Michael Sachs

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I am a data scientist, physicist and visual designer who is interested in the stories data can tell. I have managed teams, been part of technology start-ups, and consulted with companies both large and small. My work has been published in scientific journals, covered by the popular science press, and I have given talks at scientific conferences in Hawaii, Singapore, San Francisco, Santa Fe and New York. I studied physics at Columbia University and the University of California, Davis, and visual design at Virginia Commonwealth University. I am a NASA Earth and Space Science fellow and a Santa Fe Institute Complex Systems Summer School alumni, and currently the Data Science Lead at Radius Intelligence in San Francisco.

Technologies

Languages

python, C, C++, HTML, CSS, JavaScript, Java, php, SQL, CQL, bash shell scripting, Objective C, IDL, Mathematica, MatLab, lisp, ActionScript

Applications, Modules and Libraries

Spark, Databricks, MySQL, Numpy, scikit-learn, scipy, celery, SQLAlchemy, Cassandra, Redshift, D3.js, boto, EC2, Flask, HDF5, Django, Matplotlib, JQuery, PIL, Ajax, Hadoop, WordPress, MPI, Mathematica, HEALPix, GeoFEST, LaGriT, Polspice,

Operating Systems

Mac OS X, Linux, Windows

Professional Experience

Radius Intelligence

Data Science Lead — March 2017 to Present

- Building a team of data scientists engaged in expanding and exploring The Network of Record: the most accurate, comprehensive and up-to-date B2B data. Our goal: to find novel ways to deliver real value to our customers.

Discovery Digital Networks

Director of Data Science and Technology — February 2016 to March 2017

- Created a robust data science platform to support data collection, distribution and analysis across multiple Discovery Communications brands including: The Discovery Channel, Animal Planet and The Science Channel. At its peak this platform was ingesting and analyzing over 500 million rows of data per day.
- Working with stakeholders at Discovery corporate, advised a company wide data working group tasked with creating a corporate data strategy.
- Analyzed the performance impact of new products on Facebook and YouTube.
- Led the competitive analysis of potential corporate acquisitions.
- Created flexible data dashboards which delivered performance data on hundreds of distribution sources including YouTube channels, Facebook pages, owned and operated web sites, and Freewheel ad services.
- Developed a time-series forecasting algorithm based on the notion of a directed random walk, and deployed the results of this algorithm to corporate dashboards.

Discovery Digital Networks

Director of Technology and Data — September 2014 to February 2016

- Led a group of software architects, web engineers, and apps engineers in implementing and maintaining a suite of online properties with a total of approximately 2 million unique users per month and a data collection, reporting and analytics infrastructure storing information about tens of thousands of video assets across dozens of distribution platforms.
- Directed the design, implementation, and deployment of a modern RESTful web architecture, using Lumen, React and Node.js, which replaced an 8 year old legacy PHP framework. The

finished architecture more than halved the page delivery and rendering time, and resulted in vastly improved stability and development time.
- Led the migration of all of Discovery Digital Networks web and data infrastructure to Amazon Web Services.
- Led the successful development and deployment of seekernetwork.com, an online video network featuring original content focused on travel and adventure.

Discovery Digital Networks

Data Scientist — April 2014 to September 2014

- Developed enterprise level software designed to collect and process video usage data across multiple distribution channels. This software reliably collects daily data from over two gigabytes of log files and over 30,000 api calls and consolidates it into a single data warehouse.
- Created a forecasting algorithm to predict the 30 day performance of new videos, and processes to produce daily forecasts for all videos under 30 days old. After 15 days, 95% of the predictions made by the algorithm were within 10% of the actuals.
- Using machine learning categorization algorithms, developed a tool that uses past video performance to help producers create better video titles. The tool automatically selects the best algorithm and external parameters, and creates new models daily. The best case model guessed the correct answer around 80% of the time, while the worst case was still better than chance at around 56%.
- Created a process which continuously polls the YouTube and Facebook APIs to collect high-frequency view data for all published videos under 30 days old. The resulting data is stored in a Cassandra database and allows producers and audience development to react quickly to ensure videos success.
- Developed RESTful API endpoints using Python and Flask to deliver all analytics data to end users and applications.

Department of Physics, University of California, Davis

Researcher — April 2008 to April 2014

- Working under Professors John Rundle and Donald Turcotte, developed, extended and analyzed Virtual California, a computer simulation of the earthquake fault systems in California and analyzed the results of the Regional Earthquake Likelihood Models earthquake forecasting results.
- Working under Professor Steve Carlip, developed a method of testing various properties of 2+1-dimensional spacetimes which emerge from causal dynamical triangulations, a lattice approach to approximating the gravitational path integral.
- Working under Professor David Wittman, analyzed weak gravitational lensing observations using wavelet techniques.

Department of Astronomy and Astrophysics, Columbia University

Research Assistant — May 2006 to September 2006

- Modeled the effects of dust contamination on Wolter type x-ray optics.
- Presented preliminary results at Columbia University's "Astrofest" in September 2006.

Mikesachs.com

Founder/Principal — January 2005 to September 2007

- Created compelling web experiences for a diverse set of organizations.
- Successful completion of five major projects for a variety of organizations including the New York Ad Club and Fountain House.
- Enabled small organizations to take control of their web presence.
- Collaborated with designers and subcontractors to deliver on client requirements.

Weill Cornell Medical College/NewYork-Presbyterian Hospital

Web Project Manager/Senior Web Designer — June 2002 to January 2005

- Led the successful completion of over 30 websites for both Weill Cornell Medical College and NewYork-Presbyterian Hospital.
- Led the development of institutionalized IT project management within Weill Cornell Medical College.
- Improved the web development process by integrating project management, source control and reusable design components.

- Collaborated with NewYork-Presbyterian Hospital marketing and Weill Cornell Medical College directors to solve business problems on the web.
- Supported Weill Cornell Medical College Geriatric Division in completing grant audits.

Xperts Inc.

Creative Director/Lead Designer March 1997 to June 2002

- Designed and implemented user interface strategies for over 30 companies in market sectors ranging from healthcare and education to broadband and packaged consumer goods.
- Led an award-winning team of designers and user interface engineers through mentoring, selective hiring, and the development of management systems.
- Guided the development of Xperts software design methodology in collaboration with other company executives.
- Facilitated the acquisition of new business by developing sales strategies, project estimates and bid presentations.
- Directed the organizational wide acceptance of new user interface and design technologies.

Letterbrain.com

Co-founder May 1999 to October 2000

- Partner and co-creator of an Internet-based business conceived to leverage web technologies in easing the process of traditional paper-based correspondence.
- Designed and developed an innovative WYSIWYG letter writing web interface using Flash 4 and Generator 2.
- Created the visual identity for the Letterbrain.com brand.

Education

University of California, Davis

Completed physics PhD, 2013

- Adviser: Professor John B. Rundle
- Area of Study: Computational physics and complex systems
- Previous Adviser: Professor Steve Carlip
- Previous Area of Study: Quantum gravity
- Course work completed with a 3.87 GPA

Columbia University

Completed undergraduate physics curriculum, 2007

- 3.99 GPA

Virginia Commonwealth University

Bachelor of Fine Arts, Graphic Design, School of the Arts, 1995

- Tied for #1 public university school of arts and design in the country (#4 among public & private institutions) by U.S. News & World Report (2015).
- 3.24 GPA

Publications

Parametrizing Physics-Based Earthquake Simulations
K. W. Schultz, M. R. Yoder, J. M. Wilson, E. M. Heien, **M. K. Sachs** , J. B. Rundle, and D. L. Turcotte
Pure and Applied Geophysics (2016)

Virtual Quake: Statistics, Co-Seismic Deformations and Gravity Changes for Driven Earthquake Fault Systems
K. W. Schultz, **M. K. Sachs** , E. M. Heien, M. R. Yoder, J. B. Rundle, D. L. Turcotte, and A. Donnellan
International Symposium on Geodesy for Earthquake and Natural Hazards (GENAH) 145 29-37 (2015)

Simulating Gravity Changes in Topologically Realistic Driven Earthquake Fault Systems: First Results
K. W. Schultz, **M. K. Sachs** , E. M. Heien, J. B. Rundle, D. L. Turcotte, and A. Donnellan
Pure and Applied Geophysics In press (2014)

Self-Organizing Complex Earthquakes: Scaling in Data, Models, and Forecasting
M. K. Sachs , J. B. Rundle, J. R. Holliday, J. Gran, M. Yoder and W. Graves
"Self-Organized Criticality Systems" Open Academic Press (2013)

A Comparison among Observations and Earthquake Simulator Results for the allcal2 California Fault Model
T. E. Tullis, K. Richards-Dinger, M. Barall, J. H. Dieterich, E. H. Field, E. M. Heien, L. H. Kellogg, F. Pollitz, J. B. Rundle, **M. K. Sachs** , D. L. Turcotte, S. N. Ward and M. B. Yikilmaz
Seismological Research Letters 83 994-1006 (2012)

Generic Earthquake Simulator
T. E. Tullis, K. Richards-Dinger, M. Barall, J. H. Dieterich, E. H. Field, E. M. Heien, L. H. Kellogg, F. Pollitz, J. B. Rundle, **M. K. Sachs** , D. L. Turcotte, S. N. Ward and M. B. Yikilmaz
Seismological Research Letters 83 959-963 (2012)

Virtual California Earthquake Simulator
M. K. Sachs , E. M. Heien, D. L. Turcotte, M. B. Yikilmaz, J. B. Rundle and L. H. Kellogg
Seismological Research Letters 83 973-978 (2012)

Forecasting Earthquakes: The RELM Test
M. K. Sachs , D. L. Turcotte, J. R. Holliday and J. B. Rundle
Computing in Science and Engineering 14 43 (2012)

Understanding Long-Term Earthquake Behavior through Simulation
E. M. Heien and **M. K. Sachs**
Computing in Science and Engineering 14 10 (2012)

Black swans, power laws, and dragon-kings: Earthquakes, volcanic eruptions, landslides, wildfires, floods, and SOC models
M. K. Sachs , M. R. Yoder, D. L. Turcotte, J. B. Rundle and B. D. Malamud
European Physical Journal Special Topics 205 167-182 (2012)

Implications of the RELM test of earthquake forecasts in California
M. K. Sachs , Y. T. Lee, D. L. Turcotte, J. R. Holliday and J. B. Rundle
Research in Geophysics 2 e10 (2012)

Evaluating the RELM test results
M. K. Sachs , Y. T. Lee, D. L. Turcotte, J. R. Holliday and J. B. Rundle
International Journal of Geophysics 2012 (2012)

Earthquake precursors: activation or quiescence?
J. B. Rundle, J. R. Holliday, M. Yoder, **M. K. Sachs** , A. Donnellan, D. L. Turcotte, K. F. Tiampo, W. Klein and L. H. Kellogg
Geophysical Journal International 187 225-236 (2011)

Results of the Regional Earthquake Likelihood Models (RELM) test of earthquake forecasts in California
Y. T. Lee, D. L. Turcotte, J. R. Holliday, **M. K. Sachs** , J. B. Rundle, C. C. Chen and K. F. Tiampo
Proceedings of the National Academy of Sciences (USA) 108 16533-16538 (2011)

Testing Lattice Quantum Gravity in 2+1 Dimensions
M. K. Sachs
arXiv:1110.6880 [gr-qc] (2011)

Awards and Recognition

- Three time Discovery D-Lighter award winner

- 2014 and 2015 Discovery Digital Networks Hackathon winner
- 2011 NASA Earth and Space Science Fellowship
- 2011 Santa Fe Institute Complex Systems Summer School
- Member of the Golden Key International Honor Society
- Interactive Best in Show, Richmond Ad Show 2004: AdCenter Website
- 10 eHealthcare Leadership Awards including 2 Platinum Awards for work done on the Weill Cornell Medical College Environmental Geriatrics Continuing Medical Education Application 2002-2005
- Artwork exhibited in the 2002 Paperveins Museum of Art Biennial at the Here Arts Center in New York City
- Xperts Employee of the Month May 1999, June 2001, August 2001
- Addy Award: Xperts Self Promotional Website 2000
- Xperts Outstanding Engineering Sales Support December 1999
- Xperts Excellence in Engineering Award August 1999
- 9 Xperts customer service awards 1997-2002

Conferences

AGU 2013

Earthquake Simulations and Historical Patterns of Events: Forecasting the Next Great Earthquake in California
***M. K. Sachs** , J. B. Rundle, E. M. Heien, K. Schultz, D. L. Turcotte, M. B. Yikilmaz, and L. H. Kellogg2013
Abstract NG41A-1662 (Poster) presented at 2013 Fall Meeting AGU San Francisco, Calif. 7-13 Dec.

Monitoring Earthquake Fault Slip from Space: Model Implications for a High Precision, High Resolution Dedicated Gravity Mission (Invited)
J. B. Rundle, ***M. K. Sachs** , K. F. Tiampo, J. Fernandez, D. L. Turcotte, A. Donnellan, E. M. Heien and L. H. Kellogg2013
Abstract G13C-08 presented at 2013 Fall Meeting AGU San Francisco, Calif. 7-13 Dec.

AGU 2012

Virtual California: studying earthquakes through simulation
***M. K. Sachs** , E. M. Heien, D. L. Turcotte, M. B. Yikilmaz, J. B. Rundle and L. H. Kellogg2012
Abstract NG43C-02 presented at 2012 Fall Meeting AGU San Francisco, Calif. 3-7 Dec.

Dynamics, Patterns, and Migration in Earthquake Fault Systems (Invited)
*J. B. Rundle, **M. K. Sachs** , J. R. Holliday, E. M. Heien, D. L. Turcotte, A. Donnellan and Z. Meadows2012
Abstract S13A-2518 (Poster) presented at 2012 Fall Meeting AGU San Francisco, Calif. 3-7 Dec.

EcoSummit 2012

Using Insights from Statistical Physics to Model Common Pool Resource Management
***M. K. Sachs** , N. Kunz, Z. A. Hamstead, A. Fajardo2012
Abstract GS07.28 presented at 2012 Meeting EcoSummit Columbus, Ohio 30 Sept. - 5 Oct.

AOGS 2012

Delivery of Earthquake Forecasts on Web-Based Platforms: Estimating Reliability and Forecast Skill
J. B. Rundle, J. R. Holliday, ***M. K. Sachs** , W. Graves, P. B. Rundle, S. N. Ward and A. Donnellan2012
Abstract SE61-75-A001 presented at 2012 Meeting AOGS Singapore 13-17 Aug.

Numerical Simulations for Space-time Seismic Pattern Analysis and Earthquake Forecasting
***M. K. Sachs** , E. M. Heien, D. L. Turcotte, M. B. Yikilmaz, J. B. Rundle and L. H. Kellogg2012
Abstract SE61-75-A002 presented at 2012 Meeting AOGS Singapore 13-17 Aug.

AGU 2011

RELM Test Results: How Good Were the Forecasts?
***M. K. Sachs** , Y. T. Lee, D. L. Turcotte, J. R. Holliday and J. B. Rundle2011
Abstract NG44B-02 presented at 2011 Fall Meeting AGU San Francisco, Calif. 5-9 Dec.

Using Speculative Execution to Reduce Communication in a Parallel Large Scale Earthquake Simulation
E. M. Heien, M. B. Yikilmaz, **M. K. Sachs** , J. B. Rundle, D. L. Turcotte and L. H. Kellogg2011
Abstract NG51D-1672 (Poster) presented at 2011 Fall Meeting AGU San Francisco, Calif. 5-9 Dec.

E-DECIDER: Earthquake Disaster Decision Support and Response Tools - Development and Experiences
M. T. Glasscoe, R. G. Blom, G. W. Bawden, G. Fox, M. Pierce, J. B. Rundle, J. Wang, Y. Ma, M. R. Yoder, **M. K. Sachs** and J. W. Parker2011
Abstract IN11A-1269 (Poster) presented at 2011 Fall Meeting AGU San Francisco, Calif. 5-9 Dec.

SCEC Earthquake Simulator Comparison Results for California (Invited)
*T. E. Tullis, K. Richards-Dinger, M. Barall, J. H. Dieterich, E. H. Field, E. M. Heien, L. H. Kellogg, F. Pollitz, J. B. Rundle, **M. K. Sachs** , D. L. Turcotte, S. N. Ward and O. Zielke2011
Abstract NG44B-01 presented at 2011 Fall Meeting AGU San Francisco, Calif. 5-9 Dec.

SCEC 2011

An Evaluation of the RELM Test Forecasts
M. K. Sachs , Y. T. Lee, D. L. Turcotte, J. R. Holliday and J. B. Rundle2011
Abstract B-120 (Poster) presented at 2011 Annual Meeting SCEC Palm Springs, Calif. 11-14 Sep.

Parallelization of the Virtual California Earthquake Simulator
E. M. Heien, M. B. Yikilmaz, **M. K. Sachs** , J. B. Rundle, L. H. Kellogg, and D. L. Turcotte2011
Abstract B-087 (Poster) presented at 2011 Annual Meeting SCEC Palm Springs, Calif. 11-14 Sep.

The Future of Virtual California Simulations
M. B. Yikilmaz, J. B. Rundle, D. L. Turcotte, E. M. Heien, **M. K. Sachs** , and L. H. Kellogg2011
Abstract B-110 (Poster) presented at 2011 Annual Meeting SCEC Palm Springs, Calif. 11-14 Sep.

Comparisons Among Earthquake Simulator Results for UCERF2 Fault Model of California and Observed Seismicity
T. E. Tullis, K. Richards-Dinger, M. Barall, J. H. Dieterich, E. H. Field, E. Heien, L. H. Kellogg, F. Pollitz, J. B. Rundle, **M. K. Sachs** , D. L. Turcotte, S. N. Ward, M. B. Yikilmaz, and O. Zielke2011
Abstract B-109 (Poster) presented at 2011 Annual Meeting SCEC Palm Springs, Calif. 11-14 Sep.

ACES 2011

Virtual California: Inner Workings, Recent Results and Future Development
***M. K. Sachs** , J. B. Rundle, D. L. Turcotte, A. Donnellan and J. W. Parker2011
Abstract 7400 presented at 2011 Meeting ACES Maui, Hawaii 1-5 May

Virtual California: A Guided Tour
M. K. Sachs , E. M. Heien, J. B. Rundle, D. L. Turcotte, M. B. Yikilmaz, L. H. Kellogg, K. F. Tiampo, A. Donnellan, W. Klein and J. W. Parker2011
Presented at 2011 Meeting ACES Maui, Hawaii 1-5 May

Teaching Experience

Department of Physics, University of California, Davis

Associate Instructor — January 2010 to July 2010

- Developed ten weeks of lectures for introductory undergraduate physics.
- Led weekly lectures to 250+ students.
- Created quizzes and exams.
- Organized small groups graduate teaching assistants to assist in grading and interacting with students.

Teaching Assistant — September 2007 to September 2010

- Led discussion lab of more than 30 students.

Press

scientificamerican.com

Test Pits Earthquake Forecasts against Each Other :
http://www.scientificamerican.com/article.cfm?id=test-pits-earthquake-forecasts

msnbc.com

Flagging quake hotspots an inexact science :
http://www.msnbc.msn.com/id/44676488/ns/technology_and_science-science/#.TrB2c2B8tjB

UCDavis News

Assessing California earthquake forecasts :
http://www.news.ucdavis.edu/search/news_detail.lasso?id=10025

NASA

Managing the Deluge of 'Big Data' From Space :
http://www.jpl.nasa.gov/news/news.php?release=2013-299
QuakeSim and NASA Mobile App Win NASA Software Award :
http://www.nasa.gov/topics/earth/features/quakesim20120920.html