

# The New Zealand Association of Scientists Awards for 2020

Due to COVID-19 restrictions this year's medallists were presented with their awards at their respective institutions and generally in company with internal celebrations at the particular institute. The Shorland medal was announced via a video link with the recipient now at the Nord University, Norway

## The Marsden Medal

The Marsden Medal is awarded for a lifetime of outstanding service to science. It recognises service rendered to the cause or profession of science in the widest connotation of the phrase.

Professor Martha Savage has been awarded the 2020 Marsden Medal for her path-breaking research in the fields of seismology, plate tectonics and volcanology, as well as her distinguished record of service to New Zealand and the global scientific community.

In her pioneering work, Prof Savage used remotely sensed texture—seismic anisotropy—of rocks deep below Earth's surface to fundamentally change how plate-boundary processes are studied and understood. The observations at the heart of her work, separation of seismic waves into components that travel at slightly different speeds, are due to rock textures and, once detected, those textures reveal how tectonic plates move and respond to stresses built up within them. She has conducted comparative studies of deep crustal properties and processes in New Zealand and the western states of the USA, investigated the relationship between time-varying anisotropy and volcanic eruption sequences, and developed new observational approaches and new computational methods to interpret seismic data. Her work showcases New Zealand as a rich natural laboratory in which to develop understanding of globally relevant geophysical methods and processes.

Prof Savage was also a pathbreaker as the second woman to winter-over in Antarctica. Her Antarctic work was focused on cosmic-ray observations at Amundsen-Scott South Pole Station, but she credits it to have also allowed her to learn about the importance of personal character and positive, supportive relationships in science. Professor Savage has a distinguished record of service, to New Zealand and the global scientific community, through review panels, advisory boards, editorial boards and mentorship. She is a Fellow of the Royal Society of New Zealand and is the first New Zealand woman to have been elected Fellow of the American Geophysical Union.

## The Shorland Medal

The Shorland Medal is awarded in recognition of major and continued contribution to basic or applied research that has added significantly to scientific understanding or resulted in significant benefits to society. The 2020 recipient of the Shorland Medal is Professor Mark Costello from the

Faculty of Biosciences and Aquaculture at the Nord University, Norway.

Prof Mark Costello pioneered the field of 'ocean biodiversity informatics' by leading the formation of two worldwide databases that are now core resources in marine biology. The World Register of Marine Species (<https://www.marinespecies.org/>) includes names and information on over 240,000 marine species, while the Ocean Biogeographic Information System (<https://obis.org/>) contains over 50 million field records of marine species. Both databases are continuously updated and edited by experts, and offer free online access to unprecedented amounts of data, enabling a significantly better understanding of our global marine environment. Analyses of these databases have led to notable advances in biological and marine sciences and a rethinking of established viewpoints, including: improved predictions of how many species may exist; documenting the increasing numbers of people describing species new to science; the creation of new data-driven maps of ocean biodiversity; helping pin-point where Marine Reserves are best located; and the discovery of a dip in marine diversity at the equator that is due to climate warming. Moreover, Mark has championed open data and led conceptual thinking that has guided change in the transformation of scientific practice to be more international and collaborative. Alongside this outstanding service to science, Mark Costello's own research is internationally recognised and very highly cited.



## The Hill Tinsley Medal

The Hill Tinsley Medal is awarded for outstanding fundamental or applied research in the physical, natural or social sciences published by a scientist or scientists within 15 years of their PhD. In 2016, the NZAS awarded the first Beatrice Hill Tinsley Medal, which replaced the Association's Research Medal for early-career researchers. The recipient for 2020 is Associate Professor Frederique Vanholsbeeck from the University of Auckland, a physicist whose primary field of research is biophotonics, which focuses on the use of optical and laser technologies for biomedical studies.

Prof Vanholsbeeck's research on monitoring bacteria using quantitative fluorescence spectroscopy – very accurate measurement of the spectral density of the fluorescence signal – has created a better understanding of how to monitor bacterial viability and antibiotic efficiency. She has developed a near-real time, cost-effective and portable fluorometer, the optrode, for quantifying fluorescence signals leading to better food safety and



antibiotic sensitivity testing. She leads a biophotonics lab undertaking both fundamental and applied research, with diverse and varied interdisciplinary collaboration. A further notable aspect of her research has been the extent to which she mentors a vibrant group of early-career researchers and postgraduate research students.

## The Cranwell Medal

The Cranwell Medal is awarded to a practising scientist for excellence in communicating science to the general public in any area of science or technology. In 2017 this medal was renamed from the Science Communicator Medal to honour the botanist Dr Lucy Cranwell. The recipient for 2020 is

Dr Dianne Sika-Paotonu who is the Scientific Lead for New Zealand's Rheumatic Fever and Penicillin Research Programme and the Associate Dean (Pacific) at the University of Otago, Wellington.

Since completing her PhD at the Malaghan Institute in 2015, Dr Sika-Paotonu has maintained a strong record of public engagement with community groups and with students, at secondary, tertiary undergraduate and postgraduate levels. She regularly presents science to non-scientific audiences and

has received local and international recognition for her research and science communication efforts. Her awards include the MacDiarmid New Zealand Young Scientist of the Year (Advancing Human Health & Wellbeing category), Colmar Brunton Research Excellence award, and the Australasian Society of Immunology BD Science Communication Award.



Dr Sika-Paotonu is of Pacific heritage and is actively involved in mentoring young Pacific people in the Wellington region. She also holds numerous service and leadership responsibilities within the Pacific community, and is an HRC Pacific Emerging Research Fellow, as well as a recent recipient of the Sir Thomas Davis Te Patu Kite Rangi Ariki Health Research Fellowship from HRC. She is also a member of the Royal Society Te Apārangi Council, the National Science Challenge Healthier Lives Science Leadership Team and the HRC New Zealand Pacific Health Research Committee.

## News

# 2020 Prime Minister's Science Prizes

The Prizes recognise the impact of science on New Zealanders' lives, celebrate the achievements of current scientists, and encourage scientists of the future.

## The 2020 Prime Minister's Science Prize

The premier award has been awarded to Te Pūnaha Matatini for its COVID-19 response. Te Pūnaha Matatini, hosted at University of Auckland, is a multidisciplinary Centre of Research Excellence; set up to apply complexity science to 'critical issues of our time'. Centre Director Professor Shaun Hendy MNZM FRSNZ, University of Auckland, quickly saw in early 2020 that there was a gap in providing the New Zealand Government with the data science it needed to make informed decisions about responding to the pandemic. He quickly assembled a team who has worked tirelessly to fill this need. The team's response has been multifaceted. Throughout the pandemic, they have developed a series of new mathematical models and ran a multitude of different scenarios to inform the unique situation that New Zealand found itself in.

They have done modelling work and analysis on a wide number of areas including hospital capability, contagion rates and likely disease spread, virus genomic tracing, contact tracing and vaccination. The results of this work were translated for use

by the Government policymakers and front-line operators and helped inform the Government's response to the COVID-19 pandemic. Among other actions, this led to the Government's 'Go Hard and Go Early' mantra that resulted in stringent lockdowns - both the country-wide lockdown beginning in March 2020 and the tailored Auckland lockdown beginning in August 2020. Diane Abad-Vergara from the World Health Organization said that the work of Te Pūnaha Matatini on the COVID-19 response has had significant health and social impacts for Aotearoa New Zealand and internationally 'contributing to New Zealand's internationally coveted status as one of only a limited number of nation-states which have eliminated and contained the virus'. Right from the beginning, data modelling and experience from previous pandemics made it clear that Māori and Pasifika peoples would be more badly affected if the COVID-19 virus got established in Aotearoa. For this reason, Te Pūnaha Matatini decided to apply an equity lens to all their COVID-19 work. Te Pūnaha Matatini modelling work, together with other scientists' research from around the globe, was actively communicated to the public throughout 2020 - with several of the center's researchers emerging as the nation's most prominent science

---

communicators during the crisis. This included Associate Professor Siouxsie Wiles who produced a number of graphics with cartoonist Toby Morris for The Spinoff, many of which have ‘gone viral’ internationally and are being used by governments and the World Health Organisation. Siouxsie was recently named 2020 New Zealander of the Year for this work.

## The other prize winners

---

### The Prime Minister’s 2020 MacDiarmid Emerging Scientist Prize

---

Won by Dr Christopher Cornwall, a Rutherford Discovery Fellow at Te Herenga Waka – Victoria University of Wellington, for his cutting-edge research on how marine organisms will fare under climate change.

Chris studies how warmer and more acidic ocean water affects the ability of calcifying marine organisms to lay down calcium carbonate to grow and make their skeletons. This includes the foundation marine organisms called coralline algae, calcifying seaweeds, which cement reefs together, both in temperate and tropical waters, but also signal to and provide a home for many other species, such as pāua and kina. His cutting-edge research using boron isotopes showed for the first time the pH levels inside the organisms where they lay down this calcium carbonate. This allowed him to identify those species with a greater ability to keep their internal pH constant under ocean acidification. He has followed up with studies to see if these traits to resist ocean acidification can be gained in a lifetime or over many generations. Next, he has led a team to assess and model how 233 tropical reefs will be able to grow and survive at varying levels of carbon dioxide in the atmosphere. Sounding an urgent warning, he says ‘these reefs will be badly impacted by both ocean acidification and warming. Our ability to keep CO<sub>2</sub> emissions down is really the best way we can protect these reefs for the future.’

### The Prime Minister’s 2020 Science Communication Prize

---

Professor Michael Baker MNZM, an epidemiologist with the University of Otago, Wellington has won the 2020 Prime Minister’s Science Communication Prize. He is a Professor of Public Health, Director of the Health Environment Infection Research Unit, and Leader of Co-Search, a Health Research Council funded group conducting multi-disciplinary research to support the Covid-19 response

Michael has been New Zealand’s go-to science expert since the start of the pandemic. He has done more than 2,000 interviews since January 2020, contributing over 30% of the total science outputs recorded for the 70 commentators tracked by the Science Media Centre. Michael describes the period at the start of March 2020 just before New Zealand went into lockdown as the ‘the most intense period of my working life’. Michael says

he developed a concept of Covid-19 elimination and concluded that it was the optimal response strategy. He also concluded that New Zealand needed an intense lockdown to stamp out the virus and give the country time to build the capacity to manage the pandemic. Michael promoted these ideas actively through multiple forms of science communication in early March and was hugely relieved when they were adopted by the Government.

### The Prime Minister’s 2020 Science Teacher Prize

---

Queenstown teacher Sarah Washbrooke is the first technology teacher to win the Prime Minister’s Science Teacher Prize. Her hands-on approach to teaching technology is so engaging for her students that they often remain unaware of the depth and range of learning they are doing. Sarah ensures her students remain engaged by making sure to offer them real life authentic projects and also involves the wider Wakatipu community in setting challenges.

She hopes that by following the design-thinking process, her students develop empathy and that ‘they can learn to learn for themselves and they can learn to solve problems and go back again and be prepared to try again, then those skills are going to set them up for life in the future’. The selection panel was most impressed with the way that Sarah’s work is increasing student participation and engagement in technology at her school and also within the community, and also by how she develops and shares resources to the wider New Zealand technology teaching community.

### The Prime Minister’s 2020 Future Scientist Prize

---

James Zingel, a former student of Bethlehem College in Tauranga, has been selected as the 2020 Prime Minister’s Future Science Prize Winner. James’ research project used a breast cancer dataset run through both a classical computer and a quantum computer in an effort to see which is superior in analysing the data and determining the type of breast cancer present. James has spent hundreds of hours delving into this project and has learnt so much in terms of quantum physics and machine learning. Being able to go from a general understanding of quantum physics theory, to describing it in maths, and finally coding it in a language that generates coherent results has been a fantastic progression that he has loved completing. His findings showed that, at the moment, the classical method worked better than the quantum one, but excited about the possibilities of quantum computing, he said ‘I think the quantum algorithm will much outperform the classical one in the very near future’. The selection panel was impressed with the way he applied himself wholeheartedly to this complex project and his enthusiasm for quantum computing.