Generation of Subduction-related Andesites

Calc-alkaline Volcanism occurs inboard of Subduction Zones at Convergent Plate Boundaries

When mantle melts beneath Mid-Ocean Ridges or at Hot-spots, uniform tholeiitic basalt is formed

• Why does melting of mantle at subduction zones produce such different magmas?

• The magmas of subduction-related volcanoes are calc-alkaline magmas, mostly andesites.

Things about subduction-related magmatism that must be explained by any model

• The magmas (and rocks) are calc-alkaline, not tholeiitic
  
  – i.e., they show no Fe-enrichment

• Magmas (and rocks) are dominantly andesites with higher SiO$_2$ than basalts

• More varied magma types are produced than in Hawaii or at Mid-ocean ridges

• Bimodal volcanism (basalt + rhyolite) is common

• Eruptions are commonly explosive

Generation of Calc-alkaline volcanic rocks above Subduction Zones

Refer to the Handout – Cross-section of an ocean-continent subduction zone
What happens at each of the locations numbered 1-9?

1 –

2 –

3 –

4 –

5 –

6 –

7 –

8 –

9 –

Processes that change magma composition:

- Crystal Fractionation
- Contamination
- Magma mixing
- Assimilation
- and others
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