Mineralogy of Faults in the San Andreas System That are Characterized by Creep


San Andreas Fault Observatory at Depth (SAFOD)

Introduction

Central Deforming Zone (CDZ) and Southwest Deforming Zone (SDZ)

Rocks at the SAFOD site are characterized by multiple episodes of dextral (left-lateral) slip. The most recent of these events occurred between 1857 and 1906. The exposed rocks at the SAFOD site represent a high-strain area of the San Andreas Fault System.

Bartlett Springs Fault

Geologic Setting

The Bartlett Springs Fault (BSF) is an active, right-lateral strike-slip fault. The fault is a part of the San Andreas Fault system with a dextral oblique-slip sense on land and a left-lateral sense offshore. The fault accommodates right-lateral motion along its length, and accommodated a dextral offset along the Segan Fault.

Surface Geology

The surface geology of the area surrounding the SAFOD site is characterized by a variety of rock types. The area is dominated by metamorphic rocks, with some minor exposures of sedimentary and volcanic rocks.

Geologic map of the area surrounding the SAFOD field site.

Lighter-Colored Zones

The lighter-colored zones are dominated by siliciclastic sediments, which are composed of clastic material. The sediments are primarily composed of sand, silt, and clay, and are distributed across the study area.

Darker-Colored Zones

The darker-colored zones are dominated by carbonate sediments, which are composed of calcium carbonate. The sediments are primarily composed of limestone and dolostone, and are distributed across the study area.

Clay-Mineral Chemistry

Textures and mineral assemblages of the goethite in the exposure of the BSF near Lake Pillsbury are very similar to those observed at SAFOD, both in the SDZ and CDZ, and at the surface. The main difference is that the low-temperature, clay-mineral formation has progressed to a substantially greater degree in the CDZ than in the SDZ and at the surface.