Continental Arc Magmatism

1. Continental crust acts as density filter, primitive melts must fractionate to lower density (lower FeO) before they can rise into low density continental crust.

2. During fractionation, rising magma will assimilate crustal material, increasing K2O, SiO2, and other lithophile elements.

3. Partial melting of lower crust (anorogenic in composition) creates large volumes of more felsic magma, resulting in granite intrusion.

4. Batholiths are common in continental arcs, e.g., Sierra Nevada Batholith in California, Coast Range Batholith in British Columbia, Coastal batholiths in Peru.

5. Depth of origin; shallow K2O-saturated melts of lower crust/mantle create magma which will freeze (-intermediate olivine) before reaching surface.

<table>
<thead>
<tr>
<th>Andean Arcs</th>
<th>Island Arcs</th>
</tr>
</thead>
<tbody>
<tr>
<td>SiO2</td>
<td>50-70 wt%</td>
</tr>
<tr>
<td>FeO/MgO</td>
<td>&gt; 2.0</td>
</tr>
<tr>
<td>K2O/Na2O</td>
<td>0.6 to 1.1</td>
</tr>
</tbody>
</table>

Continental Arc Magma

- Melt zone
- Fluid flux to melt zone
- Serpentine dehydration

Continental Arc Plutonism

Plate tectonic framework of western North America:
- NVZ = Northern Volcanic Zone
- CVZ = Central Volcanic Zone
- SVZ = Southern Volcanic Zone
- NVZ, CVZ: Young Basemnt
- CVZ, SVZ: Penacnician Basemnt

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