

# Ophiolite Suites Encyclopedia Article

## Ophiolite Suites

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# Ophiolite Suites

Since the late 1970s, the term ophiolite has been used to describe sections of oceanic **crust** and upper mantle, along with **sedimentary rocks** deposited on the sea floor, emplaced as thrust slices onto continental **lithosphere**. This process, called obduction, results from continent-continent collision following subduction of oceanic crust and the closure of **oceans** or back-arc basins. A typical ophiolite suite comprises (from base to top):

- Harzburgite, dunite, **peridotite**, and pyroxenite (ultramafic **igneous rocks** composed of varying amounts of **olivine** and pyroxene) representing upper, oceanic mantle. They are commonly altered to the slippery, shiny green-black **rock** serpentinite. Serpentinite is named after its resemblance to the skin of a snake. Indeed, the word ophiolite is derived from the Greek words *ophis*, meaning snake, and *lithos*, meaning stone, because of the presence of serpentinites.
- Iron-titanium and magnesium gabbros. Layered, cumulate-textured gabbros dominate the basal section of oceanic crust. Higher-level gabbros tend to be more massive and associated with plagiogranites.
- Sheeted **mafic** dykes, feeders to overlying volcanics.
- Pillow basalts, formed as **lava** flows on the sea floor. The characteristic pillow shapes result from rapid cooling when lava contacts seawater.
- Radiolarian **chert** and **limestone**, graywacke and mud-stone or their metamorphic equivalents **marble**, quartzite and mica schist. Oceanic crust in ophiolites is produced at spreading centers, above zones of subduction in extensional or transtensional arcs (supra-subduction zone ophiolites), and along some leaky **transform faults**. Ophiolites that lack ultramafic, upper mantle rocks may represent obducted slices of seamounts or oceanic plateaus.

Many ophiolites have undergone high pressure-low **temperature**, blueschist **metamorphism** in subduction zones prior to their emplacement. Blueschists are named after blue-colored glaucophane and other sodium-rich amphiboles formed in rocks of appropriate composition. Eclogite facies metamorphism occurs when rocks are subducted to greater depth. In eclogites, pyroxene, olivine, and **plagioclase** recrystallize to sodium-rich pyroxene and garnet. During collision, blueschists plus or minus eclogites are thrust as a series of imbricate slices onto lower-grade, continental rocks. Ophiolites may be overprinted by greenschist facies metamorphic assemblages and exhumed during collapse of a thrust-thickened orogen.

Ophiolites in orogenic (mountain building) belts represent sutures between two continental plates. Their recognition is therefore important in tectonic reconstructions. Ophiolites host a range of mineral deposits. Ultramafic and gabbroic rocks may contain deposits of chromium or platinum-group elements. Chrysotile asbestos occurs in serpentinites. Copper, zinc, cobalt and nickel sulfides (marine exhalatives) may occur in economic amounts. Some ophiolites host shear controlled epithermal or mesothermal gold mineralization.

## See Also

Plate Tectonics; Subduction Zone