Stanford



# Mathieu Lapôtre

Associate Professor of Earth and Planetary Sciences and, by courtesy, of Geophysics

Earth & Planetary Sciences

## Bio

### BIO

Prof. Lapôtre leads the Earth & Planetary Surface Processes group. His research focuses on the physics behind sedimentary and geomorphic processes that shape planetary surfaces (including Earth's), and aims to untangle what sedimentary rocks tell us about the past hydrology, climate, and habitability of planets.

### ACADEMIC APPOINTMENTS

- Associate Professor, Earth & Planetary Sciences
- Associate Professor (By courtesy), Geophysics

### ADMINISTRATIVE APPOINTMENTS

- Assistant Professor, Stanford University, (2019-2026)
- John Harvard Distinguished Science Fellow, Harvard University, (2017-2019)
- Mars Science Laboratory Special Expert Consultant, NASA/JPL-Caltech, (2017-2018)
- Mars Science Laboratory Science & Operations Team Collaborator, NASA/JPL-Caltech, (2013-2017)

### HONORS AND AWARDS

- CAREER Award, National Science Foundation (2026-2031)
- Luna B. Leopold Early Career Award, American Geophysical Union (2021)
- Robert P. Sharp Lecturer, American Geophysical Union (2021)
- Scialog Fellow, Heising-Simons Foundation, Research Corporation for Science Advancement (2021)
- Kavli Fellow, U.S. National Academy of Sciences (2020)
- John Harvard Distinguished Science Fellowship, Harvard University (2017-2019)
- NASA Group Achievement Award, MSL Extended Mission-1 Science & Operations Team, NASA (2017)
- John C. Crowell Best PhD Dissertation Award, 2nd place, SEPM Pacific Section (2017)
- Dwornik Award, graduate oral presentation, honorable mention, Planetary Geology Division, Geological Society of America (2016)
- SETI/NASA Astrobiology Institutes Travel Award, SETI/NASA (2016)
- Best overall, best in theme, PEACH award, NASA-NIA RASC-AL Space Design (2016)
- NASA Group Achievement Award, MSL Prime Mission Science & Operations Team, NASA (2015)
- AGU Outstanding Student Paper Award, American Geophysical Union (2014)
- NASA Earth & Space Science Fellowship, NASA (2012-2015)

- Robert P. Sharp Graduate Student Fellowship, California Institute of Technology (2012-2013)

### BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Mars Forward Operational Risk and Contamination Evaluation (MFORCE) Tiger Team, NASA (2026 - 2026)

### PROFESSIONAL EDUCATION

- Ph.D., California Institute of Technology , Geology (2017)
- M.S., California Institute of Technology , Planetary Science (2014)
- M.S. (Ingenieur), Ecole & Observatoire des Sciences de la Terre , Geophysical Engineering (2011)
- M.S., Universite de Strasbourg , Environmental Science & Engineering (2011)
- B.S., Universite de Strasbourg , Geophysics with minor in Astrophysics (2009)

### LINKS

- Earth & Planetary Surface Processes Lab: https://epsp.stanford.edu/

## Teaching

### COURSES

**2026-27**

- Departmental Seminar in Earth & Planetary Sciences: EPS 290 (Spr)
- Earth and Planetary Processes and Mechanics: EPS 217, EPS 3 (Win)
- Geomorphology: The Mechanics of Earth's Landscapes: CEE 112E, CEE 212E, EARTHSYS 112G, EARTHSYS 212G, ESS 137, ESS 237, GEOPHYS 113 (Spr)
- Planetary Surface Processes: Shaping the Landscape of the Solar System: EPS 120, EPS 220, GEOPHYS 119, GEOPHYS 219 (Win)

**2025-26**

- Departmental Seminar in Earth & Planetary Sciences: EPS 290 (Spr)
- Earth and Planetary Processes and Mechanics: EPS 217, EPS 3 (Win)
- Geomorphology: The Mechanics of Earth's Landscapes: CEE 112E, CEE 212E, EARTHSYS 112G, EARTHSYS 212G, EPS 112 (Spr)
- Geomorphology: The Mechanics of Earth's Landscapes: EPS 212 (Spr)
- Geomorphology: The Mechanics of Earth's Landscapes: ESS 137, ESS 237, GEOPHYS 113, GEOPHYS 213 (Spr)

**2024-25**

- Departmental Seminar in Earth & Planetary Sciences: EPS 290 (Spr)
- Earth and Planetary Processes and Mechanics: EPS 217, EPS 3 (Win)
- Planetary Surface Processes: Shaping the Landscape of the Solar System: EPS 120, EPS 220 (Win)

**2023-24**

- Departmental Seminar in Earth & Planetary Sciences: EPS 290 (Spr)
- Earth and Planetary Processes and Mechanics: EPS 217, EPS 3 (Win)
- Rivers: The Arteries of Earth's Continents: EPS 224 (Spr)

### STANFORD ADVISEES

**Doctoral Dissertation Reader (AC)**

Timmy Lui, Adrian Wackett

**Doctoral (Program)**

Claire Blaske, Vittorio Colicci

# Publications

## PUBLICATIONS

- **Windblown dunes are born in sand at the brink of transport.** *Proceedings of the National Academy of Sciences of the United States of America*
  Marvin, M. C., Gleason, A., Narteau, C., Rozier, O., Lapôtre, M. G.
  2026; 123 (49): e2613085123
- **Extraterrestrial Sedimentology** *Reading's Sedimentary Environments: Processes, Facies and Stratigraphy*
  Lapôtre, M. G., Edgar, L., Gupta, S.
  Wiley.2026; 4th Edition: 1269-1337
- **Microtextural analyses of detrital zircon for paleoenvironmental interpretations of metasedimentary rocks** *GEOLOGY*
  Mar, M., Hasson, M., Colicci, V., Abubo, R., Lapotre, M. G. A.
  2025
- **Vegetation changes the trajectory of river bends.** *Science (New York, N.Y.)*
  Hasson, M., Finotello, A., Ielpi, A., Lapôtre, M. G.
  2025: eadv4939
- **Ripples formed in low-pressure wind tunnels suggest Mars's large windblown ripples are not impact ripples.** *Nature communications*
  Alvarez, C. A., Lapôtre, M. G., Swann, C., Ewing, R. C.
  2025; 16 (1): 2945
- **Effect of Boulder-Size Distributions on Thermally Derived Rock Abundances on the Moon** *JOURNAL OF GEOPHYSICAL RESEARCH-PLANETS*
  Amaro, B., Prieur, N., Rubanenko, L., Hayne, P., Lapotre, M.
  2026; 131 (3)
- **Remote Compositional Analyses of Space-weathered Lunar Maria** *PLANETARY SCIENCE JOURNAL*
  Jung, J., Lapotre, M. G. A., Milliken, R. E., Minson, S. E.
  2026; 7 (1)
- **Archean eolian dynamics, deposits, and indicators of other weather phenomena: Lessons from Earth and Mars** *The Archean Earth*
  Lapôtre, M. G., Heubeck, C.
  Elsevier.2026; 2nd Edition: 799-817
- **Aerodynamic roughness of rippled beds under active saltation at Earth-to-Mars atmospheric pressures.** *Nature communications*
  Alvarez, C. A., Lapotre, M. G., Swann, C., Ewing, R. C., Jia, P., Claudin, P.
  2025; 16 (1): 5113
- **From Xanadu Around and Back: A ca. 11,000 km Journey of Windblown Sand Revealed by Global Dune Patterns on Titan** *GEOPHYSICAL RESEARCH LETTERS*
  Marvin, M., Lapotre, M. G. A., Radebaugh, J., Bo, W.
  2025; 52 (5)
- **Automated determination of transport and depositional environments in sand and sandstones.** *Proceedings of the National Academy of Sciences of the United States of America*
  Hasson, M., Marvin, M. C., Lapôtre, M. G.
  2024; 121 (40): e2407655121
- **Direct Measurements of Dust Settling Velocity Under Low-Density Atmospheres Using Time-Resolved Particle Image Velocimetry** *GEOPHYSICAL RESEARCH LETTERS*
  Alvarez, C. A., Gunn, A., Swann, C., Trimble, S. M., Ewing, R. C., Lapotre, M. G. A.
  2024; 51 (15)
- **Complementary classifications of aeolian dunes based on morphology, dynamics, and fluid mechanics** *EARTH-SCIENCE REVIEWS*
  du Pont, S., Rubin, D. M., Narteau, C., Lapotre, M. G. A., Day, M., Claudin, P., Livingstone, I., Telfer, M. W., Radebaugh, J., Gadal, C., Gunn, A., Hesp, P. A., Carpy, et al

2024; 255

- **The Geochemical and Mineralogical Signature of Glaciovolcanism Near þórisjökull, Iceland, and Its Implications for Glaciovolcanism on Mars** *JOURNAL OF GEOPHYSICAL RESEARCH-PLANETS*
  Bedford, C. C., Rampe, E. B., Thorpe, M. T., Ewing, R. C., Mason, K., Horgan, B., Rudolph, A., Lapotre, M. G. A., Sinha, P., Nachon, M., Champion, E., Berger, L., Reid, et al
  2024; 129 (7)
- **Locomotion as manipulation with ReachBot.** *Science robotics*
  Chen, T. G., Newdick, S., Di, J., Bosio, C., Ongole, N., Lapôtre, M., Pavone, M., Cutkosky, M. R.
  2024; 9 (89): eadi9762
- **Vegetation enhances curvature-driven dynamics in meandering rivers.** *Nature communications*
  Finotello, A., Ielpi, A., Lapôtre, M. G., Lazarus, E. D., Ghinassi, M., Carniello, L., Favaro, S., Tognin, D., D'Alpaos, A.
  2024; 15 (1): 1968
- **Martian Exploration of Lava Tubes (MELT) with ReachBot: Scientific Investigation and Concept of Operations**
  Dil, J., Cuevas-Quinones, S., Newdick, S., Chen, T. G., Pavone, M., Lapotre, M. G. A., Cutkosky, M., IEEE
  IEEE.2024: 36-41
- **Grain Size Measurements of the Eolian Stimson Formation, Gale Crater, Mars and Implications for Sand Provenance and Paleoatmospheric Conditions** *JOURNAL OF GEOPHYSICAL RESEARCH-PLANETS*
  Preston, S., Siebach, K., Lapôtre, M., Banham, S.
  2024; 129 (11)
- **Automatic Characterization of Boulders on Planetary Surfaces From High-Resolution Satellite Images** *JOURNAL OF GEOPHYSICAL RESEARCH-PLANETS*
  Prieur, N. C., Amaro, B., Gonzalez, E., Kerner, H., Medvedev, S., Rubanenko, L., Werner, S. C., Xiao, Z., Zastrozhnov, D., Lapotre, M. G. A.
  2023; 128 (11)
- **Glacial Isostatic Adjustment Modulates Lateral Migration Rate and Morphology of the Red River (North Dakota, USA and Manitoba, Canada)** *GEOPHYSICAL RESEARCH LETTERS*
  Kodama, S. T., Pico, T., Finnegan, N. J., Lapotre, M. G. A., Willenbring, J. K.
  2023; 50 (15)
- **A depositional model for meandering rivers without land plants** *SEDIMENTOLOGY*
  Hasson, M., Marvin, M., Gunn, A., Ielpi, A., Lapotre, M. G. A.
  2023
- **Dune interactions record changes in boundary conditions** *GEOLOGY*
  Marvin, M., Lapotre, M. G. A., Gunn, A., Day, M., Soto, A.
  2023
- **Modelling fire-induced perturbations in sediment flux based on stream widening and accelerated bank migration** *CATENA*
  Ielpi, A., Lapotre, M. G. A.
  2023; 228
- **Large sinuous rivers are slowing down in a warming Arctic** *Nature Climate Change*
  Ielpi, A., Lapôtre, M., Finotello, A., Roy-Léveillée , P.
  2023
- **A distinct ripple-formation regime on Mars revealed by the morphometrics of barchan dunes.** *Nature communications*
  Rubanenko, L., Lapotre, M. G., Ewing, R. C., Fenton, L. K., Gunn, A.
  2022; 13 (1): 7156
- **The Role of Seasonal Sediment Transport and Sintering in Shaping Titan's Landscapes: A Hypothesis.** *Geophysical research letters*
  Lapôtre, M. G., Malaska, M. J., Cable, M. L.
  2022; 49 (8): e2021GL097605
- **Ancient Winds, Waves, and Atmosphere in Gale Crater, Mars, Inferred From Sedimentary Structures and Wave Modeling** *JOURNAL OF GEOPHYSICAL RESEARCH-PLANETS*

Rubin, D. M., Lapotre, M. G., Stevens, A. W., Lamb, M. P., Fedo, C. M., Grotzinger, J. P., Gupta, S., Stack, K. M., Vasavada, A. R., Banham, S. G., Bryk, A. B., Caravaca, G., Christian, et al
2022; 127 (4)

- **The impact of vegetation on meandering rivers** *Nature Reviews Earth & Environment*
  Ielpi, A., Lapôtre, M., Gibling, M., Boyce, C.
  2022
- **Mars as a time machine to Precambrian Earth** *Journal of the Geological Society*
  Lapotre, M., Bishop, J., Ielpi, A., Lowe, D., Siebach, K., Sleep, N., Tikoo, S.
  2022
- **Accumulation of windblown sand in impact craters on Mars** *Geology*
  Gunn, A., Rubanenko, L., Lapotre, M.
  2022; 50 (9): 981-985
- **Drainage initiation, expansion, and channel-head arrest in heterogenous bedrock landscapes of the Colorado Plateau** *GSA Bulletin*
  Steelquist, A., Lapôtre, M., Hilley, G.
  2022
- **Linking sediment flux to river migration in arid landscapes through mass balance** *Journal of Sedimentary Geology*
  Ielpi, A., Lapotre, M.
  2022; 92 (8): 695-703
- **An evolving understanding of enigmatic large ripples on Mars** *Journal of Geophysical Research: Planets*
  Lapôtre, M. G., Ewing, R. C., Lamb, M. P.
  2021
- **Martian dunes: A crucial record of present and past Mars surface environment and aeolian processes** *Treatise on Geomorphology*
  Diniega, S., Burr, D. M., Chojnacki, M., Lapôtre, M. G., Swann, C.
  2021
- **Automatic detection and segmentation of barchan dunes on Mars and Earth using a convolutional neural network** *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*
  Rubanenko, L., Pérez-López, S., Schull, J., Lapôtre, M.
  2021
- **Modern Mars' geomorphological activity, driven by wind, frost, and gravity** *Geomorphology*
  Diniega, S., Bramson, A. M., Buratti, B., Buhler, P., Burr, D. M., Chojnacki, M., Conway, S. J., Dundas, C. M., Hansen, C. J., McEwen, A. S., Lapôtre, M. G., Levy, J., Mc Keown, et al
  2021
- **Planform-asymmetry and backwater effects on river-cutoff kinematics and clustering** *EARTH SURFACE PROCESSES AND LANDFORMS*
  Ielpi, A., Lapotre, M. G. A., Finotello, A., Ghinassi, M.
  2020
- **Channel mobility drives a diverse stratigraphic architecture in the dryland Mojave River (California, USA)** *EARTH SURFACE PROCESSES AND LANDFORMS*
  Ielpi, A., Lapotre, M. G. A., Finotello, A., Ghinassi, M., D'Alpaos, A.
  2020
- **The pace of fluvial meanders on Mars and implications for the western delta deposits of Jezero crater** *AGU Advances*
  Lapôtre, M. G., Ielpi, A.
  2020; 1 (2)
- **Probing space to understand Earth** *Nature Reviews Earth & Environment*
  Lapôtre, M. G., O'Rourke, J. G., Schaefer, L. K., Siebach, K. L., Spalding, C., Tikoo, S. M., Wordsworth, R. D.
  2020; 1: 170-181
- **A probabilistic approach to determination of Ceres' average surface composition from Dawn VIR and GRaND data** *Journal of Geophysical Research: Planets*

Kurokawa, H., Ehlmann, B. L., De Sanctis, M. C., Lapôtre , M. G., Usui, T., Stein, N. T., Prettyman, T. H., Raponi, A., Ciarniello, M.
2020

- **A tenfold slowdown in river meander migration driven by plant life** *Nature Geoscience*
  Ielpi, A., Lapotre, M. G.
  2020; 13: 82-86

- **Biotic forcing militates against river meandering in the modern Bonneville Basin of Utah** *SEDIMENTOLOGY*
  Ielpi, A., Lapotre, M. G. A.
  2019; 66 (5): 1896–1929

- **BARREN MEANDERING STREAMS IN THE MODERN TOIYABE BASIN OF NEVADA, USA, AND THEIR RELEVANCE TO THE STUDY OF THE PRE-VEGETATION ROCK RECORD** *JOURNAL OF SEDIMENTARY RESEARCH*
  Ielpi, A., Lapotre, M. G. A.
  2019; 89 (5): 399–415

- **Model for the Formation of Single#Thread Rivers in Barren Landscapes and Implications for Pre#Silurian and Martian Fluvial Deposits** *Journal of Geophysical Research - Earth Surface*
  Lapotre, M. G., Ielpi, A., Lamb, M. P., Williams, R. E., Knoll, A. H.
  2019; 124 (12): 2757-2777

- **Curiosity's Investigation of the Bagnold Dunes, Gale Crater: Overview of the Two-Phase Scientific Campaign and Introduction to the Special Collection** *GEOPHYSICAL RESEARCH LETTERS*
  Lapotre, M. A., Rampe, E. B.
  2018; 45 (19): 10200–10210

- **Morphologic Diversity of Martian Ripples: Implications for Large-Ripple Formation** *GEOPHYSICAL RESEARCH LETTERS*
  Lapotre, M. A., Ewing, R. C., Weitz, C. M., Lewis, K. W., Lamb, M. P., Ehlmann, B. L., Rubin, D. M.
  2018; 45 (19): 10229–39

- **Sand Grain Sizes and Shapes in Eolian Bedforms at Gale Crater, Mars** *GEOPHYSICAL RESEARCH LETTERS*
  Weitz, C. M., Sullivan, R. J., Lapotre, M. G. A., Rowland, S. K., Grant, J. A., Baker, M., Yingst, R.
  2018; 45 (18): 9471–79

- **Sand Mineralogy Within the Bagnold Dunes, Gale Crater, as Observed In Situ and From Orbit** *GEOPHYSICAL RESEARCH LETTERS*
  Rampe, E. B., Lapotre, M. A., Bristow, T. F., Arvidson, R. E., Morris, R. V., Achilles, C. N., Weitz, C., Blake, D. F., Ming, D. W., Morrison, S. M., Vaniman, D. T., Chipera, S. J., Downs, et al
  2018; 45 (18): 9488–97

- **The Bagnold Dunes in Southern Summer: Active Sediment Transport on Mars Observed by the Curiosity Rover** *GEOPHYSICAL RESEARCH LETTERS*
  Baker, M. M., Lapotre, M. G. A., Minitti, M. E., Newman, C. E., Sullivan, R., Weitz, C. M., Rubin, D. M., Vasavada, A. R., Bridges, N. T., Lewis, K. W.
  2018; 45 (17): 8853–63

- **Ancient Martian aeolian processes and palaeomorphology reconstructed from the Stimson formation on the lower slope of Aeolis Mons, Gale crater, Mars** *SEDIMENTOLOGY*
  Banham, S. G., Gupta, S., Rubin, D. M., Watkins, J. A., Sumner, D. Y., Edgett, K. S., Grotzinger, J. P., Lewis, K. W., Edgar, L. A., Stack-Morgan, K. M., Barnes, R., Bell, J. F., Day, et al
  2018; 65 (4): 993–1042

- **Substrate controls on valley formation by groundwater on Earth and Mars** *GEOLOGY*
  Lapotre, M. G. A., Lamb, M. P.
  2018; 46 (6): 531–34

- **Coarse Sediment Transport in the Modern Martian Environment** *JOURNAL OF GEOPHYSICAL RESEARCH-PLANETS*
  Baker, M. M., Newman, C. E., Lapotre, M. A., Sullivan, R., Bridges, N. T., Lewis, K. W.
  2018; 123 (6): 1380–94

- **Compositional variations in sands of the Bagnold Dunes, Gale crater, Mars, from visible-shortwave infrared spectroscopy and comparison with ground truth from the Curiosity rover** *JOURNAL OF GEOPHYSICAL RESEARCH-PLANETS*
  Lapotre, M. A., Ehlmann, B. L., Minson, S. E., Arvidson, R. E., Ayoub, F., Fraeman, A. A., Ewing, R. C., Bridges, N. T.

2017; 122 (12): 2489–2509

- **Sedimentary processes of the Bagnold Dunes: Implications for the eolian rock record of Mars** *JOURNAL OF GEOPHYSICAL RESEARCH-PLANETS*
  Ewing, R. C., Lapotre, M. A., Lewis, K. W., Day, M., Stein, N., Rubin, D. M., Sullivan, R., Banham, S., Lamb, M. P., Bridges, N. T., Gupta, S., Fischer, W. W.
  2017; 122 (12): 2544–73

- **Chemistry, mineralogy, and grain properties at Namib and High dunes, Bagnold dune field, Gale crater, Mars: A synthesis of Curiosity rover observations** *JOURNAL OF GEOPHYSICAL RESEARCH-PLANETS*
  Ehlmann, B. L., Edgett, K. S., Sutter, B., Achilles, C. N., Litvak, M. L., Lapotre, M. A., Sullivan, R., Fraeman, A. A., Arvidson, R. E., Blake, D. F., Bridges, N. T., Conrad, P. G., Cousin, et al
  2017; 122 (12): 2510–43

- **Martian aeolian activity at the Bagnold Dunes, Gale Crater: The view from the surface and orbit** *JOURNAL OF GEOPHYSICAL RESEARCH-PLANETS*
  Bridges, N. T., Sullivan, R., Newman, C. E., Navarro, S., van Beek, J., Ewing, R. C., Ayoub, F., Silvestro, S., Gasnault, O., Le Mouelic, S., Lapotre, M. A., Rapin, W.
  2017; 122 (10): 2077–2110

- **Advanced concept for a crewed mission to the martian moons** *ACTA ASTRONAUTICA*
  Conte, D., Di Carlo, M., Budzyn, D., Burgoyne, H., Fries, D., Grulich, M., Heizmann, S., Jethani, H., Lapotre, M., Roos, T., Castillo, E., Schermann, M., Vieceli, et al
  2017; 139: 545–63

- **A probabilistic approach to remote compositional analysis of planetary surfaces** *JOURNAL OF GEOPHYSICAL RESEARCH-PLANETS*
  Lapotre, M. A., Ehlmann, B. L., Minson, S. E.
  2017; 122 (5): 983–1009

- **What sets the size of current ripples?** *GEOLOGY*
  Lapotre, M. G. A., Lamb, M. P., McElroy, B.
  2017; 45 (3): 243–46

- **Regularization of Mars Reconnaissance Orbiter CRISM along-track oversampled hyperspectral imaging observations of Mars** *ICARUS*
  Kreisch, C. D., O'Sullivan, J. A., Arvidson, R. E., Politte, D. V., He, L., Stein, N. T., Finkel, J., Guinness, E. A., Wolff, M. J., Lapotre, M. A.
  2017; 282: 136–51

- **Canyon formation constraints on the discharge of catastrophic outburst floods of Earth and Mars** *JOURNAL OF GEOPHYSICAL RESEARCH-PLANETS*
  Lapotre, M. G. A., Lamb, M. P., Williams, R. M. E.
  2016; 121 (7): 1232–63

- **Large wind ripples on Mars: A record of atmospheric evolution** *SCIENCE*
  Lapotre, M. A., Ewing, R. C., Lamb, M. P., Fischer, W. W., Grotzinger, J. P., Rubin, D. M., Lewis, K. W., Ballard, M. J., Day, M., Gupta, S., Banham, S. G., Bridges, N. T., Des Marais, et al
  2016; 353 (6294): 55–58

- **Hydraulics of floods upstream of horseshoe canyons and waterfalls** *JOURNAL OF GEOPHYSICAL RESEARCH-EARTH SURFACE*
  Lapotre, M. G. A., Lamb, M. P.
  2015; 120 (7): 1227–50

- **Mars Reconnaissance Orbiter and Opportunity observations of the Burns formation: Crater hopping at Meridiani Planum** *JOURNAL OF GEOPHYSICAL RESEARCH-PLANETS*
  Arvidson, R. E., Bell, J. F., Catalano, J. G., Clark, B. C., Fox, V. K., Gellert, R., Grotzinger, J. P., Guinness, E. A., Herkenhoff, K. E., Knoll, A. H., Lapotre, M. A., McLennan, S. M., Ming, et al
  2015; 120 (3): 429–51

- **The root of branching river networks** *NATURE*
  Perron, J., Richardson, P. W., Ferrier, K. L., Lapotre, M.
  2012; 492 (7427): 100-+