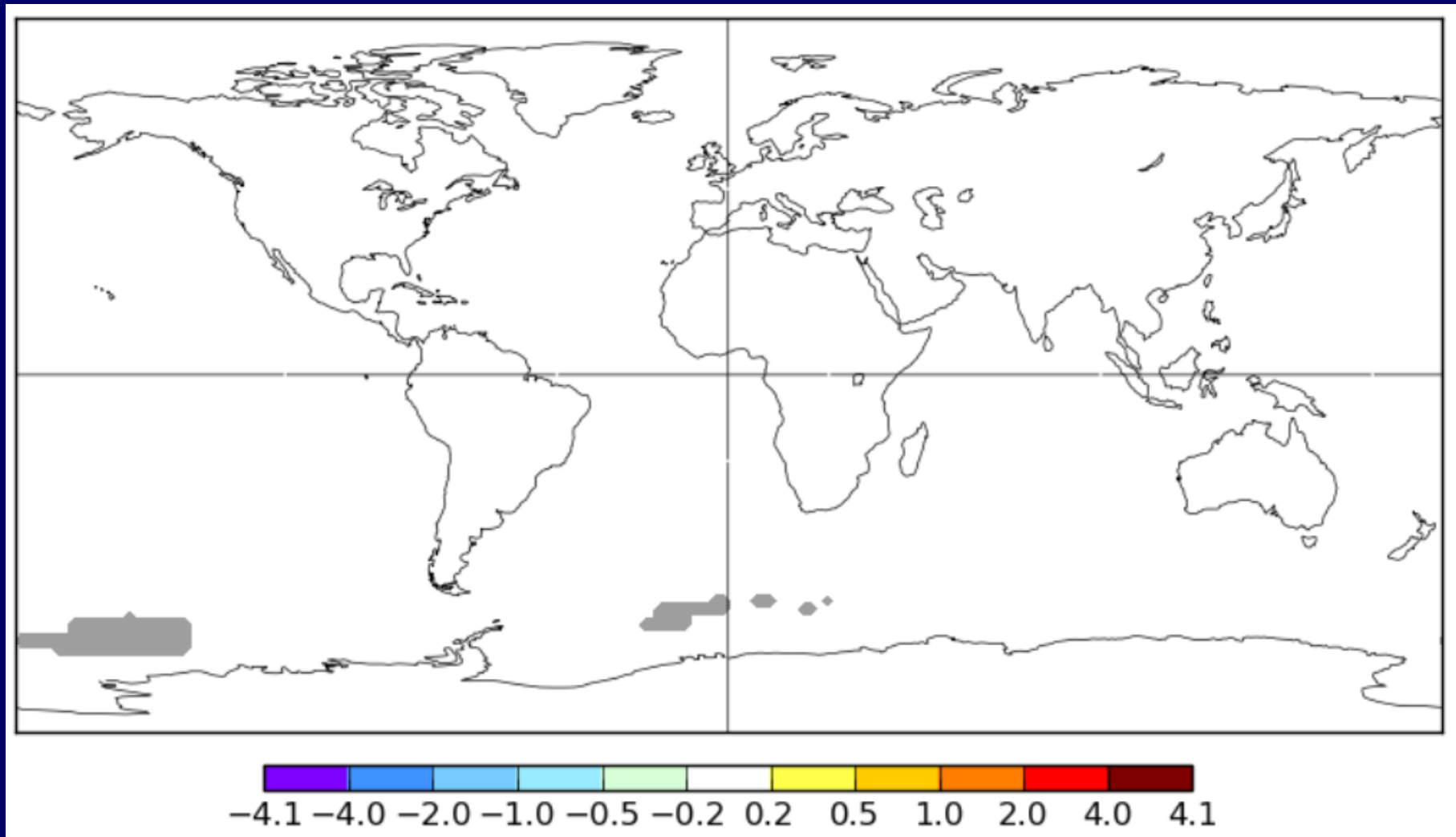


Climate change impacts: A New Zealand way forward

Professor Philip (Chris) Reid: Plymouth University and
Honorary Lancaster Fellow of the Marine Biological
Association UK.

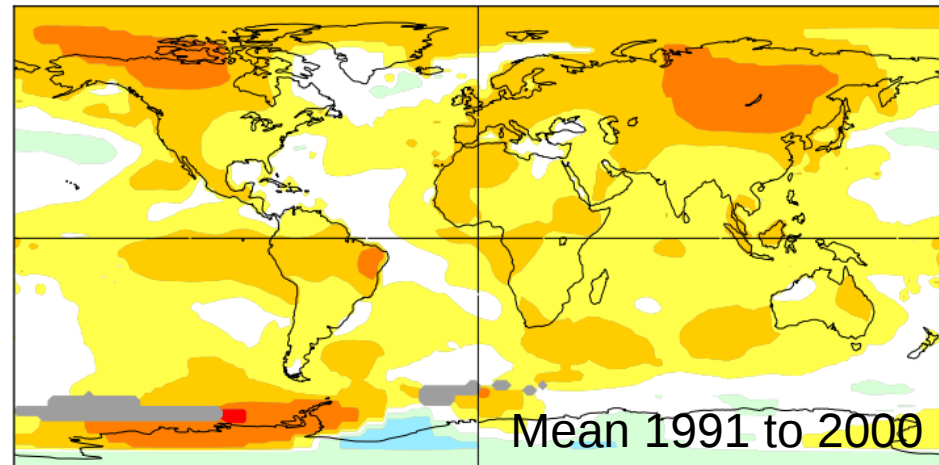
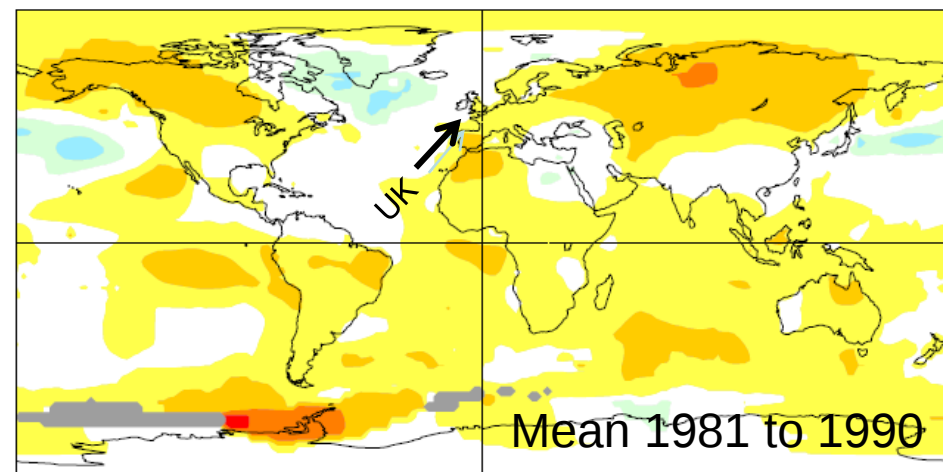
Global temperature anomaly



Starting point 'a frozen moment in time' 1951-1980 (Three decades)
Combined atmosphere over land and sea surface temperature gridded (pixels)

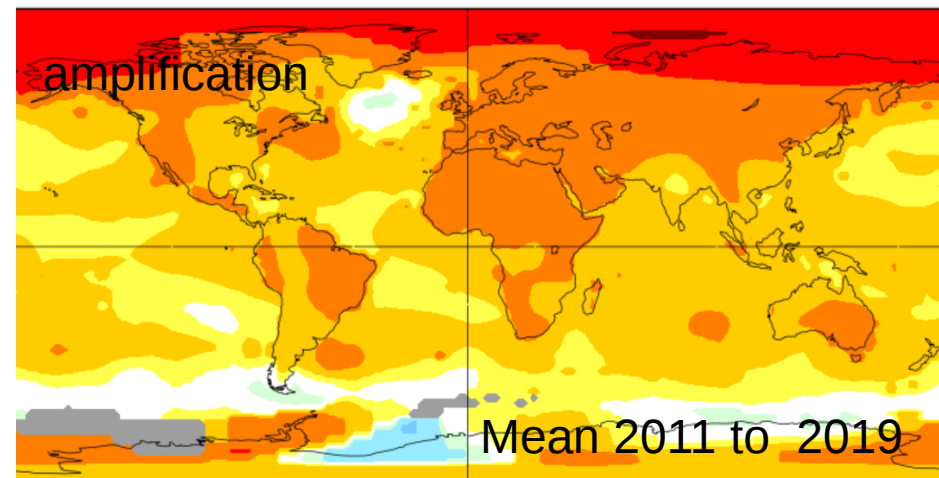
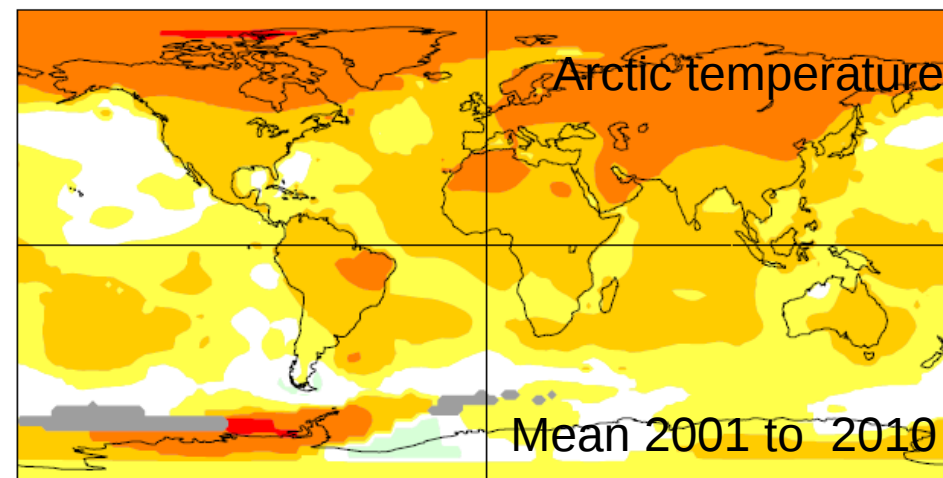
NASA GISS: R. Reudy, M. Sato, K. Lo, formerly J. Hansen

Annual J-D 1981-1990 L-OTI(°C) Anomaly vs 1951-1980 0.27 Annual J-D 1991-2000 L-OTI(°C) Anomaly vs 1951-1980 0.38



Annual J-D 2001-2010 L-OTI(°C) Anomaly vs 1951-1980 0.61

Annual J-D 2011-2019 L-OTI(°C) Anomaly vs 1951-1980 0.81



-4.1 -4.0 -2.0 -1.0 -0.5 -0.2 0.2 0.5 1.0 2.0 4.0 4.1

-4.1 -4.0 -2.0 -1.0 -0.5 -0.2 0.2 0.5 1.0 2.0 4.0 4.2

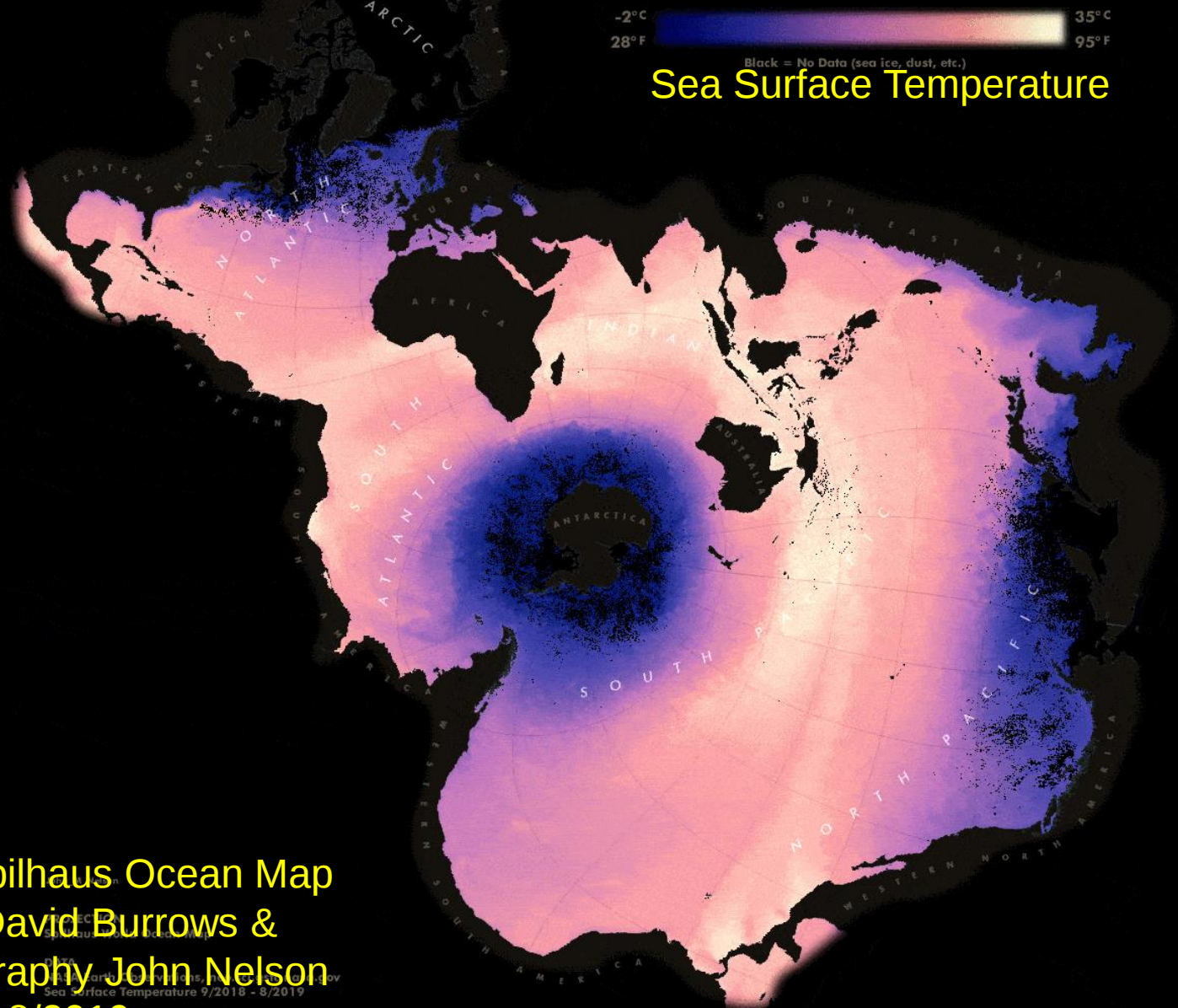
NASA GISS, R. Reudy, M. Sato, K. Lo, formerly J. Hansen

Beating Heart of the World

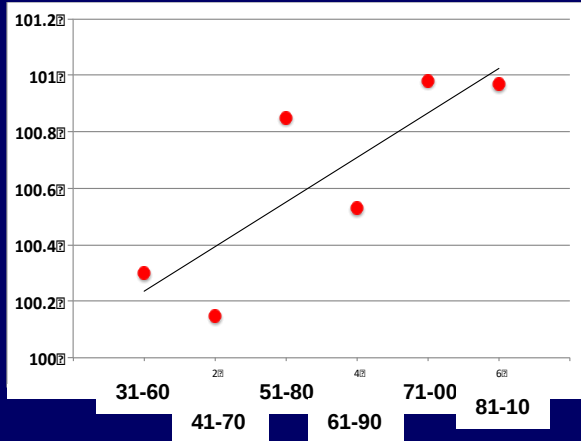
+ El Niño

Hu et al. 2020 SA
Acceleration
Ocean Circulation

Animated SST on Spilhaus Ocean Map
2019 Sep. ArcGIS. David Burrows &
Bojan Šavrič, cartography John Nelson
NASA SST 9/2018 – 8/2019



Rangitata Flooding 07 Dec 2019



Global Precipitation
50 km from coast
Curtis 2019 SR



Photos courtesy of
Bejon Haswell
See: Timaru Herald 08 Dec 2019

Credit: Stuff/Timaru Herald.

The Cryosphere (Frozen World)

NIWA Annual Glacier
Mass Balance Index
49 glaciers
1977 to present

Dr Trevor Chinn †



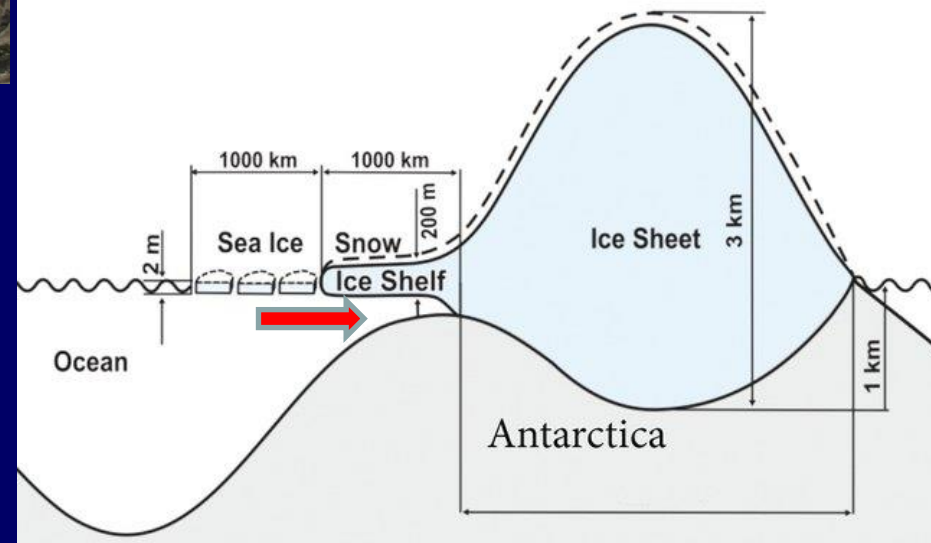
-800 Mt
June/Jul 2019

Aletsch Glacier 2013

Aoraki, Mount Cook

Lubrication

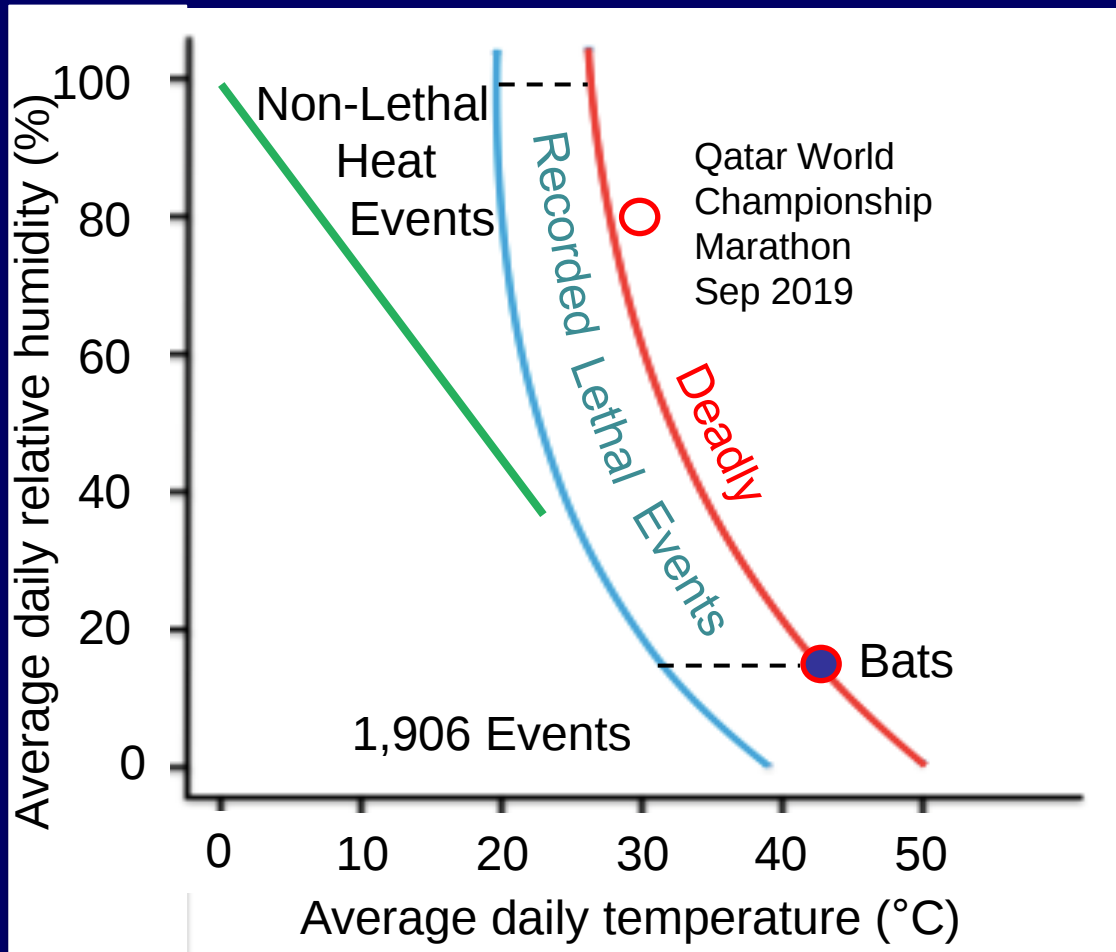
Schematic section of the Antarctic ice sheet



Australian Antarctic Division web site

Australian and Southeast Asian Fruit Bats dropping out of trees dead from extreme temperature $>42^{\circ}\text{C}$

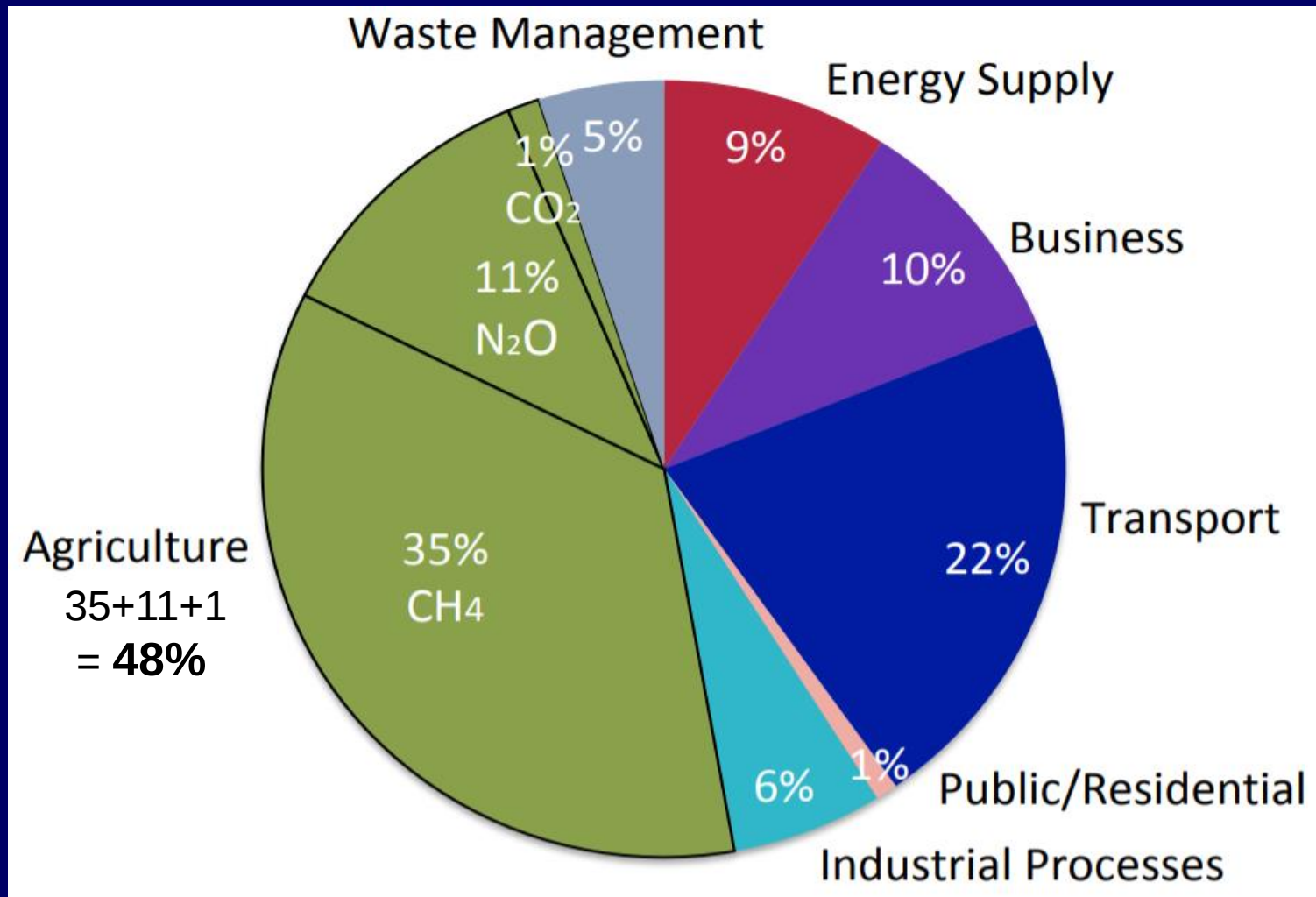
Ratnayake et al. 2019 AC, Frick et al. 2019 NYAS



Increased human mortality from extreme heat events

Mora 2017 NCC

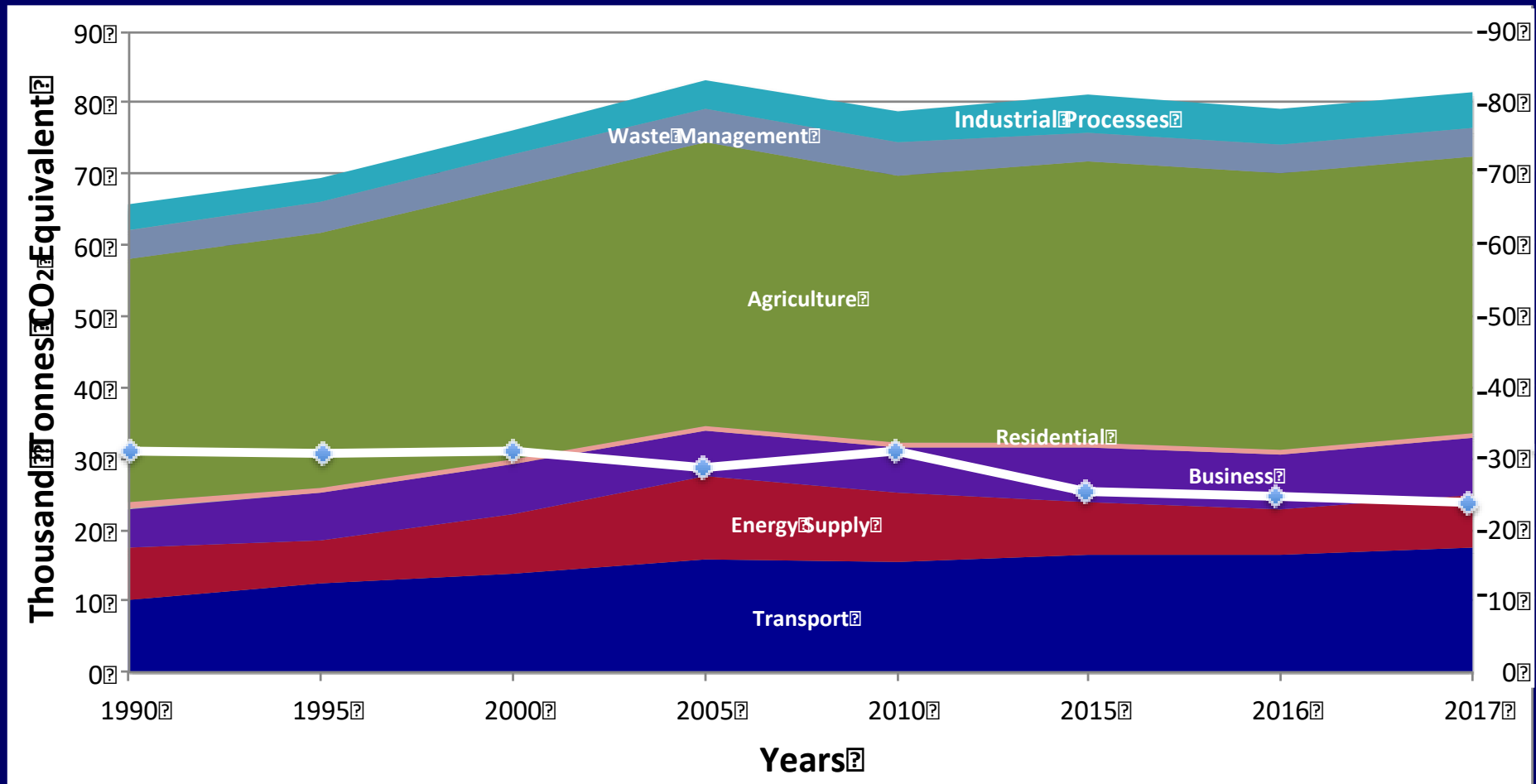
NZ Territorial CO₂e Emissions by Sector



Pie chart showing % contribution in 2017

NZ GOV GHG inventory 2019 Emission stats. 1990 - 2017

NZ Territorial CO₂e Emissions by Sector 1990-2017



— LULUCF right axis negative

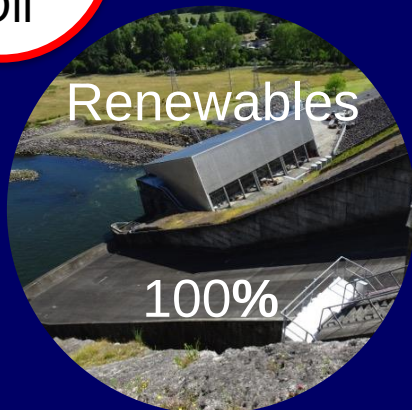
Ireland

NZ GOV GHG inventory 2019 Emission stats. 1990 - 2017



New Zealand: To Do List

VOTE



What can we do as individuals?

Lobby MPs NOW

Lobby Local Councils and Councillors

VOTE for candidates who recognise the seriousness of climate change

Include climate change in all school curriculums

Some Links to climate action web pages:

<https://www.mfe.govt.nz/climate-change/we-all-have-role-play/what-you-can-do-about-climate-change>

<https://www.activesustainability.com/climate-change/6-actions-to-fight-climate-change>

<https://www.un.org/en/actnow/>

<https://www.bbc.com/future/article/20181102-what-can-i-do-about-climate-change>

<http://www.oecd.org/stories/climate-25-actions/>

Conclusions

WAKE UP CALL TO ALL NATIONS

- Wide range of impacts that can be attributed to climate change
- Important interactions population growth, resources and climate
- Decadal to 80 year plus prognosis worrying
- Need to change the way we live at all levels
- Major economic benefits if we act now
- We are stewards of the world for future generations
- Kaitiaki – Guardians of the Earth and the waters
- The poor, children, developing countries especially vulnerable
- Just transition: fair, equitable, inclusive

NOT TACKLING ISSUES WITH URGENCY AND RESOURCES
REQUIRED



PCR

