Tectonic History of Coos Bay Basin

and its’ Relationship to Cenozoic Tectonics in the Pacific Northwest

A Preliminary Report of Ongoing Research

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‘Siletzia’ Accreted a “Large Igneous Province”

Aeromagnetic Map

Siletzia Time-Rock Diagram

Coos Bay Basin

Wells et al. (2014)
Topics

Basin Setting

Structural Observations

Deformation Phases

Emerging Regional Pattern

Ongoing Research
Coos Bay Basin

Million Years Formations Relative Accommodation Deformational Phases
0 Terraces

10 Empire 500m

20 Tarheel 300m+?

30 Tunnel Point 250m

40 Bastendorff 1000m'

50 Coaledo 2000m

Sacchi Beach 600m

Basal Contact of Coaledo Fm. from Newton (1980)

Base Coaledo
Fault

North Bend

Cape Arago

Neogene Syntline

Eocene Axis

Kilometers

Miles

12 6 0

0 3 6

Structural Contour Map on 3 Coaledo Fm.
Lower Coaledo Formation Coos Bay Basin, Oregon

by Russell Welch, North Oregon Foundation
May 2019

Thompson, Armentrout and Blackwell, 5/2019
Stratigraphic Record

Cenozoic Time Scale

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Deformation Observations: Multiple Scales

- Disequilibrium Compaction
- Deformation Bands
- Fault Kinematics
- Abutting Relationships
Primary Observation Sites

- Cape Arago
- Gregory Pt.
- Fivemile Pt.
- Sacchi Beach
- North Cove
- South Cove
- Shores Acres
- Sunset Bay
- Coos Head
- Yoakum Point
- Lighthouse Beach
- Gregory Point
- South Slough
- Fossil Point
- Seven Devils Fault
- Lidar Image

Accretionary Boundary

Coos Bay

Southernmost Siletzia

Kilometers

Miles

0 1 2 4

0 1 2
Deformation Observations: Multiple Scales

North Shore Sunset Bay

Deformation “Phases”
- Miocene
- Eo-Oligocene

Strawberry Point
Sunset Bay
Lidar
Pacific Ocean
Dogami File

Shoreface Sandstone Cycles
Bedding
Major Offset
Primary Faults
Secondary Faulting

Goggle Maps

Deformation Observations
1. Multiple Scales
2. North Shore Sunset Bay
3. LiDAR
4. Strawberry Point
5. Sunset Bay
6. Pacific Ocean
7. Dogami File

Deformation "Phases"
- Miocene
- Eo-Oligocene

North Shore Sunset Bay
Fault Damage Zone
Fault Damage Zone
0 100
Meters
0 50
Topics

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Timing of Deformational “Phases” and Orientations

The Coaledo records three phases of deformation:
Each subsequent phase modifies the previous.
Upper Plate Deformation

Progressive Clockwise Rotation

Phase 1
< 45-38 Ma
Post-Tunnel Point

Phase 2
< 14(?) Ma
Post-Tarheel

Phase 3
< 5(?) Ma
Post-Empire

Phase 4
< 200 ka
Uplift

5°-12°
Folding

40°-56°
Folding

25°
Folding

Paleo-Stress Orientation

55-51 Ma
Siletzia

Accretion

Paleomagnetic Rotation
Under Re-study
Lighthouse Beach Thrust

- Within the Upper Coaledo Formation
- Post-Tarheel Event (≤15 Ma)

- Slip-surface traced through 3 coves and at points 1.2 km apart
Post Empire (<5 Ma) Deformation

- Slip Elements
- Non-Orthogonal Joints
- Shear Patterns
- Apparent Coeval SHmax
- Deformation “Phases”
- Borehole Breakout

Niem et al., 2006
Topics

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Tectonic “Phases”

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Stratigraphic and Structural Interpretations

10'sm+

500m+

300m+

3,800+m

Million Years

Formations

Terraces

Empire 500m

Tarheel 300m+?

Tunnel Point 250m

Bastendorfff 1000m

Goaledo 2000m

Sacchi Beach 600m

Siletzia Terrain Accretion 51-49 Ma

Deformational Phases

Contraction

Contraction

Extension

Extension

‘Collision’

Shmax Vector

≤ 5

3

2

1

Upper plate Shmax based on borehole breakout

Coupling of upper and lower plate deformation

Likely post-CRB deformation with dextral oblique shortening

San Andreas plate boundary change generates Juan de Fuca plate fragmentation and contraction along coast, and folding of S. Slough Syncline

Change in plate motions generates oblique extension along coast with intrusion of Tillamook Volcanics and extension of Tualatin Basin

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Basin Setting

Deformation Phases

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Ongoing Research
Ongoing Research

Tectonics:
- Basin Scale Structure, including subsurface
- Balanced Cross Sections
- Paleomagnetic Rotation History – Refined and Expanded

Stratigraphy:
- Lateral Facies Correlation – Drone-Image Refinement
- Depositional Environments, including integrated biofacies:
  (Forams, Mollusks, Elasmobranchs, Palynomorphs)

Geochronology:
- Ar/Ar on Tuffs and Pb/Ur on Zircons
- Paleomagnetic Reversals – Expanded Section
- Micropaleontology - Updated

Paleogeography:
- Paleoclimate (Palynomorphs, Marine Biofacies)
- Sandstone Mineralogy
- Zircon Age Clusters
Coaledo Team: Cross Discipline Integration

Structure/Stratigraphy
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Magnetostratigraphy
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Thank You

Shore Acres State Park, Coos Bay, Oregon

Photo from S. Taylor, Western Oregon