

# NORTHERN CALIFORNIA GEOLOGICAL SOCIETY



## NCGS FIELD TRIP Saturday July 14, 2012

### “STROLL TO SUBDUCTION: GEOLOGY OF SUNOL REGIONAL WILDERNESS, CALIFORNIA”

**Leader: John Wakabayashi, Professor, California State University, Fresno**

The title of this field trip honors the late Clyde Wahrhaftig, who wrote the marvelous field trip guide “Streetcar to Subduction”; here we will hike instead of take the bus, though. At Sunol Regional Wilderness we will view some fabulous exposures of the rock record of subduction preserved in the notorious Franciscan subduction complex as well as features that testify to the dynamic history of landscape evolution that followed the termination of subduction. These features are part of a rapidly changing understanding of the subduction process and the field relationships we see also have important practical ramifications in engineering geology. The geology we will see consists of Franciscan Complex rocks overlain by Miocene marine sedimentary rocks deposited during the early parts of the transform regime that followed the termination of Franciscan subduction. Multiple generations of landslides and strath terraces cover the bedrock in many places and the distinction between in-place Franciscan bedrock and landslide material poses challenges even to the experienced field geologist. The combination of strath terraces and landslides records a complex history of rock uplift and landscape response. All of the Franciscan bedrock has been subducted to depths sufficient to grow blueschist facies or higher grade metamorphic mineral assemblages. These Franciscan rocks record burial depths of ca. 30 km or more. Block-in-matrix units, or mélangé, comprise most of the Franciscan exposures, and Sunol allows us exceptional views of the matrix in multiple localities. The matrix shows a gradation between unstrained sedimentary breccia (submarine debris flow deposits) to foliated matrix material that many have called typical “tectonic” mélangé matrix. Matrix types include shale (probably most common), serpentinite, sandstone, and locally, mafic volcanic rocks. The gradation between undeformed sedimentary deposits and deformed matrix demonstrates that exotic blocks were introduced into the mélangé by sedimentary processes rather than by extreme tectonic strain. Moreover, the blocks also show evidence of at least one earlier stage of high-pressure metamorphism that predates their sedimentation into the mélangé. Some blocks may record two stages of pre-mélangé high-pressure metamorphism. Given that the matrix itself has been metamorphosed at blueschist facies depths, all blocks record at least two partial subduction to surface exposure cycles. The recognition of the gradation between undeformed breccia and deformed matrix, as well as the recognition of sandstone as a common matrix type also has important implications for engineering characterization of mélanges, given that a block-in-matrix unit can grade from having little block-matrix strength contrast to having the significant block-matrix strength contrast that one expects for an “engineering mélangé”. This point is driven home by one locality where we find that breccia (i.e. “matrix”) rather than a block, makes up one of the largest pinnacles of bedrock in the entire park! Yes, geology becomes ever more complicated for us. But without challenge, where would the fun be?

This field trip will be hiking field trip, and the hike will be moderate – something like 6-7 mi 2000’ (gross, not net) of elevation or so. Participants will need to bring a lot of water and fairly rugged footwear, given that we will be doing some off trail hiking. We need to minimize the number of vehicles. Carpool is a must, we will circulate attendees list.

#### **THIS FIELD TRIP WILL BE LIMITED TO 50 PEOPLE.**

\*\*\*\*\* **Field Trip Logistics** \*\*\*\*\*

**Time & Departure:** July 14, 2012, 8:00 am, Sunol Regional Wilderness, parking lot

**Cost:** \$40/person (guidebook, lunch, refreshments, soft drinks)

\*\*\*\*\***REGISTRATION FORM (Sunol Field Trip)**\*\*\*\*\*

Name: \_\_\_\_\_ E-mail: \_\_\_\_\_  
City Residence: \_\_\_\_\_ Phone: \_\_\_\_\_ Phone (alternate): \_\_\_\_\_  
Lunch: Regular: \_\_\_\_\_ Vegetarian: \_\_\_\_\_ (Please check one) Check Amount: \_\_\_\_\_

Please mail a check made out to “NCGS” to: **Tridib Guha, 5016 Gloucester Lane, Martinez, CA 94553**

Questions: e-mail: [tridibguha@yahoo.com](mailto:tridibguha@yahoo.com) Phone: (925) 370-0685 (evening) (925) 451-1999 (day)