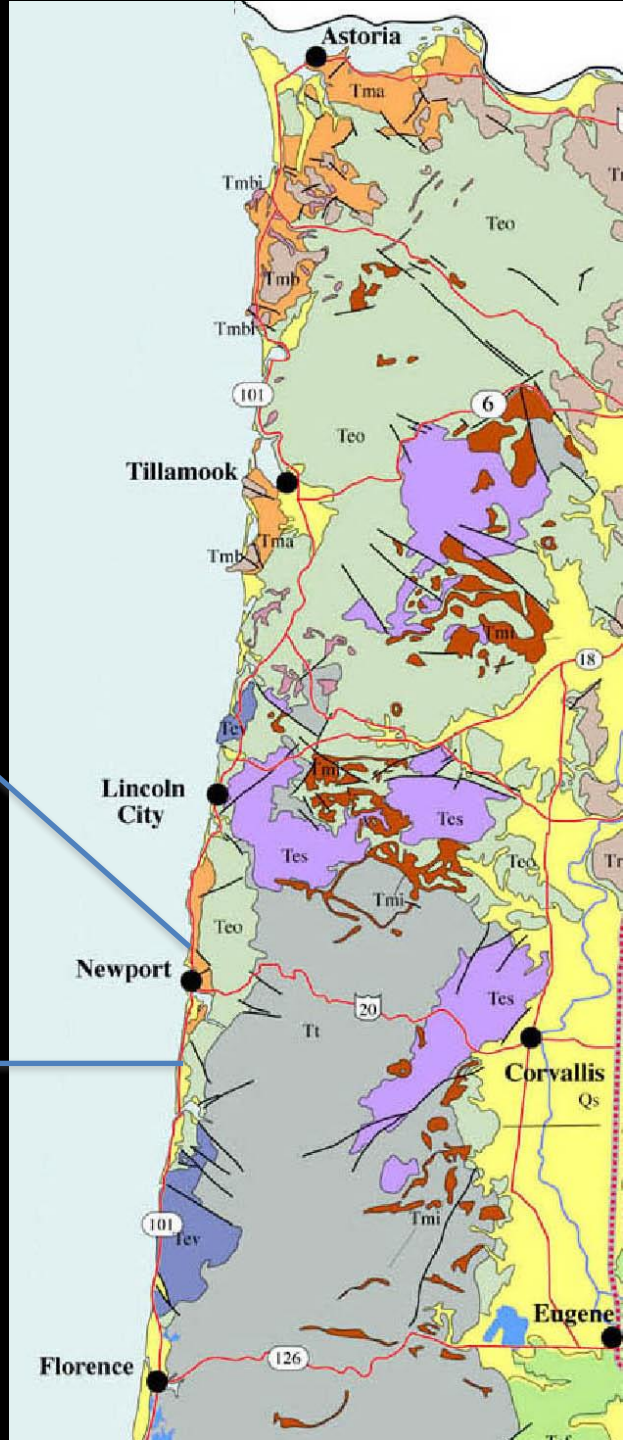


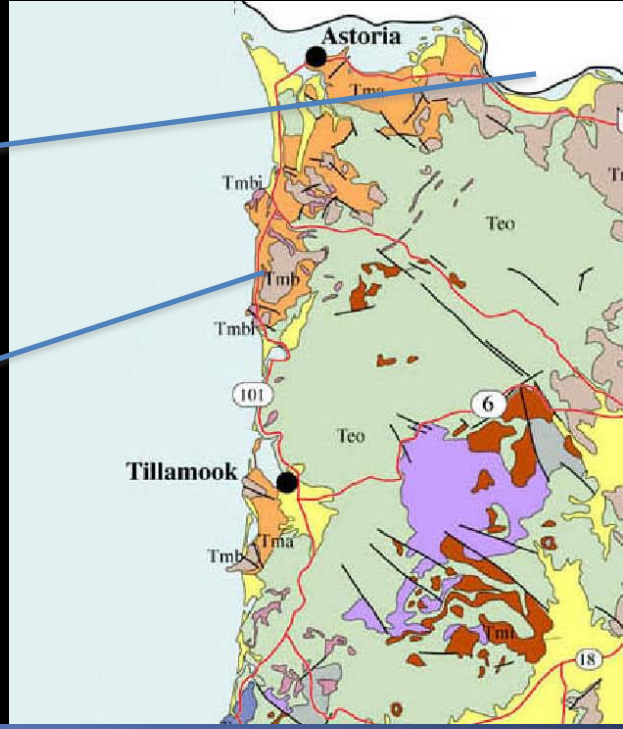
Yaquina Head

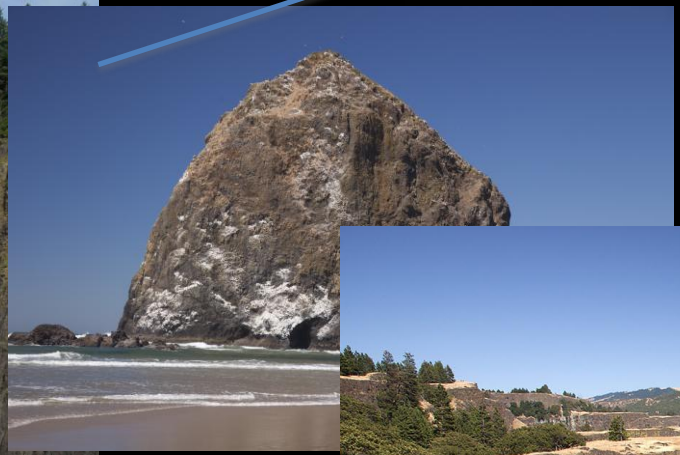
Columbia River Basalt Group

17-6 million years

Seal Rock



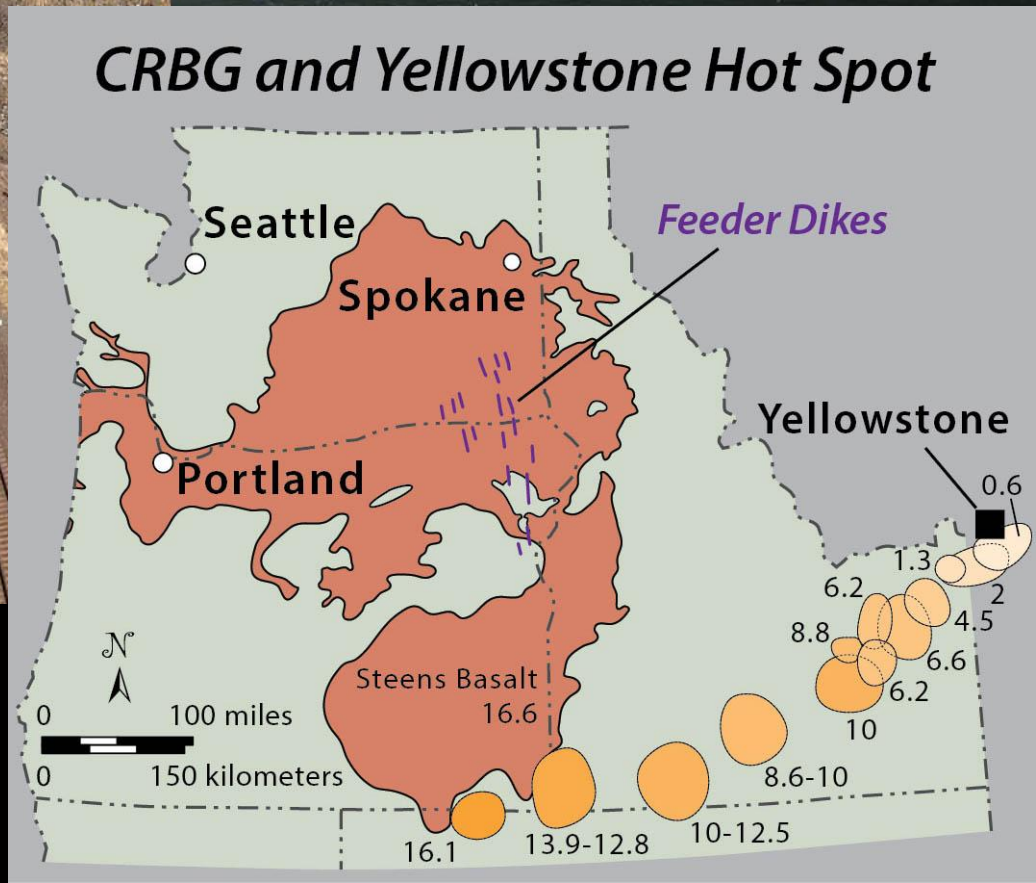




Columbia River Basalt Group

17.2-6 million years

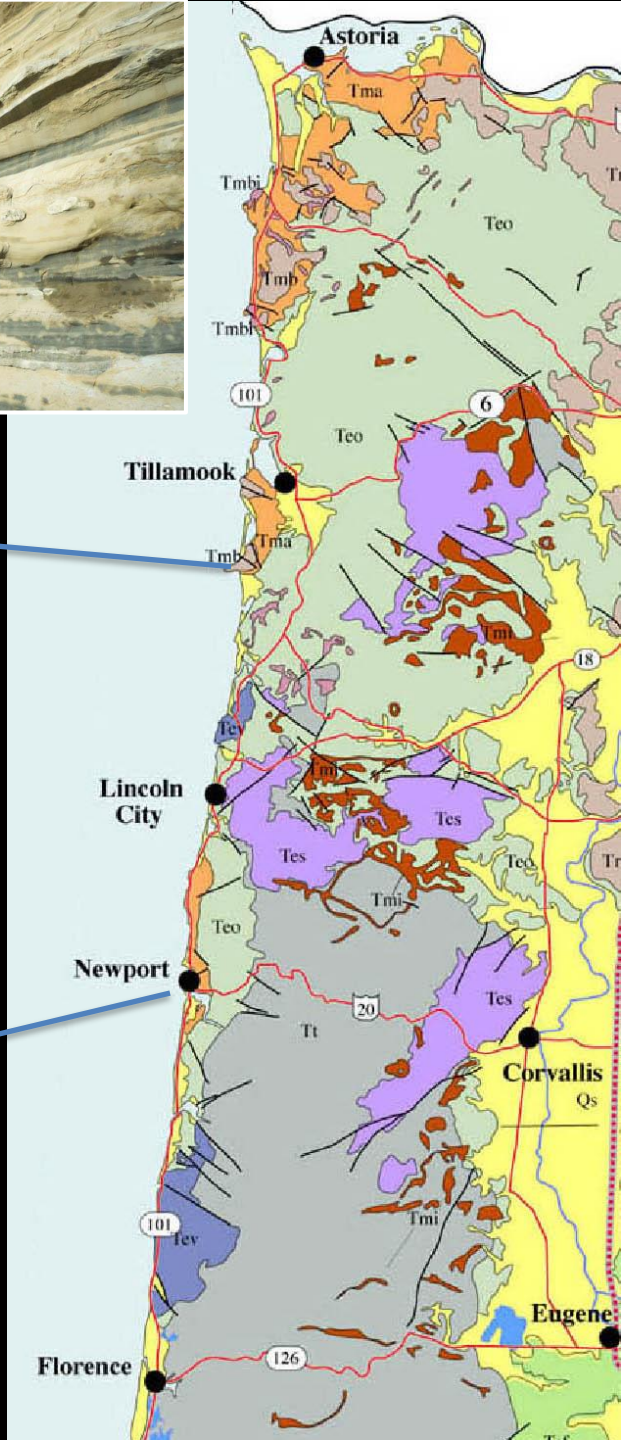
Area >81,000 square miles
Volume > 52,000 cubic miles
17.2-6 Ma, 94% by 14.5 Ma



Followed path of the Ancestral Columbia River

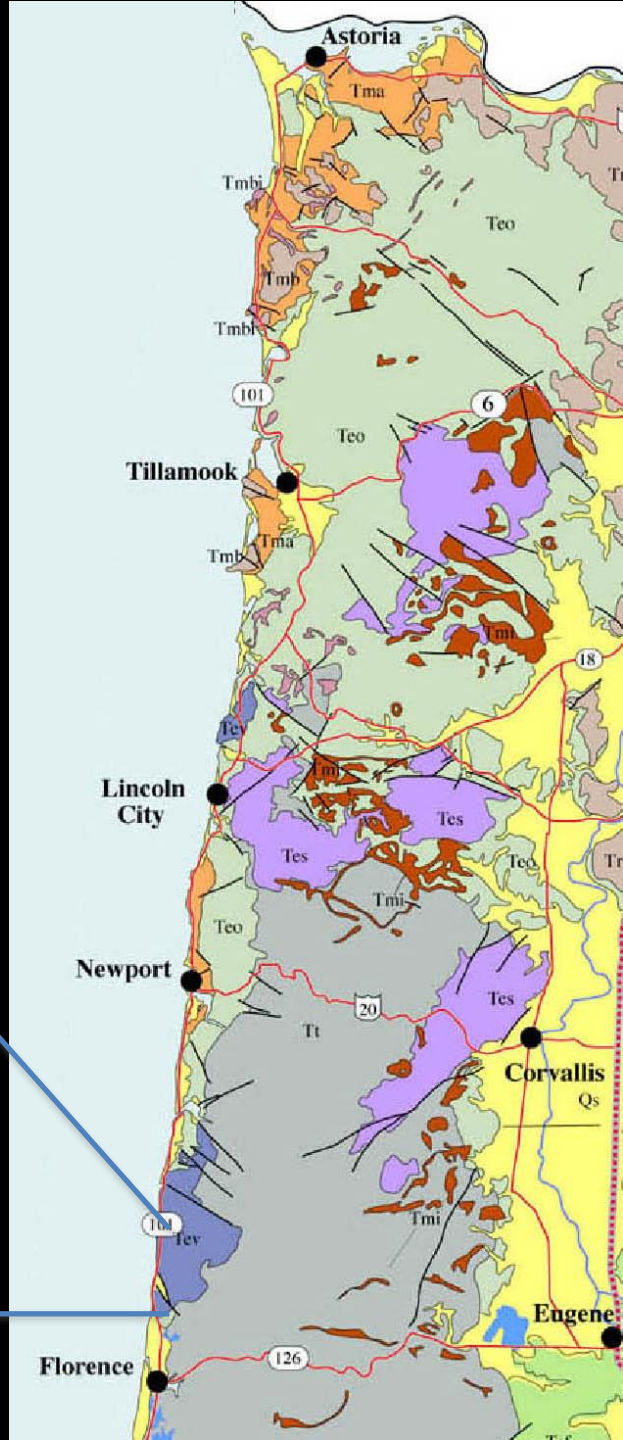
Cape Lookout

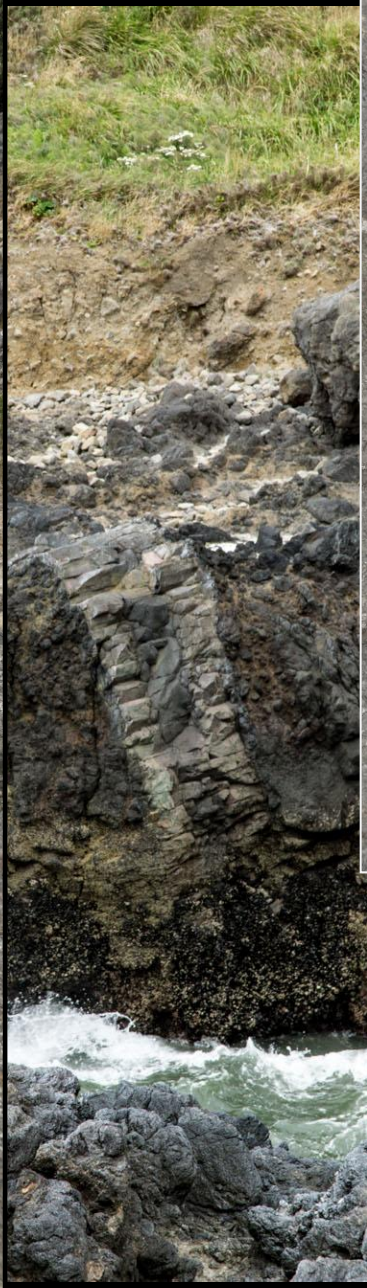
Yaquina Head (Newport)

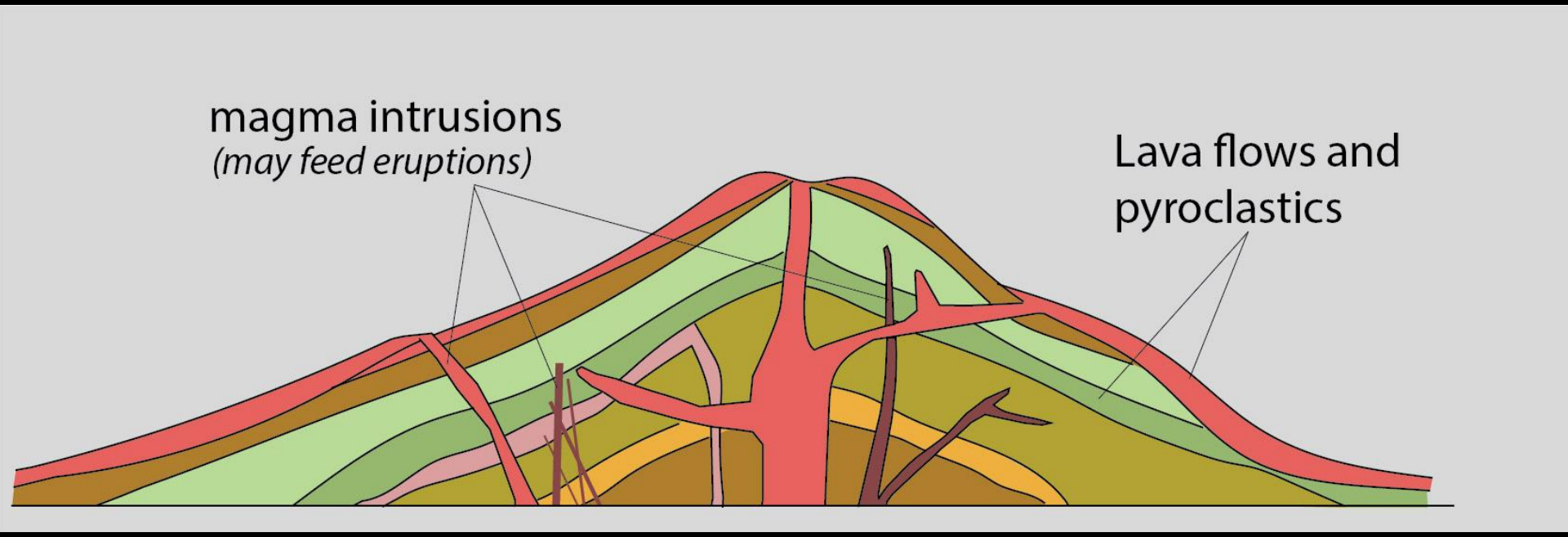


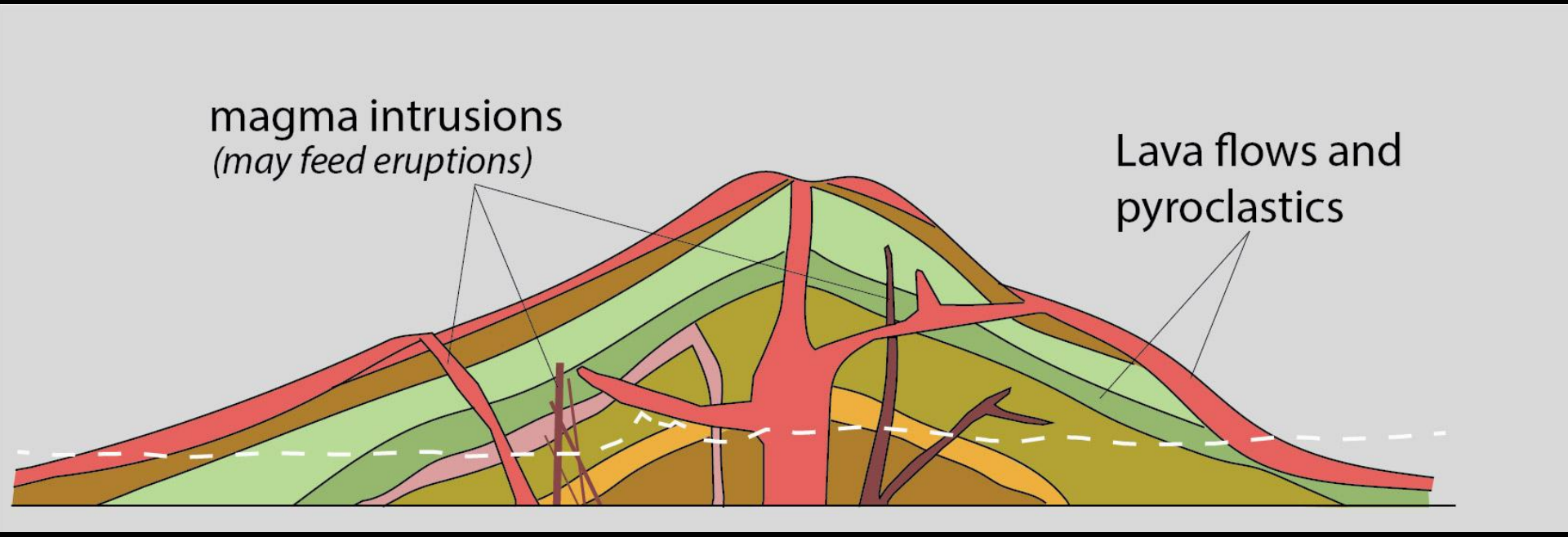
Yachats Basalt

~35 million years






magma intrusions
(may feed eruptions)
Lava flows and
pyroclastics


magma intrusions
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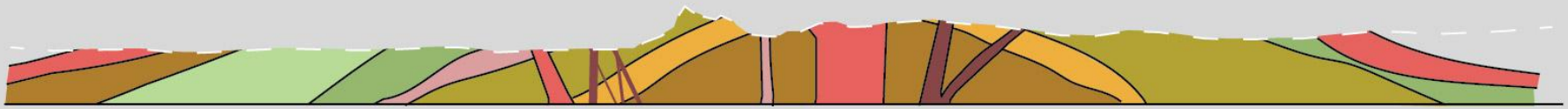
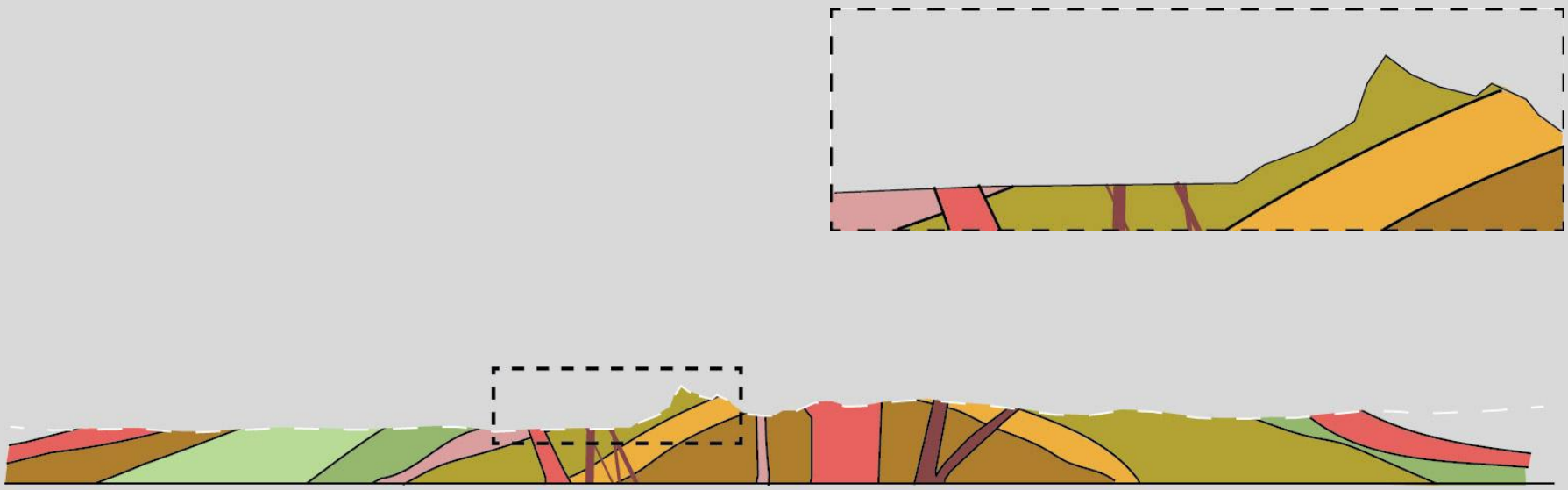
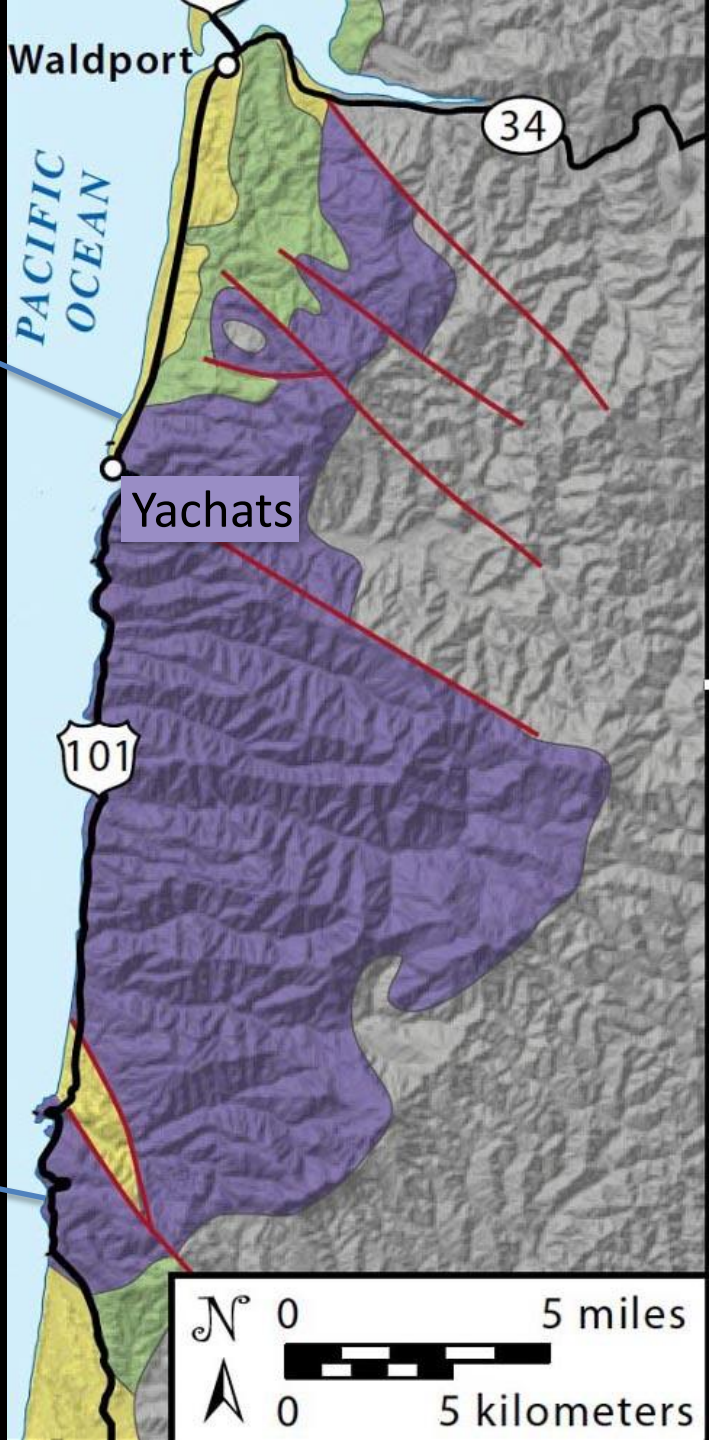
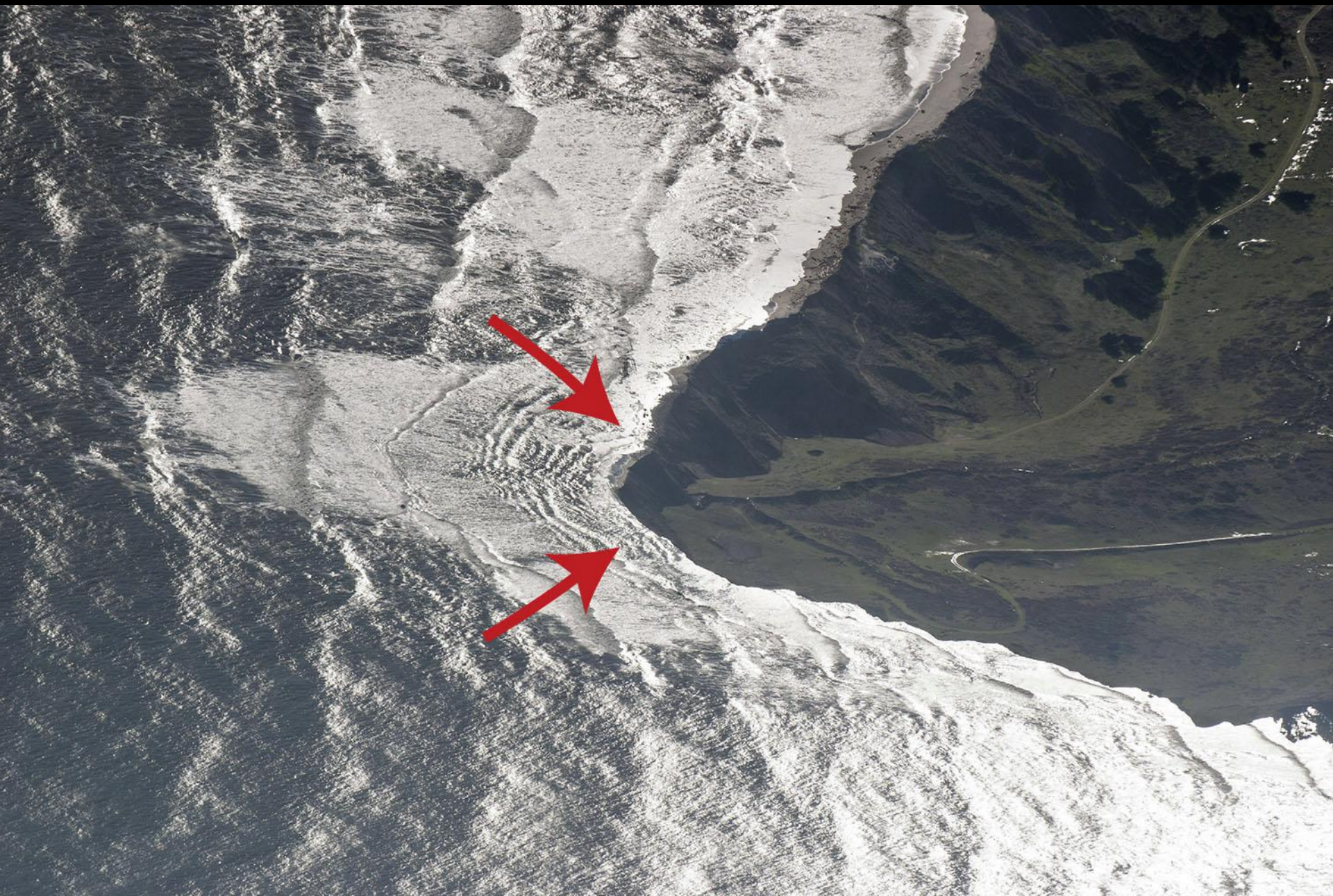
Lava flows and
pyroclastics






Waldport
34
PACIFIC OCEAN
Yachats
101
N
0
5 miles
0
5 kilometers



Second Beach, Olympic National Park

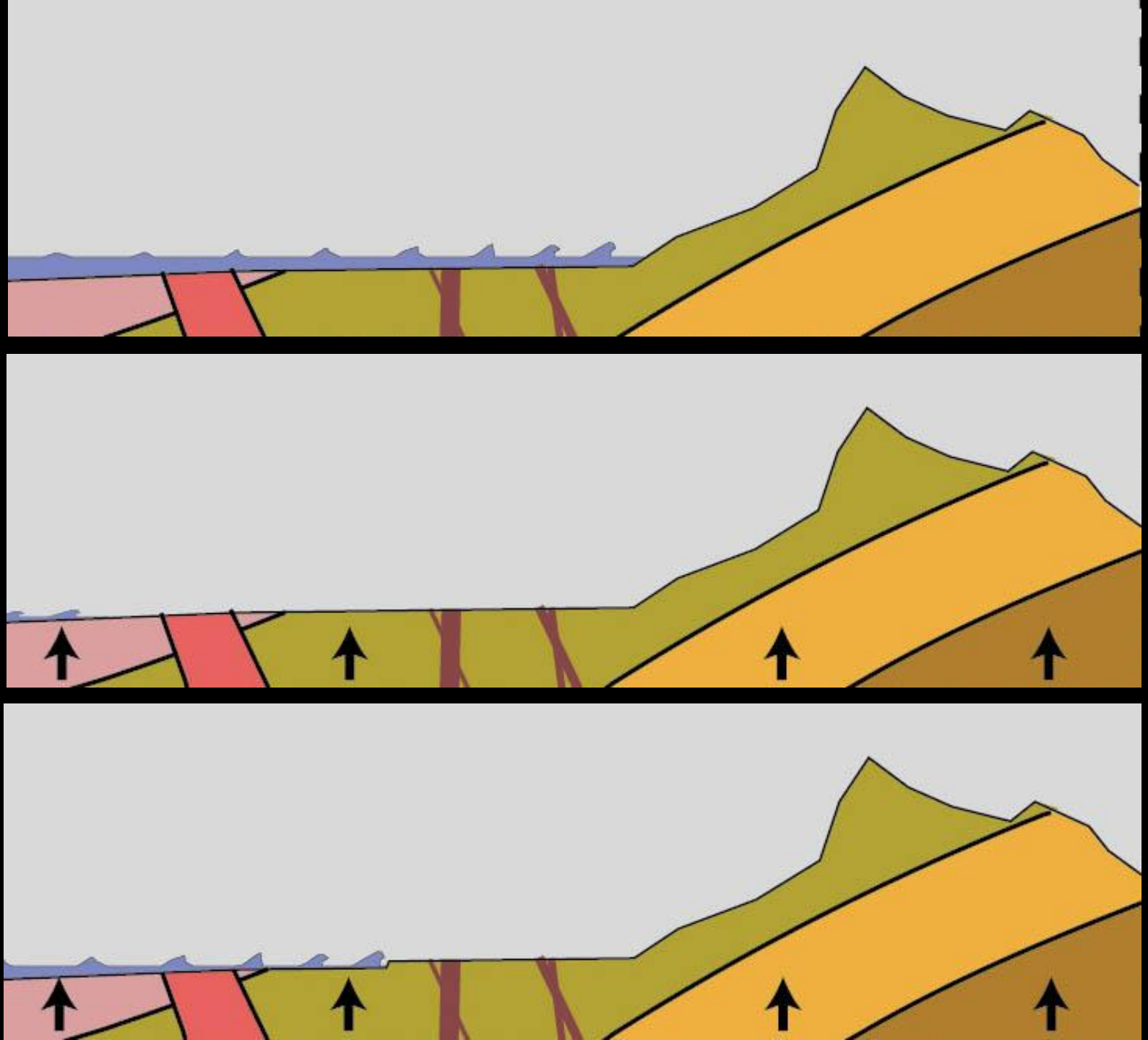
Second Beach, Olympic National Park


Sunset Bay


Shore Acres State Park

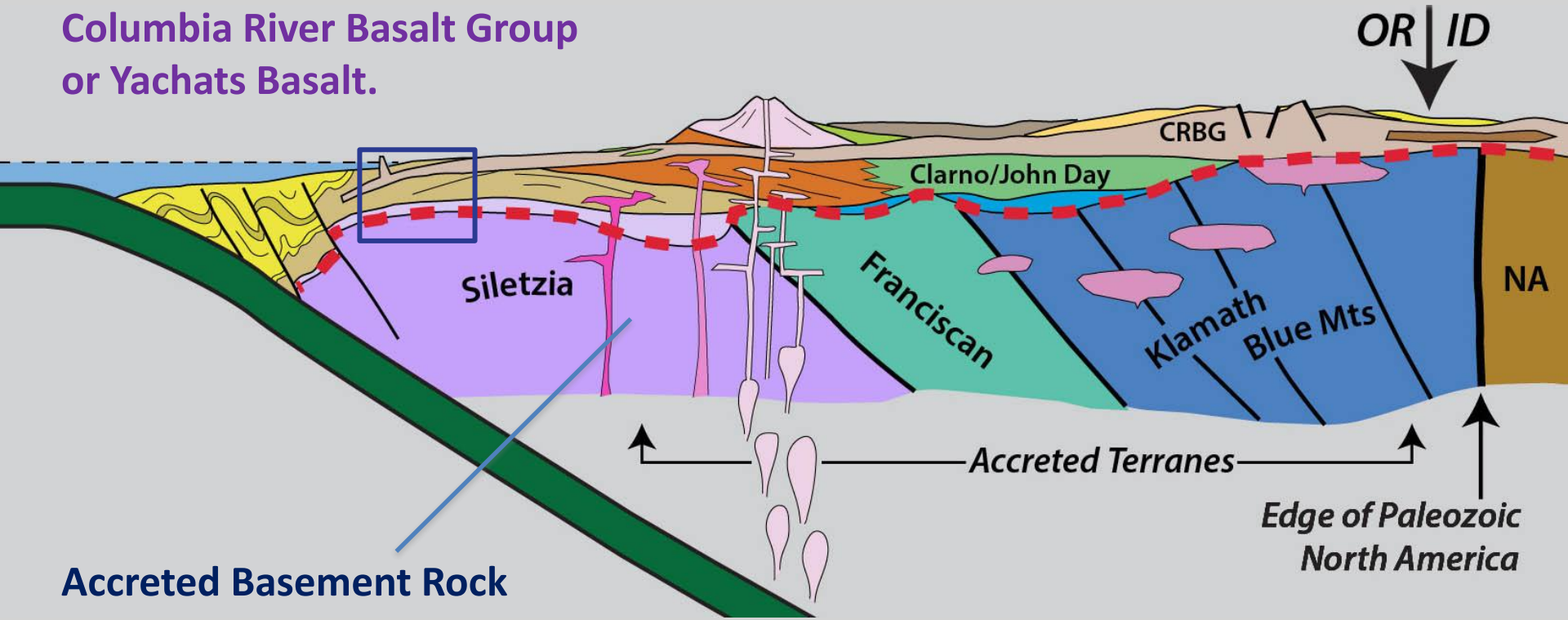
Bandon Beach

Cape Blanco



Erosion reduces headlands to marine platforms –many of which have been uplifted as marine terraces.

Headlands are resistant rock --mostly Columbia River Basalt Group or Yachats Basalt.



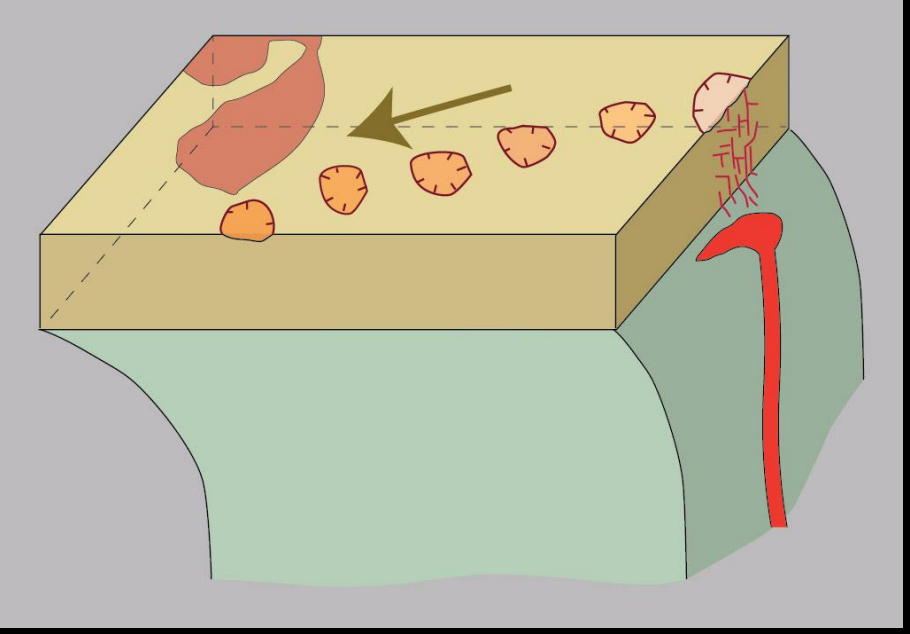
Columbia River Basalt Group *17.2 - 6 Ma*

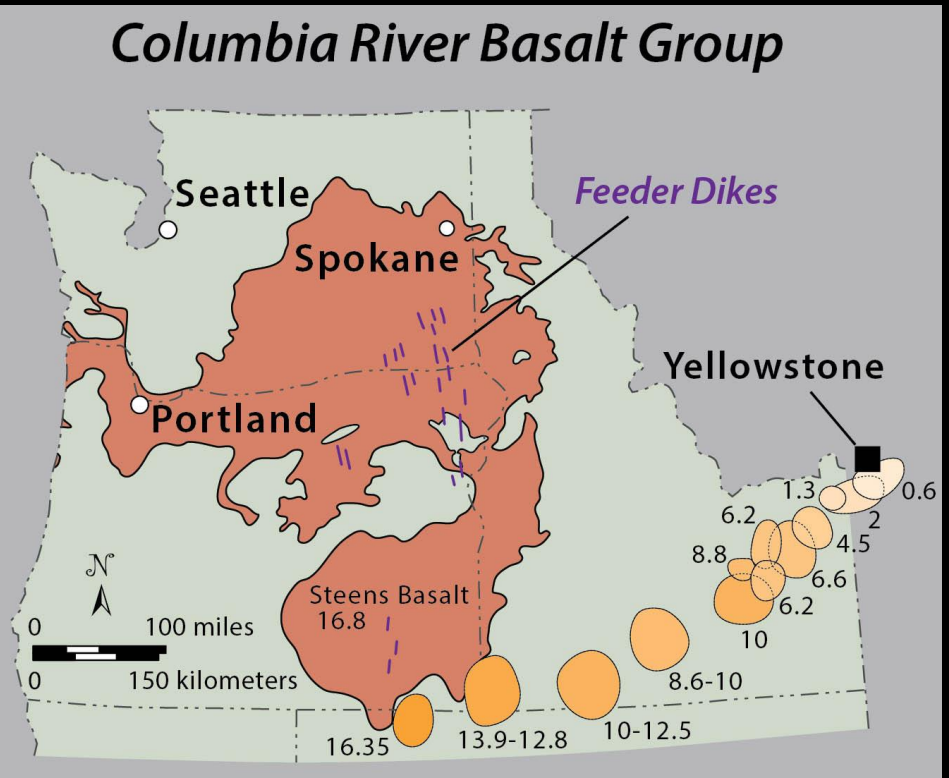
Area > 81,000 square miles

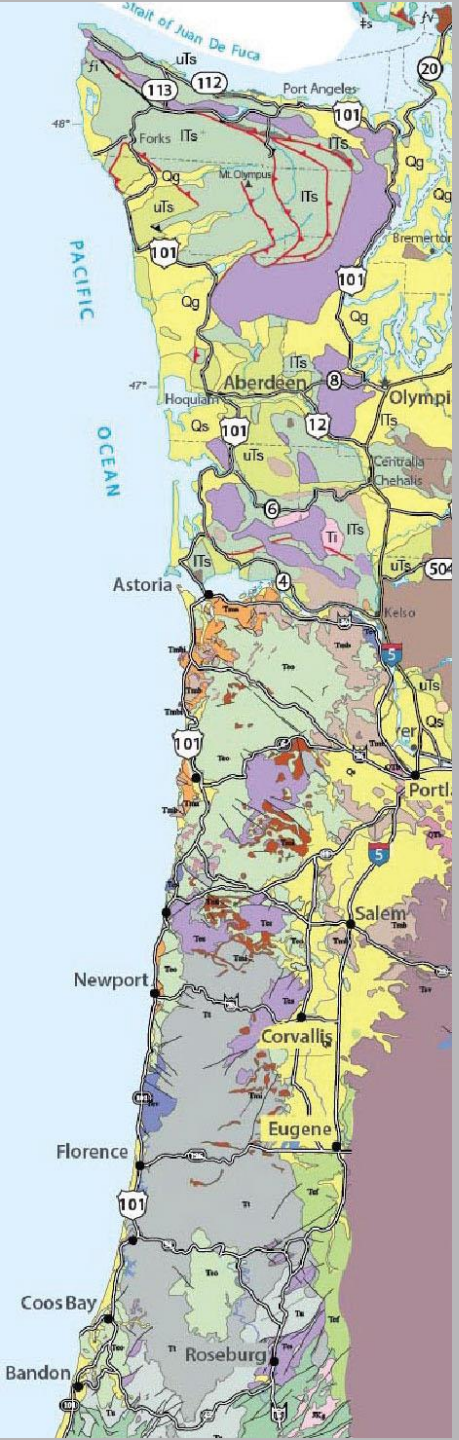
Volume > 50,000 cubic miles

Cover conterminous USA >80' deep!

94% erupted by 14.5 Ma

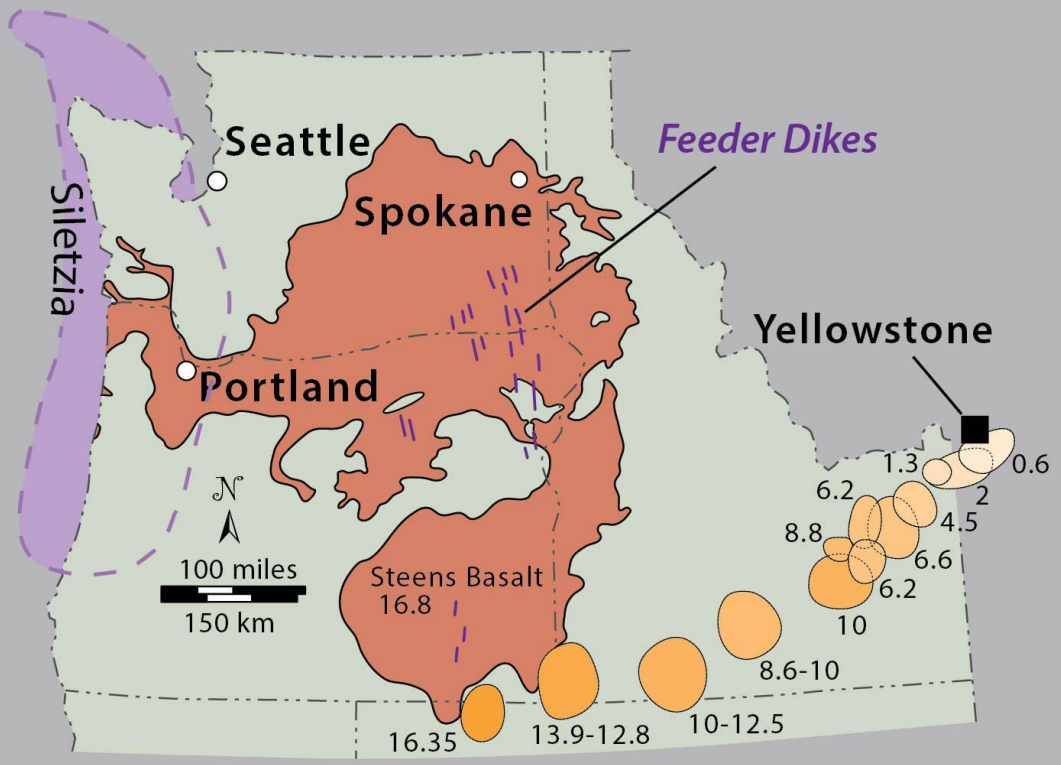



Columbia River Basalt Group
Seattle
Spokane
Feeder Dikes
Yellowstone
Portland
1.3
0.6
2
6.2
4.5
8.8
6.6
6.2
10
Steens Basalt
16.8
N
0
100 miles
0
150 kilometers
8.6-10
16.35
13.9-12.8
10-12.5



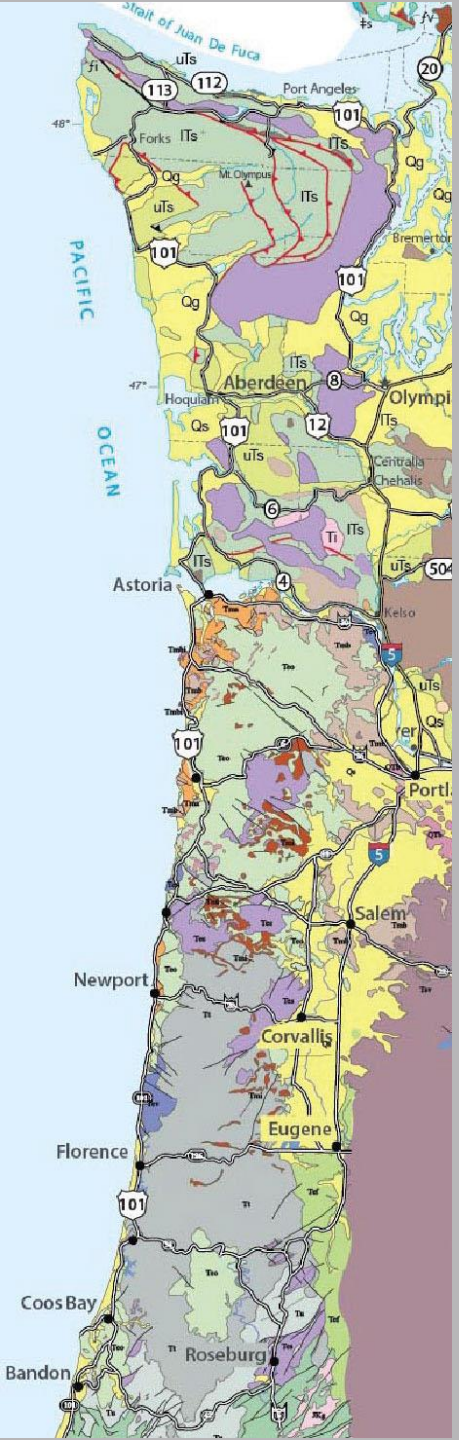
Columbia River Basalt Group 17.2-6 Ma

Volume > 50,000 cubic miles



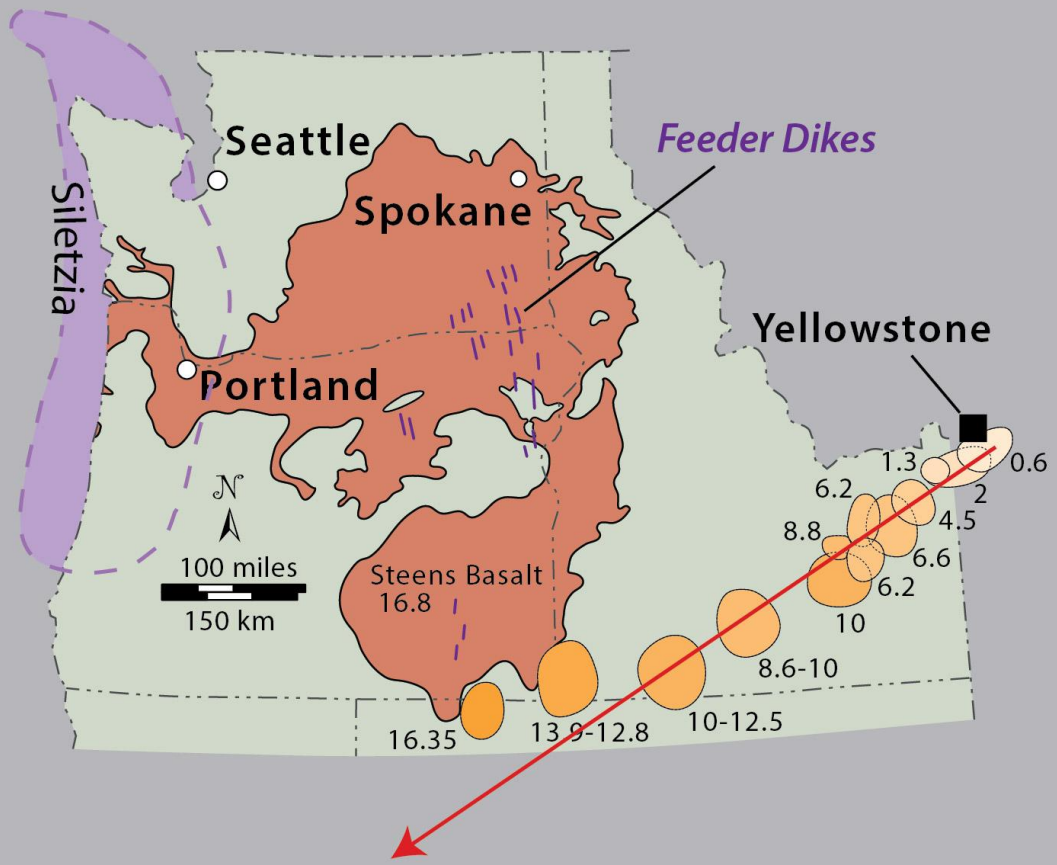
Siletzia 56-49 Ma

Volume > 400,000 to >620,000 cubic miles



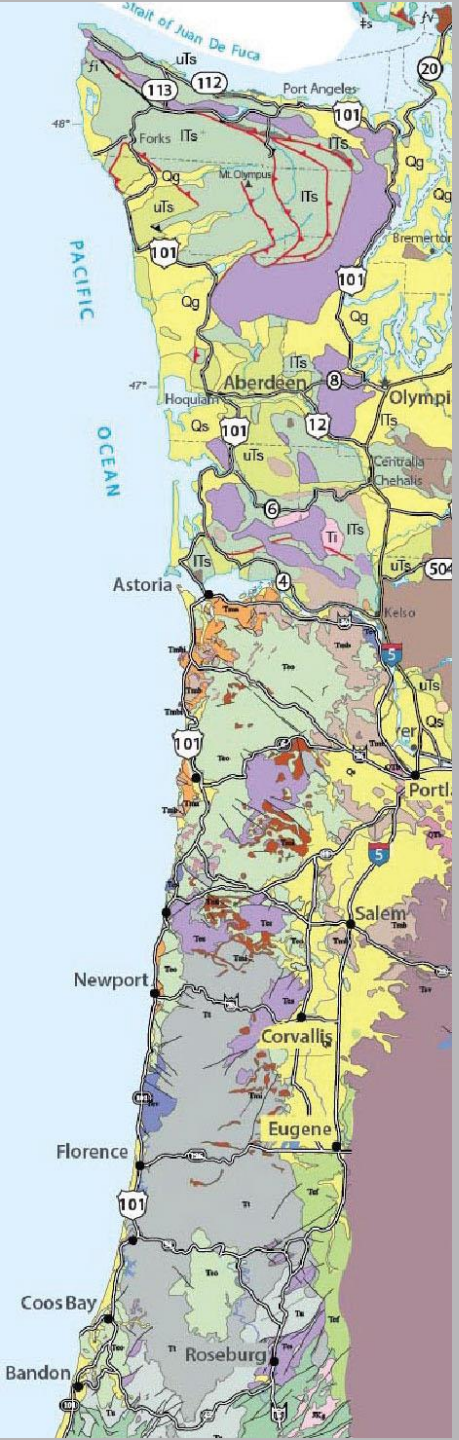
Columbia River Basalt Group 17.2-6 Ma

Volume > 50,000 cubic miles



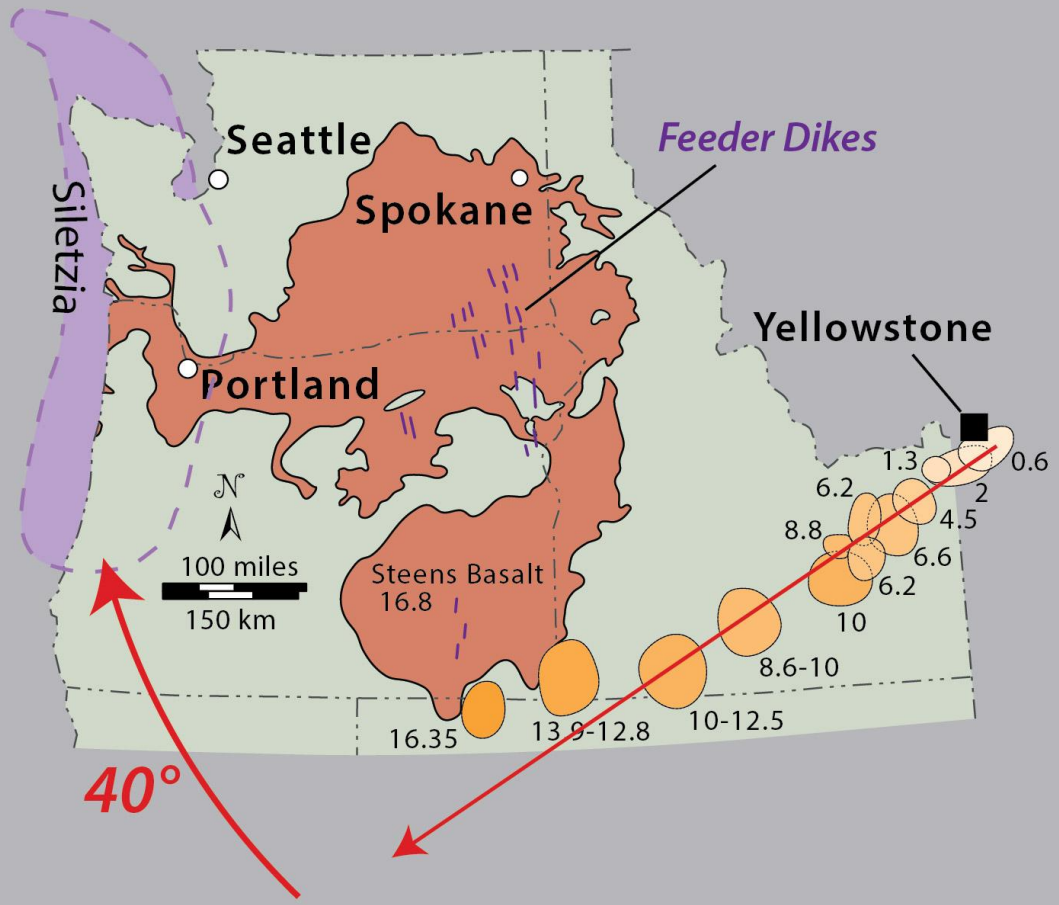
Siletzia 56-49 Ma

Volume > 400,000 to >620,000 cubic miles



Columbia River Basalt Group 17.2-6 Ma

Volume > 50,000 cubic miles

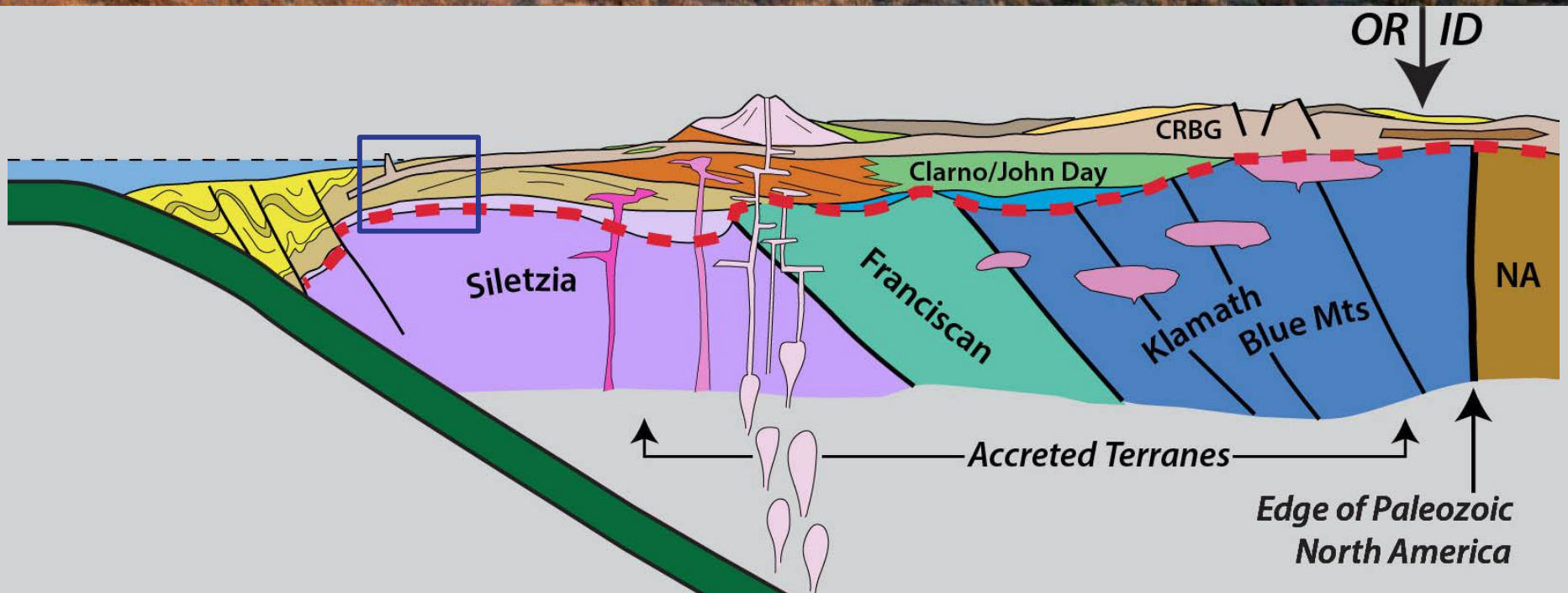


Siletzia 56-49 Ma

Volume > 400,000 to >620,000 cubic miles

Any other magmatism between Siletzia and earliest Col R Basalt?


Yachats Basalt 36-34 million years ago


OR
ID
CRBG
Clarno/John Day
Siletzia
Franciscan
Klamath
Blue Mts
NA
Accreted Terranes
Edge of Paleozoic
North America