THE UNIVERSITY OF MELBOURNE

Communicating scientific research to decision makers and the general public

McKenzie Fellows Research Communication Event:
29 November 2017

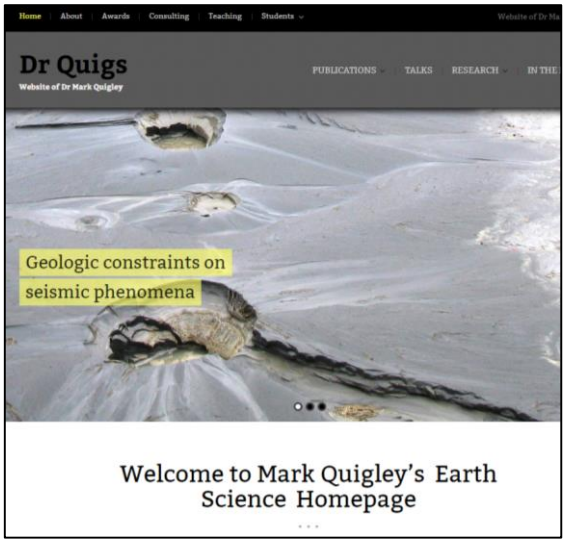
Mark Quigley
Earth Sciences
www.drquigs.com

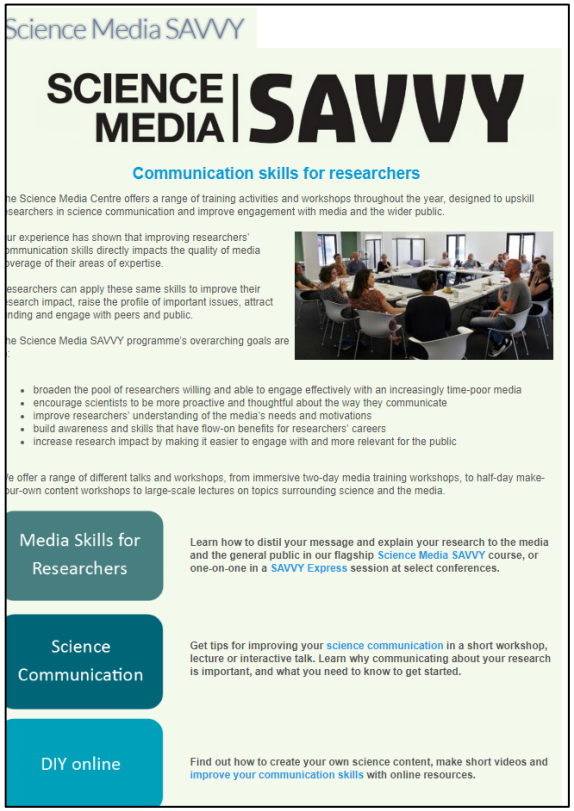
Questions

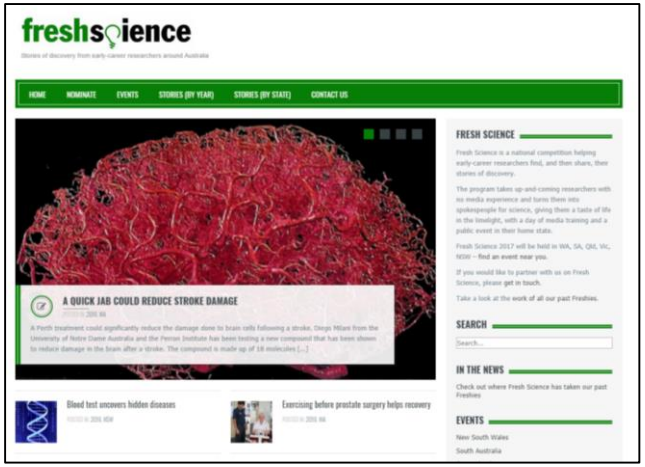
- How do you position yourself as an effective and user-friendly provider of scientific information?
- What actions and communication pathways can be used to communicate solicited and unsolicited (relevant) scientific information?
- What are the incentives and deterrents for communicating scientific research to end-users?

How do you position yourself as an effective and user-friendly provider of scientific information?

1. Preparation
(skills, contacts, presence)







http://inspiringaustralia.net.au/toolkit/

Science is not authoritative unless you are seen to be doing things in peace time

K. Gledhill, GeoNet director

How do you position yourself as an effective and user-friendly provider of scientific information?

2. Promptness and proficiency

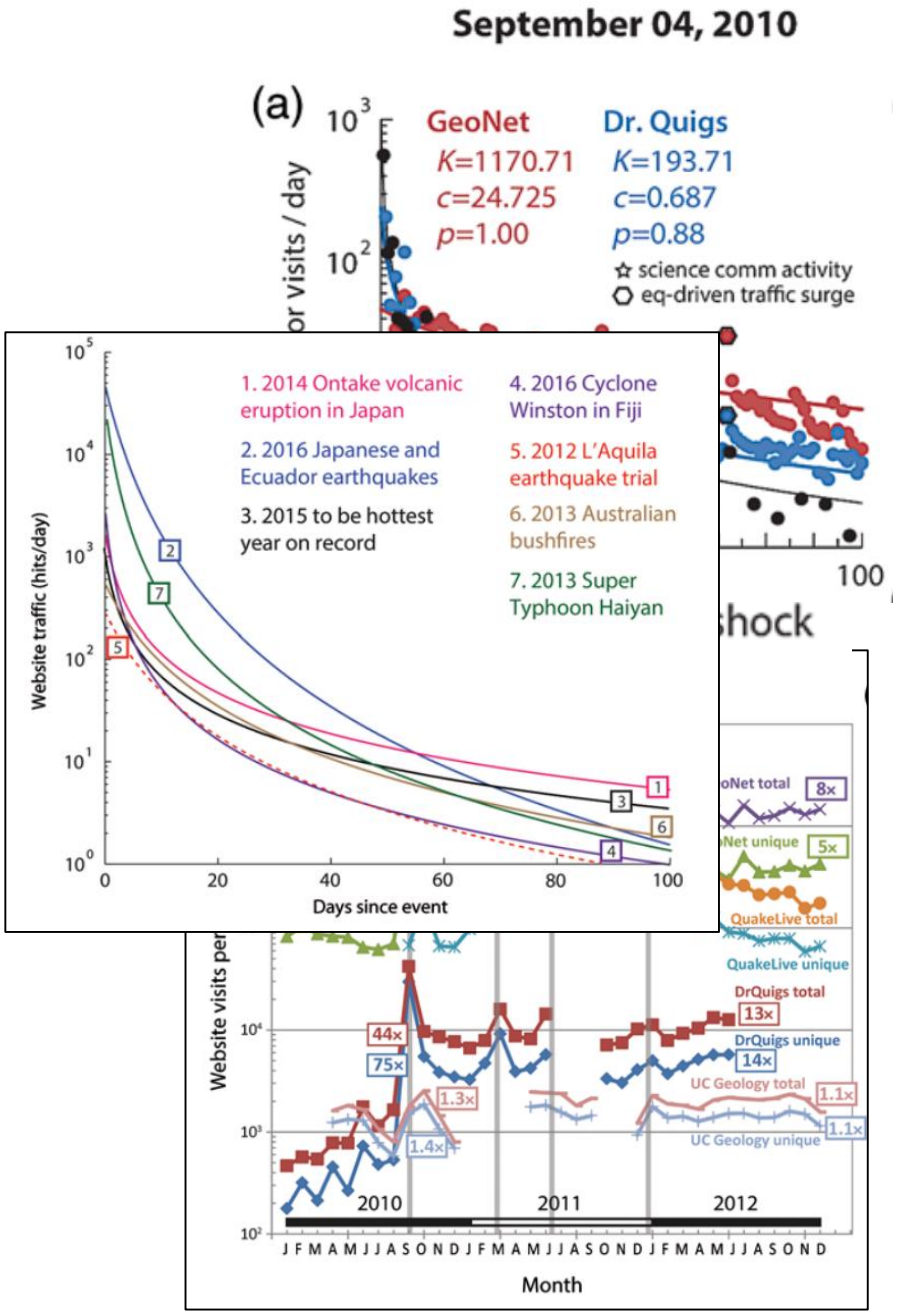
Saying yes (a lot): 118 talks; 123 print, digital, radio interviews; 47 television interviews; 9 documentaries; 23 op ed pieces since 2010

Maximum response time to external media request to ensure your utility: news media on breaking story (minutes to hours), written content, perspective piece (<1-2 days), documentary (1-5 days)

Post-response interview cancellation or content do-not-use rate: 5-20%

Time allowance per event: minutes to days

Relevance window: responding to major event half life <1-2 days; no traffic increase if response >7-9 days; article half-life (hours to <1-2 days)



Quigley, M.C, Forte, A.M., (2017) Science website traffic in earthquakes *Seismological Research Letters,* DOI: 10.1785/0220160172

How do you position yourself as an effective and user-friendly provider of scientific information?

3. Breadth of knowledge (and resourcefulness)

Staying relevant during evolving and complex issues

Diverse roles: Science providers, contact facilitators, critics and conscience of society, science brokers, supporters of colleagues, etc

Battling pseudoscience

Correcting uninformed commentary

Filling the vacuum with relevant science

Who knows the most and can they assist me?

You are only as credible as your last Google search

- Specifics of earthquakes in NZ, Australia, Italy, Nepal, Japan, Greece, etc
- Future seismicity
- Fault structure and quake potential
- Earthquake prediction and precursory phenomena
- Properties of seismic waves (f, λ, ν)
- Earthquake triggering (stress changes, tidal / lunar triggering, human activities, fracking)
- Liquefaction
- Rockfall / landsliding
- Sinkholes
- Geological history of Christchurch and Canterbury
- Tectonic setting of NZ, Australia
- Land use planning (fault setback dist, red zone decisions, etc)
- Resilient urban design
- Future flood hazard
- Science and policy
- Science communication

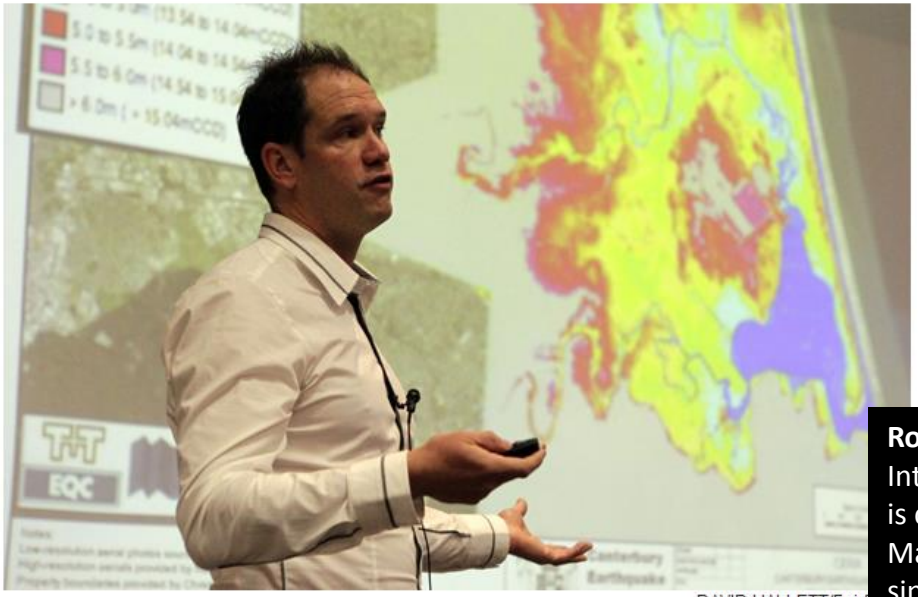
How do you position yourself as an effective and user-friendly provider of scientific information?

4. Resilience (public, colleagues)

Dense housing 'would let residents stay east'

JOELLE DALLY

Last updated 05:00 02/07/2012 66 Like 37 Tweet 1 +1 Share



DAVID HALLETT/Fairf

INNOVATIVE PROPOSAL: Canterbury University's Mark Quigley explains his vision for the rebuild of Christchu eastern suburbs.

Christchurch Earthquake 2011

Have you moved since the quakes?

Cash settlements preferred for land

Red-zoned east Christchurch residents who want to stay put could be rehoused on remediated land the size of Riccarton Racecourse if they abandoned the "Kiwi quarter-acre dream", a geologist says.

Dale #10 08:36 am Jul 02 2012
Mr Quigly should stick to geology. Those that died in the quakes died in multi-storey buildings. Who would want to live in one?

simon #22 09:35 am Jul 02 2012
Mark, stick to looking at wobbly ground, u know nothing about housing, there are already high density housing projects in the area and they are ghettos

David #46 01:21 pm Jul 02 2012
Excellent idea from Dr Mark Quigley, it resolves many issues, such as: dislocation of communities, urban sprawl - which wastes precious resources (land, feul to commute, new infrastructure - roading & other service, costs are kept down), and keeps growth in Christchurch

Rose #31 10:45 am Jul 02 2012
Interesting comments from everyone, Give the guy a break at least he is coming up with ideas and talking about them. Personally I think the Mark Quigley is the best thing to have been discovered in Christchurch since the Big Quake on 4th September, and has been open and honest.

What actions and communication pathways can be used to communicate solicited and unsolicited (relevant) scientific information?

Need for decision-making
(e.g., land-zoning decisions to reduce exposure to hazards)

Potentially relevant earth science inputs
i) Risks (e.g., fatality risk),
ii) Observed and / or predicted consequences (e.g., fatalities, injuries), exposure, vulnerability,
iii) Observed and /or predicted stimulating effects (e.g., eq-triggered rockfall)

CLASS 1 scientific actions: data acquisition and analysis

1) Scientific analysis of pre-existing data, risks, effects, and consequences relevant to decision-making needs

2) Data aquisition and analysis of observed effects (e.g., hazard characterisation)

3) Data aquisition and analysis of observed consequences (e.g., fatalities, damage)

4) Data aquisition and analysis of observed exposure and vulnerability elements

5) Characterisation of immediate risks

6) Characterisation of scientific uncertainties and biases (e.g., Fischoff and Davis, 2014)

7) Modeling and characterisation of future (± past) stimuli, exposure, vulnerability, risks

8) Seek funding and approvals to support research

9) Submit research for peer-review and publication

CLASS 2 scientific actions: provision of science to decision-makers

10) Determine and respect decision-maker identities, protocols, needs, and goals

11) Assist decision-makers with identifying relevant and potentially relevant science inputs

12) Ensure relevant research is available and accessible to decision-makers

13) Provide solicted science expertise, methods, evidence, and uncertainties to decision-makers

14) Offer unsolicted science expertise, methods, evidence, and uncertainties to decision-makers

15) Participate and serve decision-making processes: reviewer, advisor, expert witness, caucasing, expert ellicitation panels, joint-reports, other presentations

16) Provide or offer relevant science to affected parties and stake-holders directly, via decision-makers, and / or via third parties (e.g., media)

17) Assist decision-makers to understand potential limitations, uncertainties, and biases in science evidence and communications

18) Declare expertise, communication roles and perspectives: provision of autonomous research vs. knowledge brokering vs advocacy vs arbitration

19) Document and publish provision processes and utility of science inputs in decision-making processes

20) Offer constructive feedback to decision-makers on decision-making processes

CLASS 3 scientific actions: enhance the future provision and utility of science to decision-makers

21) Offer further scientific expertise, methods, evidence, and uncertainties to decision-makers to assist in identifying future decision-making needs, risks, and potentially relevant science inputs

22) Continue to conduct scientific research relevant to past and future decision-making needs

23) Maintain existing and build new relationships with decision-makers and associated bodies

24) Communicate research relevar
and future decisions to decision-m
stake-holders, and the general pub

25) Test and offer feedback to imp
existing science provisionary pathv

26) Propose and assist in construct
new science provisionary pathways

27) Maintain awareness of relevan
and science providers

28) Maintain availability and acce
relevant science and scientific expe

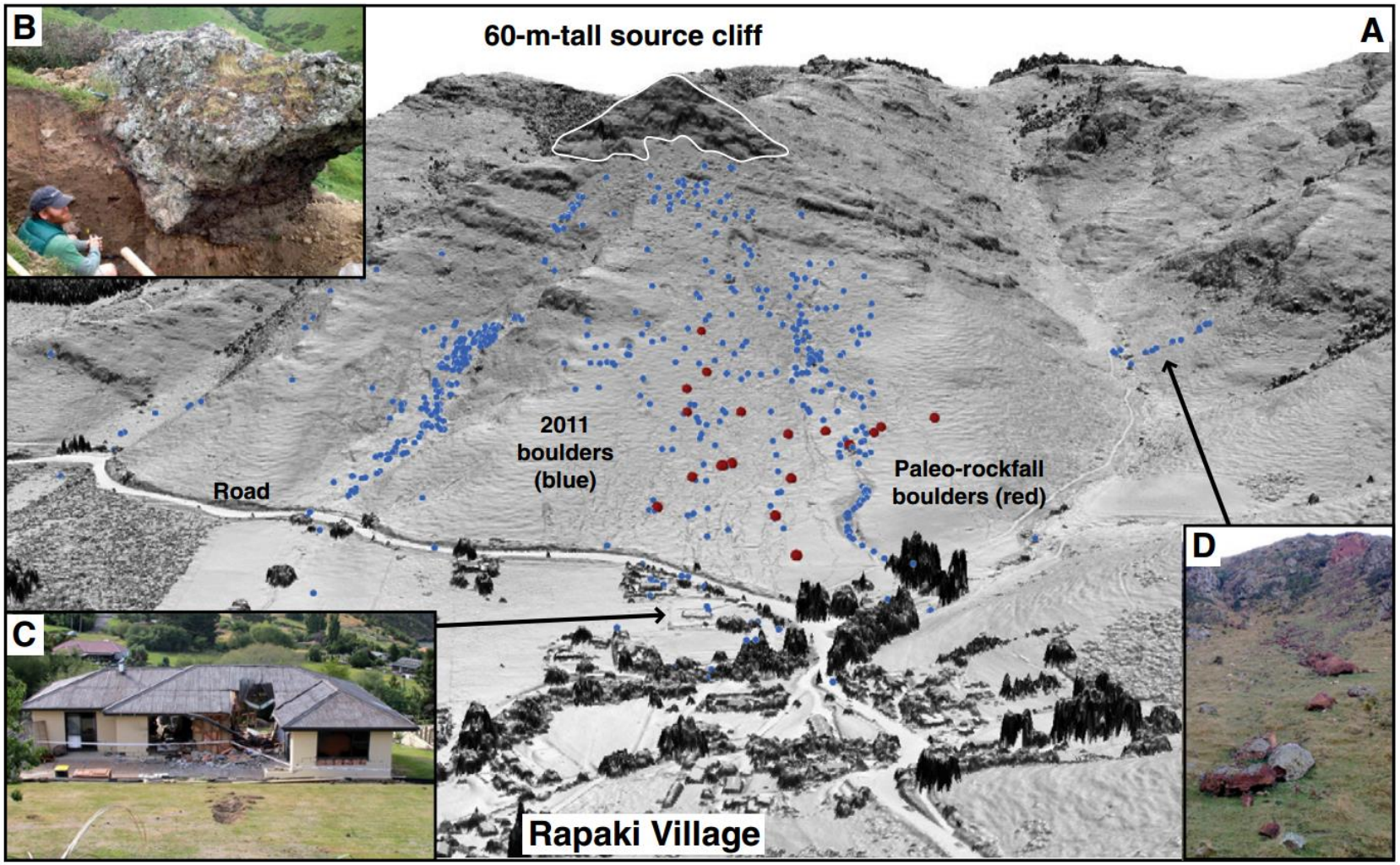
2

Case study #: *Examples of viable science provision pathways*

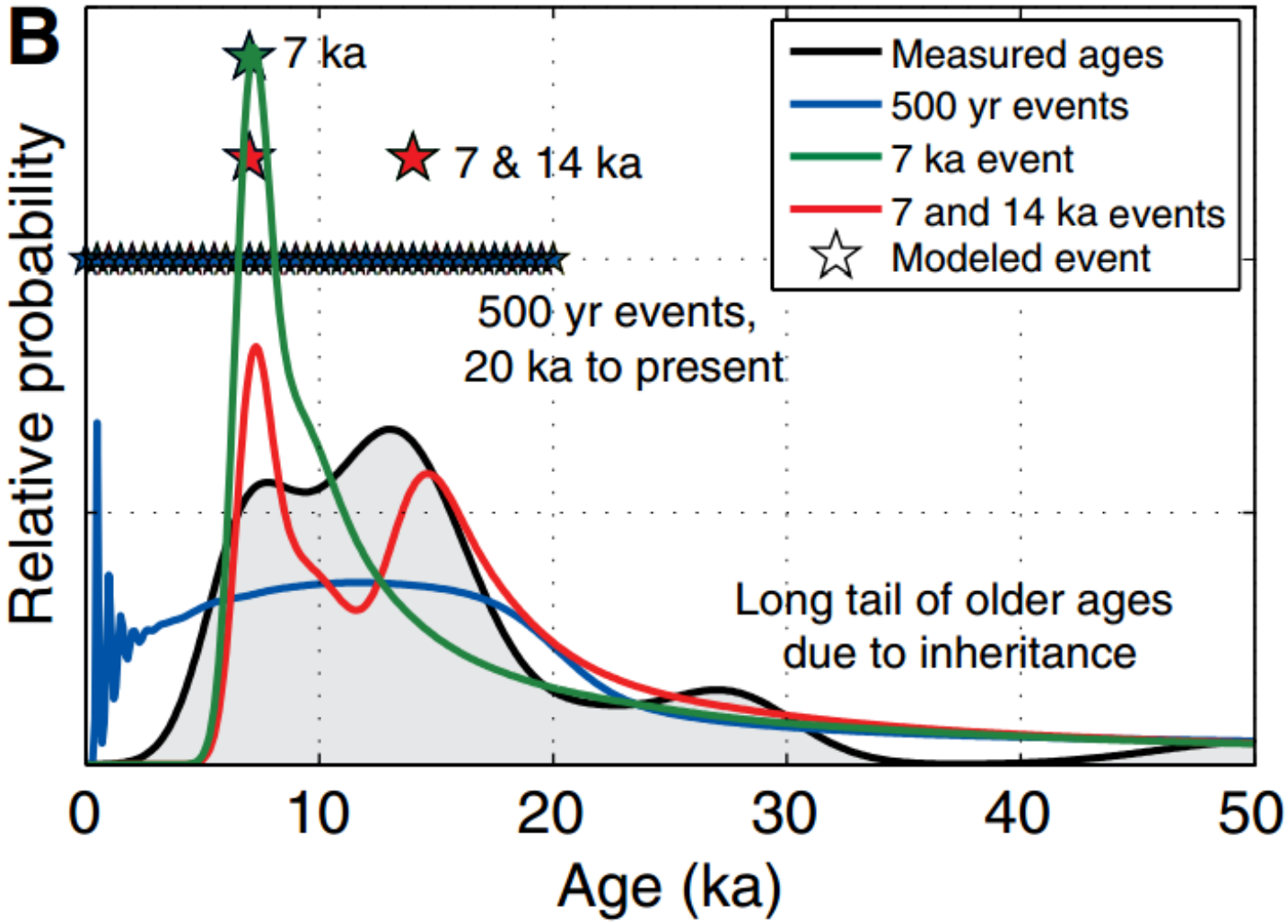
S1: *2-3-4-8-1-7-6-5-9-12-16-14-10-13-15-18-17-11-20-21-22-24-27-28*
S2: *10-1-2-3-4-5-7-12-13-17-21-8-22-23-27-28*
S3: *2-4-5-6-13-17*
S4: *1-2-3-4-5-11-12-17-21-24*
S5: *1-2-5-6-7-9-10-11-12-16-13-15-17-19-20-21-22-23-24*
S6: *10-1-6-7-19-13-21*
S7: *10-1-2-3-4-7-6-5-9-12-13-15-17-20-21-24-27-28*

Quigley, M.C et al (2018) Provision and utility of earth science and uncertainty in decision-making

Case study. Timing and frequency of past rockfall events in Christchurch hill suburbs

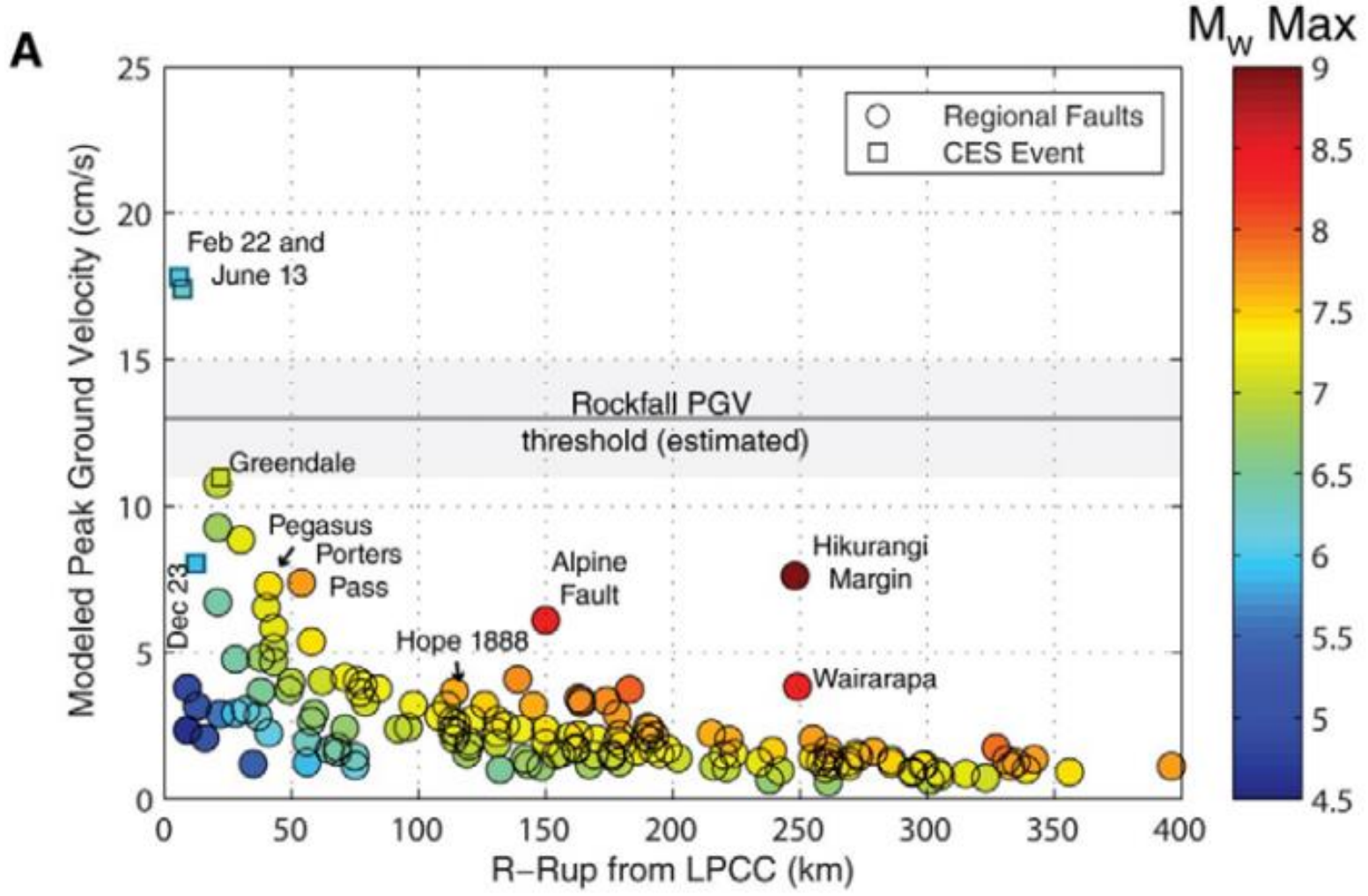


Mackey, B., and **Quigley, M**. (2014) Strong proximal earthquakes revealed by cosmogenic 3He dating of prehistoric rockfalls, Christchurch, New Zealand, *Geology,* 42 (11), 975-978



No major rockfalls like in Feb and June 2011 earthquakes in the last 6000 yrs, last event 6000-8000 yrs ago, no evidence for rockfalls triggered by 'infamous' faults

Mackey, B., and **Quigley, M**. (2014) Strong proximal earthquakes revealed by cosmogenic 3He dating of prehistoric rockfalls, Christchurch, New Zealand, *Geology,* 42 (11), 975-978

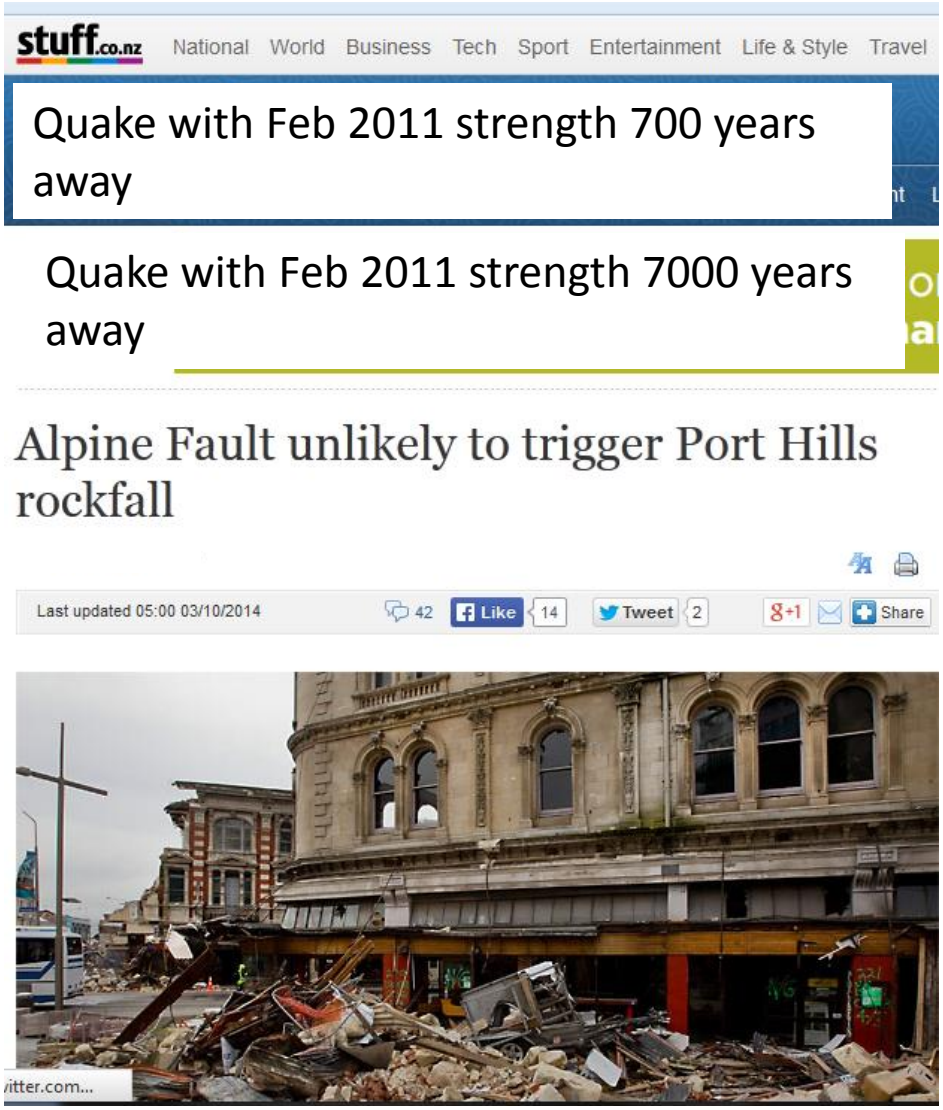


PGV modeling consistent with long return times and local seismic sources of rockfall

Mackey, B., and **Quigley, M**. (2014) Strong proximal earthquakes revealed by cosmogenic 3He dating of prehistoric rockfalls, Christchurch, New Zealand, *Geology,* 42 (11), 975-978

Communication timeline

- Alerted the press to possible story once paper was submitted for review
- Paper accepted, but waited until paper was published before doing any media interviews
- Couldn’t justify spending $3000 NZ on ‘open access’, so science not publically available through publisher
- No visuals – time constraints on getting story out and space constraints on story
- Interviews conducted with 2 authors of paper, GNS, CCC over 2 days, hours of effort, detailed emails shared, due diligence followed
- A careful and thorough ‘by the book’ media approach



The morning after

- Story cut to 350 words
- Funding agencies not listed
- Research publication not listed
- Headline dramas
- Lots of complaining
- Scientists annoyed
- Reporter feels bad
- Editor willing to make changes and corrections
- Too late BUT….

Stakeholder (affected resident) read news article

Stakeholder request for research contribution to land use decision making

Request to enter research into evidence

Expert witness testimony

Results considered within decision-making framework

The Proposed Christchurch Replacement District Plan

The Christchurch City Plan and the Banks Peninsula District Plan have been reviewed under provisions of the Canterbury Earthquake (Christchurch Replacement District Plan) Order 2014.

Christchurch City Council

Chapter 5 - Natural Hazards

maintained and managed to function to the fullest extent possible during and after natural hazard events.

5.2.3 Policy - Restrict land use to avoid or mitigate hazards

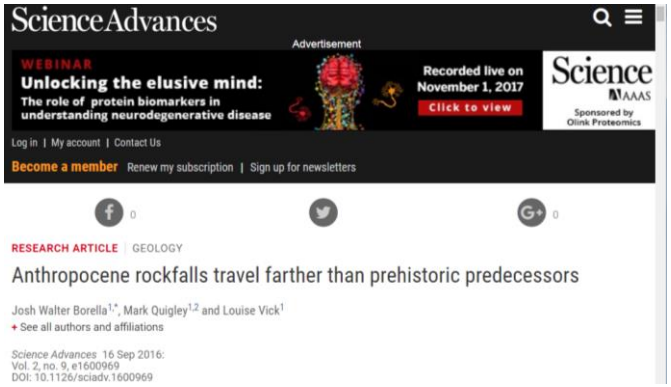
a. Apply different levels of control on subdivision, use and development in areas at risk of natural hazards, depending on the level of risk, to ensure that the adverse effects of natural hazards are avoided or adequately mitigated.

5.2.4 Policy - Precautionary approach

a. Adopt a precautionary approach to subdivision, use and development where:
   i. there is uncertainty as to likelihood and scale of a natural hazard; or
   ii. there are multiple natural hazards, with potential cumulative effects; or
   iii. there is potential for serious or irreversible effects from a natural hazard.

Strong proximal earthquakes revealed by cosmogenic ^{3}He dating of prehistoric rockfalls, Christchurch, New Zealand

Benjamin H. Mackey and Mark C. Quigley
Department of Geological Sciences, University of Canterbury, Private Bag 4800, Christchurch 8140, New Zealand



What are the incentives and deterrents for communicating scientific research to end-users?

INCENTIVES

- Increasingly tied to career progression
- Outreach and communication mandates embedded within grant applications
- Increasing competitiveness, breadth and prestige of science communication awards
- Scientists who can communicate well can increase their research profiles and become c-grade celebrities – we own this space!
- Increased popularity and reach of social media in science
- Science communication now an integrated part of the scientific process
- Scientists as entrepreneurs, self-marketing businesses, brands

What are the incentives and deterrents for communicating scientific research to end-users?

DETERRENTS

- Communication request is outside my specific area of expertise
- I do not have time to respond to the request in an appropriate timeframe
- There are hierarchies / politics / protocols that I feel limit my ability to undertake the communication
- I am worried above receiving negative commentary on my communication(s) from my colleagues
- I am worried about being misquoted in the media
- I am worried about journal embargoes
- etc

*What are **your** incentives and deterrents for communicating scientific research to end-users?*

Please assist me to understand this using the anonymous survey sheet provided

-Folded up and placed in envelope
-Drop in to my mailbox at UoM
-Slide under my office door Rm 420B
-Tell me to come and pick it up
-Results will be shared and compared to ECR winners of prestigious science communication prizes in NZ and Australia

Dr. Mark C. Quigley
Associate Professor in Earthquake Science
School of Earth Sciences
The University of Melbourne
Parkville, Victoria 3010, Australia
Office phone: +61 (0) 3 8344 7978
Mobile: +61 (0) 415 900 152
Email: mark.quigley@unimelb.edu.au
Webpage: http://www.drquigs.com/
LINK TO THIS TALK: