South American Plate Relationships: The Nazca and South American plate interactions

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Nazca Plate

- Subducts beneath vast majority of western South America
  - Oblique angle of subduction
- Not normal subduction – flat slab subduction
- Has several triple points
  - Nazca, Caribbean, South American (off coast of Colombia)
  - Nazca, South American, Antarctic (off coast of Chile)
- Due to oblique angle of subduction, shows diminishing age progression to the south
  - 33.5 Ma – 19 Ma

Location, location, location

Flat Slab subduction

- Along strike variations in dip
  - 4 major "segments" with differing dips
  - Southern Peru/Northern Chile – dips east ~ 30°
  - Northern/Central Peru, Western Argentina – Extends eastward for 100's km at depth of 100 km before resuming descent.
  - First thought to be areas of plate bounded by tears in the plate
  - Later thought to be a continuous flexure, not a tear

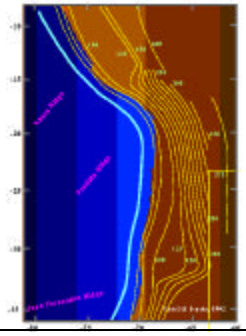
Flat Slab subduction

- Along with changes in subduction angle, produces changes in tectonic character in overriding plate
  - Regional in scale
  - Shows correlation between late Cenezoic volcanism, plateau formation

Flat Slab subduction – A tour

- Peru → Chile
- Based on seismic data
- Plate is convex up
- Shows that the slab is constantly changing
  - Beneath northern/central Peru (8 °S-13 °S)– quakes at 100-125 km, dipping E-NE at 5°
  - Abrupt change at 14 °S to steeper inclination (~30 °). Continues to ~20 °S where it "stabilizes", creating a bench at about 125 km depth.

A tour



- Subduction zone along the coast of Peru and Chile
- Note benches- areas of little seismic change

A tour: Southern Peru

- First transition zone, from near horizontal to steeper subduction
- Seismically active
- First thought to be a major plate tear, later found to be plate contortion
  - Below 100 km, plate broadens
  - Lack of intermediate seismic data makes further interpretation hard

A tour: Northern Argentina

- Second transition zone, beneath northern Argentina and Bolivia
- Gradual change, not as sharp as that under Peru
  - Determined by seismicity
  - Like Peru, little to no intermediate data is available
  - Zones of quiescence present in 2 locations – between 25.5°S and 27 °S and 29°S and 31°S

A Tour: Chile

- Third transition zone
- Flat slab zone makes it harder to determine dip angle – originally no change in dip was thought to exist

Questions??

References

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