

## Western Mexico: The Guerrero Terrane (Late Mesozoic)

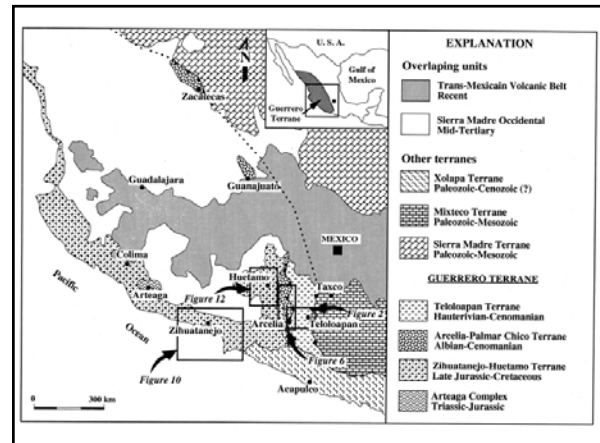
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## The Guerrero Terrane

- Late Mesozoic
- Arc assemblages
- 3 subterrane
  - Teloloapan (east)
  - Arcelia-Palmar Chico (central)
  - Zihuatanejo-Huetamo (west)

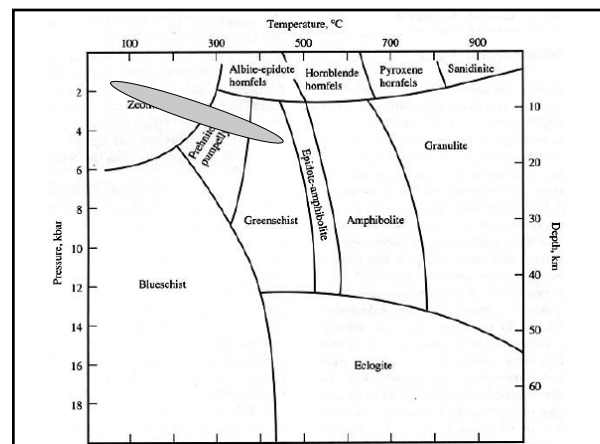
## The Guerrero Terrane

- Debate over origin
  - Single complex arc system
  - Several arcs (current Pacific arc system)
- Broken into N and S sections by Trans-Mexican Volcanic Belt
  - N section covered by Sierra Madre volcanics
  - S section almost continuous exposure



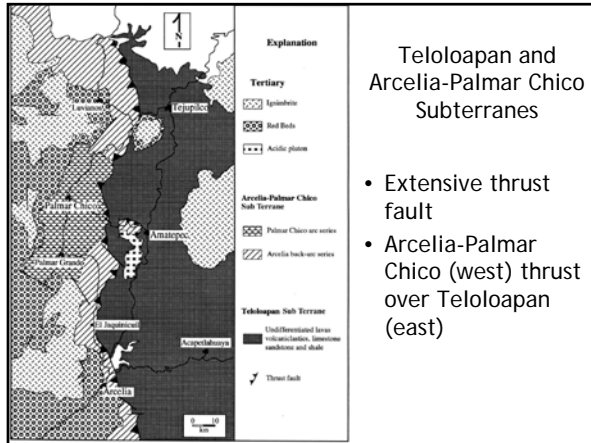
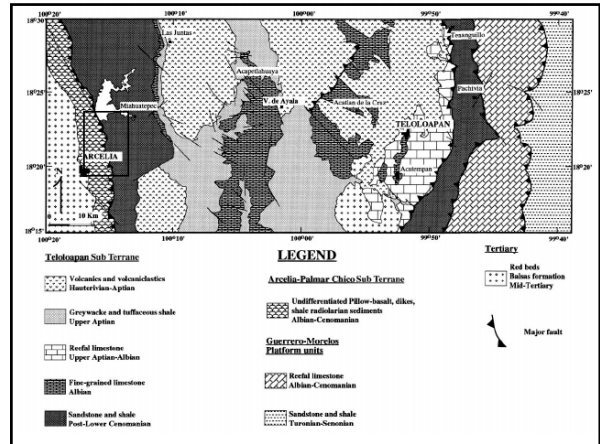
## Teloloapan Subterrane

- 100 km wide, 300 km long
- Thrust over Mixteco Terrane
  - Laramide low-angle thrust
- Ductile simple shear deformation
- Metamorphic assemblages
  - Zeolite - prehnite-pumpellyite - greenschist facies
  - Seafloor-type metamorphism
- Negative Nb, Zr, Ti anomalies: typical of subduction
- Source similar to Lesser Antilles Arc



## Arcelia-Palmar Chico Subterrane

- 40 km wide, 250 km long
- Thrust over Teloloapan subterrane
  - Laramide low-angle thrust
- Deposits > 2000 m thick
- Same deformation and metamorphism as Teloloapan
- 3 different volcanic suites:
  - A: N-MORB, back arc basin basalts
  - B: OIB
  - C: subduction-related magmatic suites
- Source similar to Aleutian Arc

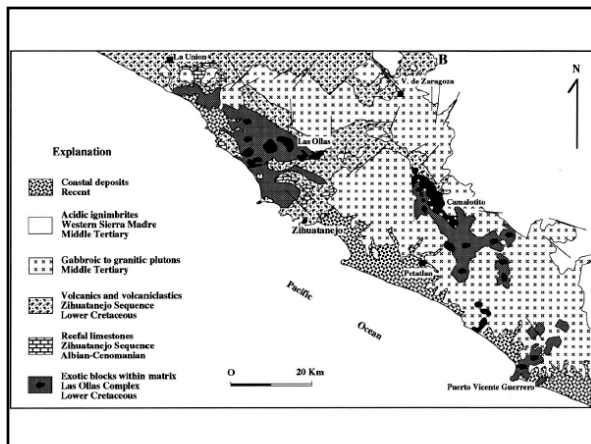


## Teloloapan and Arcelia-Palmar Chico Subterrane

- Extensive thrust fault
- Arcelia-Palmar Chico (west) thrust over Teloloapan (east)

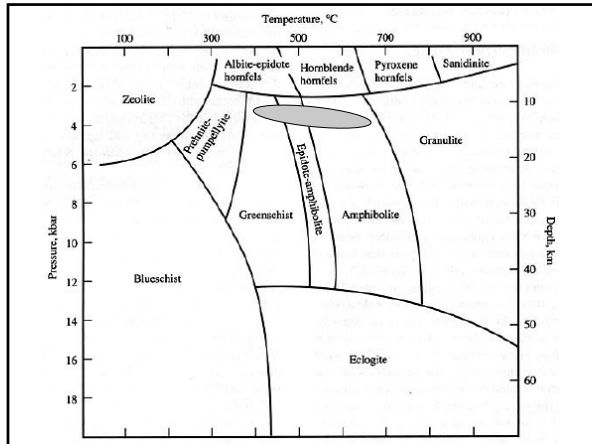
## Zihuatanejo-Huetamo Subterrane

- Westernmost subterrane
- 3 components
  - Zihuatanejo Sequence
  - Las Ollas Complex
  - Huetamo Sequence
- Contact with Arcelia-Palmar Chico covered by Tertiary red beds
- Underlain by Arteaga Complex
  - Separated by unconformity
  - Subvolcanic basement



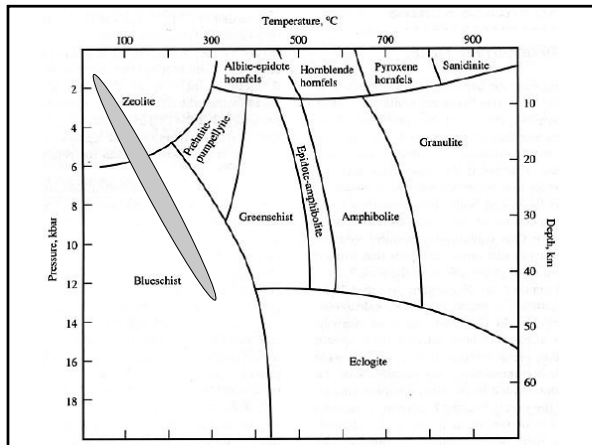
## Zihuatanejo Sequence

- Volcano-sedimentary
  - > 2000 m thick arc volcanics and sed. rocks derived from volcanics
  - Bottom 1500 m: andesite and dacite flows
    - Decreasing  $TiO_2$  from andesite to dacite
    - Negative anomaly in Zr and Ti
    - Consistent with med. to high-K calc-alkaline suites ( $TiO_2$ ), and orogenic anomalies
  - Top 500 m: reefal ls and red beds with dinosaur footprints
- Intruded by Tertiary Plutons
  - Thermal metamorphism (greenschist and amphibolite)
- Undeformed
- West-dipping



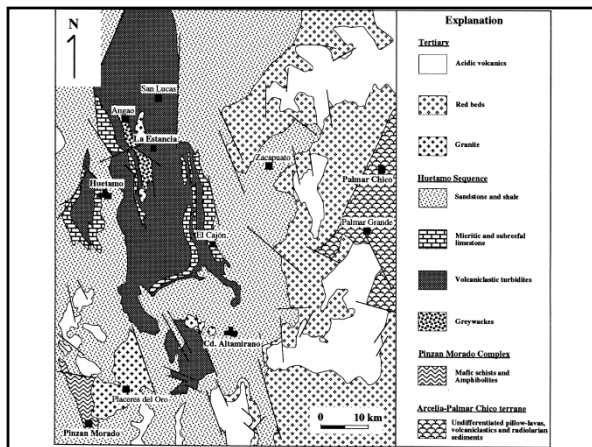
## Las Ollas Complex

- Exotic blocks and tectonic melange bounded by faults
- Blueschist metamorphic assemblages
  - High P, Low T
  - Plate convergence
- Enriched in LFSE/LIL
  - Immature island-arc tholeiites



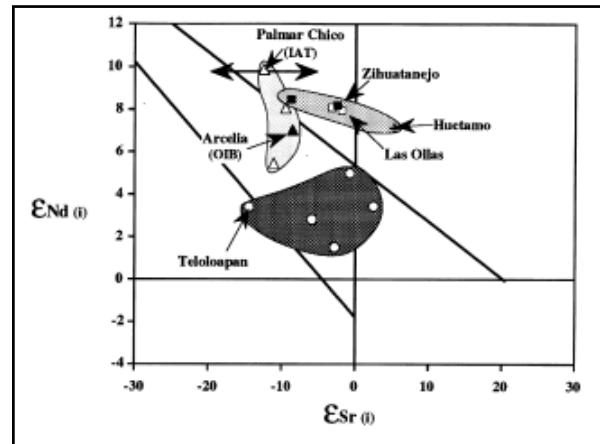
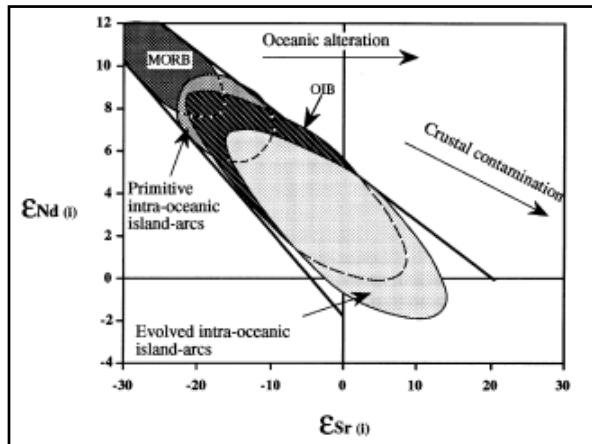
## Huetamo Sequence

- 4500 m thick Late Jurassic - Late Cretaceous sed. rocks
- Base not exposed
  - Unconformably on metamorphic basement (Artega)
- Lower: basalt volcanoclastics, pillow basalts, siliceous seds.
- Middle: andesite volcanoclastic turbidites
- Upper: reefal ls and red beds, some andesite and dacite congl.
- Negative Zr and Ti anomaly indicates island-arc source
  - Tholeiitic and med to high-K calc-alkaline intra-oceanic island arc suites
- Basalts slightly enriched in LREEs
  - Tholeiitic basalts in orogenic suites



## Isotopes!

- Teloloapan
  - Lower Nd than MORB
  - Med to high-K calc-alkaline rocks derived from evolved island arcs where magma incorporated subducted sediment (eg: Indonesia)
- Arcelia-Palmar Chico
  - No good data: only three samples
  - Moderate Nd: Typical alkalic ocean island suite
- Zihuatanejo-Huetamo
  - All sections have relatively high Nd, and moderate Sr
  - Arc that incorporated crustal material during magma evolution



### What the heck???

- Several sequences of island arcs and back arc basins
- Teloloapan: evolved island arc system
- Arcelia-Palmar Chico: primitive island arc system (Palmar Chico) and back arc basin (Arcelia)
- Zihuatanejo-Huetamo: island arc (Zihuatanejo) developed on deformed oceanic crust (Arteaga basement), back arc basin (Huetamo), and subduction complex (Las Ollas)

### Another View...

- Everyone else's model is wrong
  - No west-dipping subduction
    - Do not see accretionary prism deposits, or high-pressure metamorphic belts
- Area was to the east of an east-dipping subduction zone
- Intra-arc or back-arc basin
- Younger than thought
  - Age of Arcelia complex incorrectly dated (radiolarians)

### What about Northern North America?

- Accretion associated with start of Laramide
- Evidence suggests a complex arc system as a source for the subterraneas
  - May be similar to arcs accreted during Sonoma and Nevadan Orogenies
- Contact metamorphism from plutons
- Zihuatanejo deposits intruded by plutons look like roof pendants - also seen with Sevier intrusions

### References

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