Name _____

Minerals and textures of subduction-related metamorphic rocks

Objectives:
Familiarize yourself with the mineral assemblages and textures of rocks metamorphosed at high pressures and low temperature (HP/LT).

High-pressure metamorphic terranes are commonly composed of a variety of lithologies (metamorphosed basalts, sediments, ultramafic rocks) jumbled together in what is referred to as mélange (French for mixture). Mélange zones are thought to represent the interface between the downgoing subducting slab and the overlying mantle wedge and in most localities consist of m-scale or larger coherent blocks surrounded by a relatively fine-grained matrix.

The rocks you will examine are all mafic rocks. Three are metamorphic rocks from the Franciscan Complex, CA. These three different rocks contain minerals indicative of the range of minerals found in subduction zone metamorphic complexes. One of the rocks represents the protolith of the metamorphic rocks.

You will look at four rock and thin section samples for this lab.

1. For **each** sample, identify the major minerals present. **Describe** the identifying characteristics (in hand sample or thin section) of each mineral present in the rocks. **Describe** and **sketch** any textural relationships among the minerals.

a. **Sample J1**
What are the **five** most abundant minerals in this rock?

Mineral	Identifying characteristics

What name would you give this rock?

Describe and sketch any textural relationships in the rock (e.g. mineral inclusions, foliations, replacement textures)

b. **Sample J2**
What are the **five** most abundant minerals in this rock?

Mineral	Identifying characteristics

What name would you give this rock?

Describe and sketch any textural relationships in the rock (e.g. mineral inclusions, foliations, replacement textures)

c. Sample **J3**
What are the **five** most abundant minerals in this rock?

Mineral	Identifying characteristics

What name would you give this rock?

Describe and sketch any textural relationships in the rock (e.g. mineral inclusions, foliations, replacement textures)

d. Sample **J4**
What mineral(s) are present in this rock? What other phase(s) are present?

Mineral	Identifying characteristics

What name would you give this rock?

Describe and sketch any textural relationships in the rock (e.g. mineral inclusions, foliations, replacement textures)

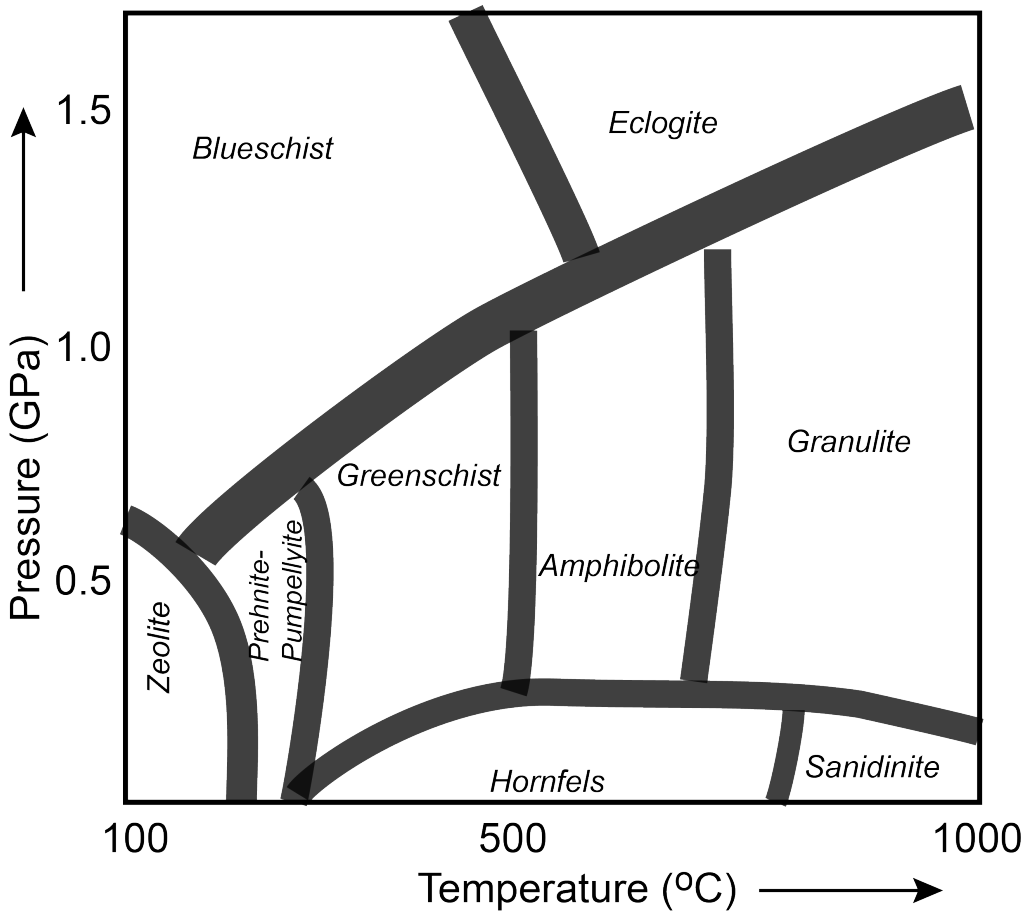
2. Make a full description – both hand sample and thin section – of one of the samples from the lab.

Sample # _____

3. Answer the questions posed below.

A. What evidence is there in the metamorphic rocks for a sequence of mineral occurrences? Is there any evidence for reaction among the minerals? If so, describe.

B. On the diagram below, indicate where each of the three metamorphic rock samples crystallized at the peak of metamorphism. Draw arrows connecting the three metamorphic rocks indicating the sequence of P-T conditions experienced by rocks as they are subducted.



C. Sketch a cross-section of a subduction zone and indicate where each sample might be found.