

July 2021



LOS ANGELES BASIN GEOLOGICAL SOCIETY

July 22nd (Thursday) – 12:00 Noon

This will be a virtual (on-line) meeting using ZOOM. See below for instructions.

LOCALIZATION OF SUBDUCTION AND EXHUMATION SLIP: FIELD OBSERVATIONS SHARPLY CONTRADICT NUMERICAL MODEL RESULTS

Dr. John Wakabayashi

Dept. of Earth and Environmental Sci., Cal State U. Fresno

Abstract

Subduction zone slip and associated exhumation has been presumed, on the basis of numerical models, to be accommodated across an active zone of distributed deformation kilometers to tens of kilometers wide, known as the subduction channel, which emplaced exotic blocks of disparate origin and history into a mélangé matrix of sheared siliciclastic shale or serpentinite. In stark contrast to these models, field relationships in the Franciscan Complex of California suggest localization of subduction slip in narrow zones (≤ 300 m thick) at the depths of ~ 10 – 80 km. Accretionary and non-accretionary subduction slip over the ca. 150 Ma of Franciscan history was accommodated across the structural thickness of the complex (maximum of ~ 30 km). During accretion of a specific unit (< 5 Ma),

subduction slip (accretionary subduction slip) deformed the full thickness of the accreting unit (≤ 5 km), primarily on discrete faults of < 20 m in thickness, with the remainder accommodated by penetrative deformation. Some faults accommodating accretionary subduction slip formed anastomosing zones ≤ 200 m thick that resulted in block-in-matrix (tectonic mélangé) relationships but did not emplace exotic blocks.

Mélangé horizons with exotic blocks range in thickness from 0.5 m to 1 km. These apparently formed by sedimentary processes as part of the trench fill prior to subsequent deformation during subduction-accretion. Accretionary subduction slip was localized within some of these mélanges in zones ≤ 300 m thick. Such deformation obscured primary sedimentary textures. Non-accretionary subduction faults separate units accreted at different

times, but these <100-m-thick fault zones capture a small fraction of associated subduction slip because of footwall subduction and likely removal of hanging wall by subduction erosion. Most exhumation was accommodated by discrete faults ≤ 30 m thick. Structural, geochronologic, and plate motion data suggest that of the ~13,000 km of subduction during the ca. 150 Ma assembly of the Franciscan Complex, ~2000 km was associated with accretion.

Speaker's Biography

John Wakabayashi is a San Francisco Bay Area native who moved to Fresno in 2005 to begin his academic career as a faculty member at California State University, Fresno, where he became full professor in 2015. He received his B.A. in Geology in 1980 from UC Berkeley, and his PhD in Geology in 1989 from UC Davis. He is a Professional Geologist (California) and a Fellow of the Geological Society of America.

After graduating from Davis, he worked as an engineering and environmental geologist for 16 years (1989-2005). He worked on a variety of different types of projects, including seismic hazard evaluation/paleoseismology, slope stability, engineering and forensic petrography, naturally occurring asbestos, and two Superfund projects on which his primary specialty was evaluation of ambient concentrations of metals of environmental concern in soils and rock. He was a member of the Working Group on California Earthquake Probabilities.

When not doing project work he conducted independent research, most of which dealt with esoteric research issues such as subduction initiation processes, metamorphic P-T paths and metamorphic contrasts as tectonic indicators, emplacement of ophiolites, subduction interface processes and development of subduction complexes, evolution of orogenic belts, development of strike-slip fault systems, and long time and length scale geomorphology. He incorporated academic research of his own and others into all of his project work, trying to bridge the academic-applied geology gap from the standpoint of a practitioner. After becoming an academic he has continued his efforts to bridge this gap, with realization that the vast majority of geology professors have never been employed in the engineering and environmental geology profession that most geology graduates will work in.

The breadth of his research has broadened rather than narrowed over time. In spite of the wide range of research interests, the geology of that beguiling train wreck of rocks known as the Franciscan Complex of coastal

California remains his chief interest and the many aspects of mélanges have become his main focus since 2009. He has supervised or is supervising a large number of graduate and undergraduate student researchers, and this includes a number of students from outside of Fresno State.

**This will be a virtual meeting
using Zoom.**

When:

**Thursday, July 22nd, 2021
12:00-1:00 pm**

Virtual Meeting Reservations:

**Reservations should be made by:
12:00 Noon Wednesday July 19th.**

**To register please email our LABGS
secretary, Joseph Landeros at
landerosjd@gmail.com**

This is just to get a head count.

**To join the talk, please use the
following Zoom link (paste it into
your web browser):**

<https://csulb.zoom.us/j/89624781998?pwd=bW5WcFh3S2dhYjJxMXhsRmVCK0lsZz09>

**Meeting ID: 896 2478 1998
Passcode: 238651**

**Please download the ZOOM app before
the start of the talk, if you have not
already done so.**

Announcements:

LABGS hopes to return to in-person meetings at The Grand starting in September. There may be one more ZOOM presentation in August. Watch for details.

Do you know if your PSAAPG/LABGS membership is current?

If you don't know, please check via the PSAAPG website:

<http://www.psaapg.info/cloud/miscellaneous/dues.php>

Please inform a LABGS Board member if you have a pertinent announcement or chime in at the end of the Zoom meeting.

LABGS Board Contact Information:

President: Scott Prior

(714) 495-0959

7figmo@gmail.com

VP & Programs: Chris Smart

(559) 908-8981

chrsmart@outlook.com

Treasurer: Francine Cason

(562) 756-0270

fcason5@gmail.com

Secretary: Joseph Landeros

(626) 497-1710

landerosjd@gmail.com

Scholarships: Karla Tucker

(714) 658-0474

ktr2@aol.com

Webmaster: Joseph Landeros

(626) 497-1710

landerosjd@gmail.com