

[← Back to results](#)

Dolby



VIEW

[Abstract](#)[Citations](#)[References](#)[Co-Reads](#)[Similar Papers](#)[Volume Content](#)[Graphics](#)[Metrics](#)[Export Citation](#)

FEEDBACK

NO SOURCES FOUND

Geometric and Spectral Analysis of Relict Channel Planforms in Central Baja California, Mexico: A Novel Approach to Paleo-Sea Level Reconstruction and Testing Hypotheses for Genetic Divergence

[Show affiliations](#)

[Gardner, Kevin](#) ; [Dorsey, Rebecca](#) ; [Usher, Evelyn](#) ; [Bennett, Scott](#) ; [Darin, Michael](#) ; [Hausback, Brian](#) ; [Dolby, Greer](#)

Genetic divergence along the central Baja California Peninsula, Mexico, has been hypothesized to reflect a Pliocene cross-peninsular seaway that previously isolated northern and southern populations of terrestrial plants and animals. One way to test this hypothesis is through quantitative analysis of relict channels preserved on low-relief paleo-surfaces. Recognition of tidal channels on relict landscapes offers a powerful tool for reconstructing past sea level in tectonically active arid coastal regions where crustal uplift results in relative sea-level fall and preservation of ancient channel networks. This method requires reliable criteria to distinguish fluvial versus tidal channels, which is challenging due to the overlap of standard metrics for the two channel types, and possible inheritance or overprinting of geometries. We improve the utility of existing metrics and explore the potential for identifying paleo-sea-level indicators by analyzing modern and ancient channels to identify unique patterns in planform geometry and to evaluate their applicability for classifying tidal versus fluvial origins. Preliminary measurements of geographically diverse modern systems reveal distinct, quantifiable differences between the two channel types in along-channel curvature, width, and wavelet spectra. Modern tidal channels display a pronounced and systematic down-channel increase in channel width and decrease in curvature. In contrast, modern fluvial channels do not display spatial patterns in channel width and curvature along their lengths. These patterns provide diagnostic criteria that can be paired with wavelet analysis of meander belts to classify the paleoenvironment of ancient channels based on their planform geometry. We apply this approach to evaluate the origin of channels preserved on relict landscapes in the San Ignacio trough in the central Baja California peninsula, a former low-relief embayment of the Pacific Ocean. Early results reveal the presence of ancient tidal channel networks at elevations of ~ 50-300 m above modern sea level on surfaces that are independently dated to be ca. 4-5 Ma. These findings provide evidence for post 4-Ma uplift in the mid-peninsular region and an ancient tidal environment that may have isolated northern and southern terrestrial populations.

Publication: AGU Fall Meeting 2021, held in New Orleans, LA, 13-17 December 2021, id. B55L-1345.

Pub Date: December 2021

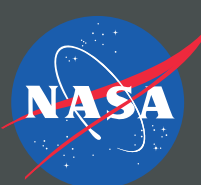
Bibcode: [2021AGUFM.B55L1345G](#)

[Feedback/Corrections?](#)

© The SAO/NASA Astrophysics Data System

[adshelp\[at\]cfa.harvard.edu](mailto:adshelp[at]cfa.harvard.edu)

The ADS is operated by the Smithsonian Astrophysical Observatory under NASA Cooperative Agreement *80NSSC21M0056*



CENTER FOR
ASTROPHYSICS
HARVARD & SMITHSONIAN

Resources

[About ADS](#)[ADS Help](#)[What's New](#)[Careers@ADS](#)[Accessibility](#)

Social

[@adsabs](#)[ADS Blog](#)

Project

[Switch to basic HTML](#)[Privacy Policy](#)[Terms of Use](#)[Smithsonian Astrophysical Observatory](#)[Smithsonian Institution](#)[NASA](#)