

Chronology of the Orogenic Record



PHOTO CAPTIONS

- Top.* Salto del Roldan, southern Pyrenean thrust front, Spain
- Bottom.* Sierra del Busa, Saint Llorenç de Morunys, Pyrenees, Spain



RESEACH DESCREPTION

Using magnetic polarity stratigraphy and cyclostratigraphy to determine high-resolution chronologies of growth strata to inform orogenic processes, Pyrenees Mountains, Spain.

RECENT PUBLICATIONS (* denotes student co-author)

Anastasio, D.J., Kodama, K.P., Parés, J.M., Hinnov, L.A., Idleman, B.D. 2021. Internal and external modulation of folding rates with 10^4 to 10^5 year time resolutions from growth strata, Pico del Aguila, Spain. *Geochemistry, Geophysics, Geosystems*, 22, e2021GC009828. <https://doi.org/10.1029/2021GC009828>

Anastasio, D.J., Teletzke, A.L., Kodama, K.P., Parés, J.M.C., Gunderson*, K.L. 2020. Geologic evolution of the Peña Flexure, Southwestern Pyrenees mountain front, Spain. *Journal of Structural Geology*. <http://doi.org/10.1016/j.jsg.2019.103969>

Gunderson,* K. L., **Anastasio, D. J.**, Pazzaglia, F. J., Kodama, K. P. 2018. Intrinsically variable blind thrust faulting. *Tectonics*, 37 (4) 1454-1471. <https://doi.org/10.1029/2017TC004917>

Active Tectonics in the Northern United States Rocky Mountains



PHOTO CAPTIONS

Top. Boulder Front fault-scarp, Idaho.

Bottom. Faceted spurs along the Red Rock fault, Tendoy Mountains, Montana

RESEARCH DESCRIPTION

Using GPS profiling of mapped surficial deposits, fault-scarp modeling, and geochronology (Radiocarbon, OSL, TCN), surface ruptures are being investigated in the northern Rocky Mountains.

RECENT PUBLICATIONS

Anastasio, D.J., Pazzaglia, F.J., Majerowicz*, C.M., Regalla*, C.A., 2010. Late Pleistocene-Holocene ruptures of the Lima Reservoir fault, SW Montana. *Journal of Structural Geology*, v. 32, p. 1996-2008. <http://doi.org/10.1016/j.jsg.2010.08.012>

ACTIVE FUNDING

Ryan Fund, Earth and Environmental Sciences, Lehigh University

Margaret D. and William F. Hecht Summer Research Fellowship, Lehigh University

Hommin Migration in the Baza Basin, Spain



PHOTO CAPTION

Baza paleolake basin, southern Spain

PROJECT DESCRIPTION

Stratigraphy, sedimentology, cyclostratigraphy, and magnetic polarity stratigraphy are being used to study the causes, patterns, and timing of early migrations to western Europe.

ACTIVE FUNDING

First Europeans: Timing and Causes of Biped Migrations out of Africa through Morocco and Spain. Faculty Innovations Grant, Lehigh University

Tectonic Forcing of Landscape Evolution Betic Cordillera, Spain



PHOTO CAPTION

Photo taken from the International Space Station of the Sierra Nevada massif, Betic Cordillera, Spain

PROJECT DESCRIPTION

Geologic mapping, OSL dating, and geospatial analysis of fluvial systems inform the tectonic forcing of landscapes.

RECENT PUBLICATIONS

Carrigan*, J., **Anastasio, D.**, Berti., C., Pazzaglia, F., in prep. Drainage Reorganization and Incision in an Active Orogen: Fragmentation of a Longitudinal Network into Transverse Drainages, Betic Cordillera. To be submitted to *Tectonics*.

Application of anisotropy of magnetic susceptibility (AMS) fabrics to determine the kinematics of active tectonics, northern Apennines, Italy



PHOTO CAPTION

Application of sediment hardener (*left*) and specimen sampling (*right*) for AMS fabric studies to inform active tectonics in the northern Apennines, Italy

PROJECT DESCRIPTION

Surficial geologic mapping and AMS studies of tectonic fabric development provide clues to ongoing orogenic kinematics in orogenic forearcs.

RECENT PUBLICATION

Anastasio, D.J., Pazzaglia, F.J., Parés, J.M., Kodama, K.P., Berti, C., Fisher*, J., Montanari, A., Carnes*, L.K., 2021 Application of anisotropy of magnetic susceptibility (AMS) fabrics to active tectonics: Examples from the Betic Cordillera, Spain and the northern Apennines, Italy. *Solid Earth*. 12, 1125–1142, <https://doi.org/10.5194/se-12-1125-2021>

ACTIVE FUNDING

Anisotropic Magnetic Susceptibility (AMS) fabric as a paleogeodetic measure of tectonic strain, transient stress, and blind faults in active orogens. Grant proposal in preparation fall 2021 submission to the National Science Foundation. David Anastasio, lead PI.

Learning Outreach in the Lehigh River Watershed, Pennsylvania



PHOTO CAPTION

Top. Shaded relief topography, southern Lehigh River Watershed, PA showing the locations of partners (libraries, environmental study centers, and Lehigh University).

Bottom. iVR use by student and teacher

PROJECT DESCRIPTION

Interactive virtual reality education curricular units of the history, industrial development, environmental consequences, and remediation in the Lehigh River watershed.

RECENT PUBLICATIONS

Bodzin, A., Araujo Junior, R., Schwartz, C., **Anastasio, D.**, Hammond, T., and Birchak, B. (in press). Learning about environmental issues with a desktop virtual reality field trip. *Innovations in Science Teacher Education*.

Bodzin, A., Araujo Junior, R., Hammond, T., and **Anastasio, D.** 2021. Investigating engagement and flow with a placed-based immersive virtual reality game. *Journal of Science Education and Technology*. 30(3), 347-360. [DOI: 10.1007/s10956-020-09870-4](https://doi.org/10.1007/s10956-020-09870-4)

Lehigh Gap Story. <https://youtu.be/scv2vgFsEqk>

ACTIVE FUNDING

Flood adventures with iVR. Grant proposal in preparation fall 2021 submission to the National Science Foundation. Alec Bodzin lead PI.