# GeoSymposium 2013

**Sponsored by the following agencies for State of California geologists**

## *Wednesday October 16, 2013*
## *9:30 am to noon*

### The National Geologic Map Database –
### A Resource for Science and Societal Issues

*by David R. Soller, Christopher P. Garrity, Robert C. Wardwell, and Nancy R. Stamm, USGS*

### Caltrans Paleontology Policy

*by Kim Christmann, Caltrans*

### Geomorphic Elements in Modern Continental Sedimentary Basins –
### Implications for Groundwater Basins in California

*by GS Weissmann, University of New Mexico*
*Co-authors: AJ Hartley, and LA Scuderi*

Registration for Fall 2013 Geosymposium:
http://www.trainingforce.com/sites/californiawater/lp/gowater.aspx?ot=9&otid=1945

Please contact either John Naginis (DTSC) or Laurent Meillier (RWQCB) with your questions.

## The National Geologic Map Database - a resource for science and societal issues

David R. Soller, Christopher P. Garrity, Robert C. Wardwell, and Nancy R. Stamm (U.S. Geological Survey)

The USGS and the Association of American State Geologists are mandated by Congress to provide a National Geologic Map Database (NGMDB) of standardized, spatial geoscience information. In this partnership, collaboration occurs with the private sector, universities, and

geological survey agencies in other countries. From the public website (http://ngmdb.usgs.gov) we serve one of our principal user communities – the professional geologists and non-geologists who need to find geologic maps and geoscience reports, and get answers to their questions. Throughout the NGMDB project's 18 years of operation, service to government agencies, the private sector, and the general public has been a principal responsibility.

Online resources provided by, or linked from, the NGMDB include:

1) the Geoscience Map Catalog (containing citations and links to ~94,000 publications, many containing GIS data and map images; http://ngmdb.usgs.gov/ngmdb/ngm_catalog.ora.html);

2) the U.S. Geologic Names Lexicon (GEOLEX; http://ngmdb.usgs.gov/Geolex/geolex.html), a standard reference for the Nation's stratigraphic nomenclature;

3) cartographic, database design, science terminology, and data-exchange standards (for example, a new standard, simple database design referred to as "NCGMP09", and the FGDC geologic map symbol standard and its implementation in ESRI software; http://ngmdb.usgs.gov/Info/standards/); and

4) Proceedings from the sixteen annual Digital Mapping Techniques workshops, which document map-preparation techniques and standards in use or in development by the Nation's geological surveys (http://ngmdb.usgs.gov/Info/dmt/).

Dave Soller began his geology career in oil&gas and in the consulting industries, and has been with USGS for more than 30 years. During that time, he has focused on the study and integration of large, complex sets of information, at both regional and local scales, and methods to effectively convey the interpretive results to geologists and to non-scientific audiences. For the past 18 years, he has managed the National Geologic Map Database project (http://ngmdb.usgs.gov/) -- this collaborative effort between the USGS and the Association of American State Geologists (AASG) has been serving the general public, and professionals, by improving access to more standardized geoscience information.

**Caltrans Paleontology Policy**

Kim Christmann, Senior Engineering Geologist, Caltrans Division of Environmental Analysis

Paleontological resources are addressed by the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) and as a result must be considered during the environmental review process for public projects. Most resources that must be considered under NEPA and CEQA are also covered by broad environmental laws and regulations that dictate procedures for resource evaluation and response. However, there aren't many laws that specifically pertain to paleontological resources and there are no laws or regulations that define a detailed process for evaluation and response. To fill this void, Caltrans has established policy and procedures that include identification, evaluation, avoidance, minimization, mitigation, and reporting.

Kim has been the Caltrans Statewide Paleontology Coordinator for the last 15 years. She also develops policy, guidance, and contract specifications regarding contamination and hazardous materials management. Prior to joining Caltrans, Kim spent 10 years working for DTSC in the Geologic Services Unit. Kim received a bachelor's degree in geology from Rutgers University and did graduate work in paleontology at UC Davis.

**Geomorphic Elements in Modern Continental Sedimentary Basins – Implications for Groundwater Basins in California**

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Modern analogs for continental sedimentary rocks (e.g., alluvial fans, fluvial successions, eolian, and lacustrine deposits) should be developed from an understanding of geomorphology in modern sedimentary basins since these are locations on Earth where subsidence allows for long-term preservation of these deposits. Weissmann et al. (2010) compiled a compendium of 724 modern continental sedimentary basins around the world to evaluate fluvial form common in these basins. They suggested that distributive fluvial systems, or DFS, dominate the depositional area in these sedimentary basins. Several of these basins are found in California. We assessed satellite imagery of several sedimentary basins to quantify the aerial extent and form of different geomorphic elements that are present in the sedimentary basins.

Geomorphic elements identified in the basins include (1) Large DFS (DFS greater than 30 km in length); (2) Smaller DFS (DFS that are less than 30 km in length); (3) Incised valleys cut through the apex of DFS deposits; (4) Abandoned DFS surfaces if the DFS is incised; (5) Bajadas and Pediment surfaces (coalesced DFS that form large fluvial/alluvial plains where it is difficult to distinguish individual DFS from imagery); (6) Interfan tributary systems; (7) Axial tributary fluvial systems; (8) Eolian deposits; and (9) Permanent and ephemeral lake deposits. Wetlands are commonly present on distal portions of DFS and are included as part of the DFS elements.

In the large modern foreland basins of the Andes and the Himalayas, DFS deposits (e.g., elements 1-5) dominate the depositional area of the sedimentary basin. In the Himalayan Foreland, these elements comprise approximately 92% of the basin area while the tributary fluvial successions (e.g., elements 6 and 7) comprise only about 8% of the area. Similarly, the DFS elements form about 98% of the area in the Andean Foreland Basin while the axial fluvial system only comprises approximately 2% of the area. DFS comprise almost all of the depositional area in the Andean Foreland basin located west of the buried forebulge (approximately 250 km from the mountain front). Other sedimentary basins around the world, including those found in California, show similar distributions of fluvial deposits, indicating that DFS dominate depositional areas in modern sedimentary basins.

Several detailed studies have been conducted focusing on both the geomorphology and subsurface geology of modern sedimentary basins in California, thus these may provide significant insights into the form and structure of fluvial deposits in the rock record. Additionally, predicted facies distributions in the sedimentary basins may help us develop improved models of heterogeneity for use in groundwater modeling.