WHAT CAN MO TALK ABOUT DURING HIS DISTINGUISHED LECTURER TRAVELING CIRCUS TOUR FOR THE IAMG?

Suggestions for the 2027 IAMG talks from a life spent in the backwaters and open plains of mathematical geosciences

Back before she became a charming adult, my oldest daughter once said to me, during a heated father-daughter argument, "Dad, do you know what your problem is?"

"No, please enlighten me. What is my problem?"

"You talk too much!"

And here we are, 15 years later and I've been asked to be the IAMG's Distinguished Lecturer for 2027, a great honour, a great opportunity … but also a chance for others to learn what my daughter knew as a teenager: sometimes you just can't get Mo to stop talking.

I'm happy to talk anywhere in the world, but we have to coordinate a sensible itinerary for the year. The IAMG is willing to cover the costs of international travel, and they expect that the local hosts of the talks will cover the cost of local accommodation and travel. The rest is free: there are no fees, no per-talk reward … except for the huge reward (to me) of being able to meet old friends and colleagues and also to meet some of the new people who have taken an interest in mathematical geosciences.

To kick-start the process of coordinating a sensible itinerary, I have put together the following notes on what topics I am happy to speak on. Some of these are mathematical in nature, some are geoscience-y; and some are neither, just strange things I've worked on during my career, using my knowledge of spatial statistics in unexpected areas of application.

If you see something that you think would make for an entertaining and informative talk, and you know others who would happily come along to listen, you can start the discussion about organizing a talk in 2027 by sending me a message via LinkedIn (https://www.linkedin.com/in/srivastava-rd3d or search LinkedIn for "Mo Srivastava geostatistician"). Or you can send an e-mail to MoSrivastava1@gmail.com. If you know others in the same broad region who might also want to arrange a talk, please feel free to coordinate your request. I will probably be doing several talks on the same trip, traveling to nearby cities or neighbouring countries to give other talks before returning home to Toronto. Even if you don't know any other mathematical geoscientists in the same region, I will let you know if I've had any other requests for talks that might be coordinated with the one you want to arrange.

Resource estimation

This is definitely my long and strong suit. I can talk on almost any aspect of building spatial models for mining, petroleum or environmental projects, even non-geostatistical topics like geology models, grade capping and Stiles' continuity curves. I have often put together 45 to 60-minute presentations that are customized to the specific interests of audiences that are looking for new ideas on tired old topics (e.g. grade capping, resource classification,

targeted drilling to improve classification, directly creating spatial realizations for specific percentiles of an uncertainty distribution). Even though these kinds of talks could be considered as "professional development" for people involved in resource estimation, I don't think of them as entertaining. If people are getting together for a brown-bag lunch talk, they often don't want to feel like they're sitting in a university lecture; instead, as they eat their sandwich and carrot sticks, they'd prefer to be listening to a talk that's technical in nature but that's also unusual and entertaining.

I've also given talks to exploration geologists on what resource estimators end up doing with the field data that they collect, a presentation in which we get to discuss what's important, i.e. what the field geos can do to collect and collate data that will form the basis for a mineral resource estimation study.

Although this has been my stock-in-trade for decades, I don't think it's the kind of talk that appeals to a broad geoscience audience. The following suggestions, versions of which I've given before, vary from thought-provoking to entertaining, and are probably more interesting to an audience that does not specialize in resource estimation.

Breaking the lottery

This is a story that keeps on giving, largely because the lottery industry keeps its head firmly stuck in the sand on the fact that state-run lotteries can (and have) been plundered. In addition to telling the story of how I broke an instant-scratch game, there's always new stuff to tell … like my 2024 discussions with a young guy who had broken another lottery game, and was interested in hiring me to help him improve his method. I have given versions of this talk to completely non-technical audiences.

https://www.wired.com/2011/01/cracking-the-scratch-lottery-code/

Forged World War II documents

This is also a story that many find entertaining and informative: they learn a bit of history that they didn't know about. In the process of writing up the technical analysis for the peer-reviewed journal *Intelligence and National Security*, I had the joy of discussing various aspects of the work with actual James Bond spy-types and spooks, like the Head Librarian of the CIA. I think the thing that makes this story interesting (at least to me) is that "old-fashioned" methods were able to reach a conclusion about authenticity when modern physical and chemical tests used by the FBI lab in Quantico failed.

https://doi.org/10.1080/02684520903069520

Geographic profiling of serial criminals

This talk explains the science of "geographic profiling", a semi-quantitative methodology that has been used (sometimes successfully) to identify the likely location where the perpetrator of a series of crimes might reside (at least to within a few blocks). For me, the fun in this

piece of work was hanging out with a cop whose day job consists of kicking in doors and shouting “Clear!” … something which, sadly, we don’t get to do often enough in resource estimation. This talk can include or exclude the geostatistics piece. If the audience knows the basics of geostatistics … kriging and variograms … then they might be interested in seeing how these can be incorporated into the geographic profiling methodology. If they don’t, I usually leave out this techno-detail. This talk also provides a great example of why you need to check underlying assumptions that may seem obviously correct but that turn out not to be … and that render the results pretty much useless.

https://greenandwhite.usask.ca/articles/2025/the-impact-of-rossmos-formula.php

Censuses of animal populations

Estimating the size of animal populations, which is necessary to conservation and preservation efforts, is a task that can make use of spatial statistics tools. But there are a few fundamental data problems that make it different from conventional resource estimation: the “data” move around, and there is almost always a strong bias in the field data because it is easier to count the young, the old and the weak than it is to count the strong and healthy members of the population. The task of accurately estimating an animal population depends on soft and indirect data that can be correlated with the primary variable of interest: the number of animals in a specific area. I think that this talk often succeeds because a lot of people like National Geographic and David Attenborough TV shows which remind us that we share this planet with other creatures.

https://news.wildlifesos.org/beyond-numbers-conducting-wildlife-census/

Climate change … can we at least get our numbers right?

This is a talk I’ve given at a couple of conferences, both to Greta groupies and to climate-change deniers. The point I’ve made to both groups is that for something as important as the Fate of Our Planet, surely we can try to avoid silly science. Both sides of this debate are guilty of using wonky statistics to support wonky arguments. The talk usually begins with a plea to give this debate the serious attention it deserves and then moves into technical issues like why correlation does not prove causation, and why lack of correlation does not prove lack of causation. It’s not as light-hearted as some of the other talks, but there were more than 100 people in attendance both times I’ve delivered this talk … so it seems to be something that lots of people are willing to listen to.

Long-term rainfall predictions

This is a talk that grew out of work done for one of the Water Management Districts in Florida that was looking for long-term forecasts of rainfall that could be fed into numerical models of aquifers and their rechargeability, their goal being to provide advice to public policymakers on the state’s pumping

quotas from the Floridan Aquifer. When I was first called about this, I nearly hung up because this project sounded like a severe case of data-free crystal ball gazing. I explained that I was a geostatistician, not a gypsy, and that I worked with data. The client was patient enough to explain to me that they had 150 years of rain-gauge data, terabytes of Doppler radar data going back 15 years, and also had long-term data from tree-ring studies on how the "Atlantic Multidecadal Oscillation" (AMO) affects the hurricane season. All of this made it clear that they were actually quite serious about predicting rainfall 20 years into the future and that their challenge was to integrate many different types of data. The methodology that was developed in this project did manage to combine, in a sensible way, all of the different types of data. One of the small side studies revealed a long-term bias in the rainfall grids created by Doppler radar: tall buildings create "shadows" in the grid. Although the reason for this was immediately apparent, this artifact in Doppler data had never been identified before.

There is a bit more technical meat on the bones with this talk than other talks described earlier. But it is still interesting, I think, to general semi-technical audiences because its focus is on integrating different types of data and being alert to systematic bias.

https://ascelibrary.org/doi/10.1061/40927%28243%29282

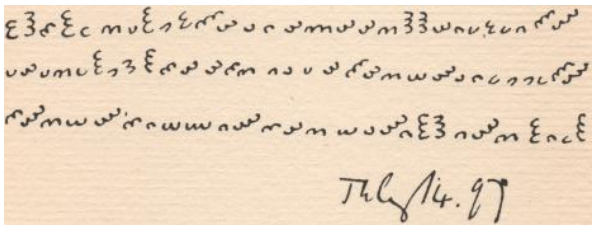
Analysis of ocean surface temperatures from the Argo network

The Argo network is an international effort to monitor the world's oceans using free-floating buoys that take continuous measurements of ocean water as they submerge and resurface. The data bases from this network contain decades of data from > 10,000 buoys, uploaded via satellite from wherever the buoys happen to be when they surface … they just get pushed around by the currents. Several organizations have tried to use this data to formulate a view on how the world's oceans are changing. A big challenge is that the data are housed on two separate servers, one in France and one in the USA. This helps provide a backup in the event that data transmission to one server fails. But it also creates many disagreements between the two data bases because countries are responsible for quality control of the data from their own buoys, and some countries … most, in fact … do their QC on only one of the two servers, which leaves researchers with two versions of the data. With the data bases being >1 Tb, it is difficult to unify them into one reliable data base. Sometimes the server in France has the more reliable data; sometimes the server in the USA has the more reliable data. Sometimes, neither version is reliable. Although it is daunting to assemble a single, unified data base, it is doable. And, once done, this data provides a strong basis for understanding changes in the world's oceans.

This talk also has more technical meat on its bones than others, but it resonates with people who have wrestled with large, messy data bases.

https://www.youtube.com/watch?v=FbakDGgD8nw

The Dorabella Cipher



In the summer of 1897, a 40-year-old music instructor named Edward sent an encrypted message to Dora, the 23-year-old daughter of friends of his. The message was written in unusual symbols that were initially thought to be hieroglyphics. Attempts to elicit meaning from the symbols have all failed. In the years since the coded message was sent, Edward would become Sir Edward Elgar, the celebrated composer. The Dorabella movement of his Enigma Variations was Elgar's attempt to capture the personality and character of his younger friend, Dora Penny, in the form of a musical composition … a "musical painting", if you will. The cipher became public in the 1930s, shortly after Elgar's death when Dora wrote a biography of her famous friend. It has stood for a century as the archetype of a cipher that should be decodable but that has stumped everyone, including professional codebreakers at the WWII British code-breaking facility at Bletchley Park. Although the cipher remains unbroken, it still serves as an excellent example of how to decode old ciphers.

Because the author of the cipher is a famous musician, and the recipient a possible romantic interest, this talk will probably appeal to a wider audience than just those who enjoy cryptography. If ever broken, it could reveal something about the nature of the Elgar-Penny friendship and the reasons why Elgar chose to encrypt the message. In addition to discussing the cipher and explaining some of the prevailing assumptions about it (e.g. that the original message was in English), this talk also examines why the puzzle remains unsolved over more than a century later despite the concerted efforts of thousands of talented amateur and professional cryptographers.

And it shows my attempt to bring a geostatistical idea to the problem: the spatial continuity of word lengths. This has not yet led to a solution, but hope springs eternal.

https://ciphermysteries.com/other-ciphers/the-dorabella-cipher

Sorting out the ailments of my own noggin

This is the talk that I gave at a conference in the Azores last year, and that I will be giving in Perth in May. It's both a personal and professional journey, with the brain that is t https://ciphermysteries.com/other-ciphers/the-dorabella-cipher he case study example being my own. In the early months of the recovery from my stroke, I was meeting with my neurologist who was showing me on her office computer the MRI images of my brain and discussing with me what the stroke had done, one of which was that it made seizures more likely. I asked her if she could take those MRI images and show where the stroke scar tissue would be on the surface of my brain … so that we could see where the scar tissue lay relative to the functional areas of the cerebrum. Knowing that I might have seizures, I was curious about whether or not there might be some discernible temporary functional impairment that might serve as a precursor warning of an impending seizure.

My neurologist's answer was "No"; so I said to her, "If you can email me those MRI images, I think I can do that". She was, at first, understandably skeptical; but she still saw no harm in indulging me in my stroke-addled delusion because she knew that stroke patients tend to do better when they have a sense of purpose. Over the next few months, and a few more scheduled follow-up appointments, I was able to show her the proof-of-concept example, all the way through to a list of three precursor signs that I should recognize as signs of an impending seizure.

This talk presents that story and presents the geostatistics tools I used to achieve the desired result. The talk can be heavy on the recovery story if the audience doesn't want to hear about geostatistics. But if they are curious about how you can map 2D MRI slices onto the topologically complex surface of the cerebrum, I can go light on the recovery story and spend more time on the geostat procedural details.

https://www.linkedin.com/pulse/turning-brain-scars-probability-maps-shows-how-geostatistics-8qn1c/?trackingId=lHXhpwi0olDKc6fMnehCnA%3D%3D

Election predictions

When election results are forecast, either weeks before the actual election, or on the night of the election, the statistical methods used for these forecasts explicitly assume that each voter acts independently. But this is not a correct assumption. Voters are influenced by the same news and by the same social media. There is a network of connections that cause the choices made by one voter to correlate with those made by another voter. Some of these connections are virtual, like the social media accessed by different voters. Others are related to physical separation distance. An analysis of actual voting data from districts across the United States or ridings across Canada shows the same tendencies seen in many earth science disciplines: that voting regions that are close together have more similar voting patterns than districts that are far apart. This simple fact allows predictions of election results to be more accurate both for polling done before an election and for real-time coverage of voting results on election night across an entire country.

https://www.sciencedirect.com/special-issue/10FQS8DJW85

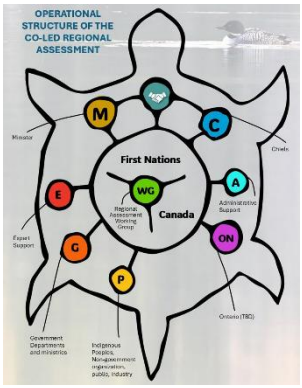
Fracture modeling

Discrete fracture network models (DFNs) are used for studies in which fractures are a controlling element. Examples include: fluid flow in a fractured porous medium where open fractures serve as pathways along which fluid flow is enhanced and sealed fractures serve as barriers to flow; geotechnical analysis of the walls in an open-pit mine, where the risk of slope failure is greater where fractures run obliquely to the designed slope of the wall; resource estimation in mineral deposits where mineralization is strongly controlled by fracture. There are deterministic crack propagation algorithms that can produce very realistic models of fractures; but these are difficult to make these honour field observations, and their run-time is often prohibitive. In the 1990s, I developed an iterative geostatistical simulation procedure that propagated fractures without solving for the stress concentrations at

fracture tips. Instead, it treated the locations and geometries of the propagating fractures as random variables amenable to conventional geostatistical simulation. This procedure achieved a high level of visual realism, was able to honour field observations, and could build 3D DFNs in a reasonable amount of time. This procedure was used in flow studies for petroleum reservoirs and for nuclear waste repositories.

https://link.springer.com/chapter/10.1007/978-1-4020-3610-1_30

Regional assessment of mining potential



This is the keynote talk I will be giving at the IAMG Annual Meeting in Montreal in August 2026. It is a study done recently for the "Ring of Fire" area in Northern Ontario, which is currently the focus of a public debate on if, when and how to develop its mineral wealth. The various attempts at assessing the impacts of mining development … on society, on the local economy and on the environment … all need information on what to expect for the total number of mines, the commodities they might produce, the time-sequence of their openings and their expected duration. Are we talking about three mines that all close within 10 years? Or about thirty mines that might run for a century?

The Ring of Fire study was inspired by the geomathematical work of John Griffiths, who developed a method for doing regional assessments of mineral resource potential that incorporated many different sources of geological and historical information. This study incorporated all of the available geological and drilling data, geophysics, satellite images, and geochronology to produce a reliable and well-reasoned prediction of mining activity in the Ring of Fire if suitable infrastructure is developed.

https://www.iamgconferences.org/iamg2026/keynote.php#IdKeyMo