Australian Government
Australian Radiation Protection and Nuclear Safety Agency

Background Radiation Environment in Australia

Scott Muston, ARPANSA

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SCOPE

- Background
- Exposure Pathways
- Data Analysis
- Results
- Future work

BACKGROUND

- ARPANSA developing a publication titled

Living with Radiation

- ionising and non-ionising radiation
- Risks explained in simple, easy to understand language

Background Radiation Project

- Informs the Living with Radiation publication
- SPATIAL VARIABILITY PROJECT (SVP)
  - Reassess doses to the population
    - One value is specified for the whole population[1]
    - Changes to dose conversion factors

[1]Webb, D., Solomon, S., Thomson, D., 1999. Background radiation levels and medical exposure levels in Australia. Radiat. Prot. Aust. 16, 25–32.

SVP: PATHWAYS INVESTIGATED

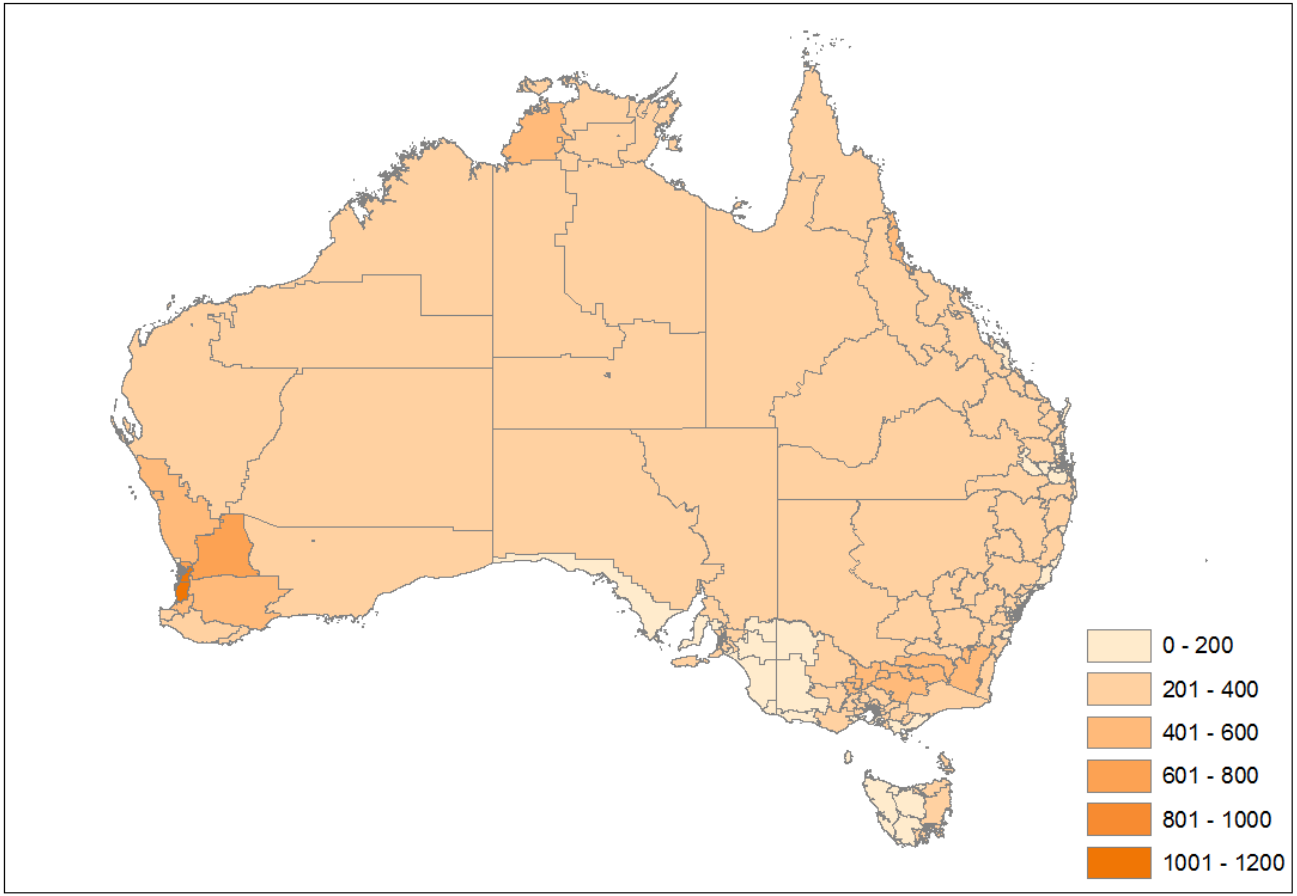
- Terrestrial
  - External hazard
  - Indoors and Outdoors
- Cosmic
  - External Hazard
  - Indoors and Outdoors
- Radon Inhalation
  - Internal hazard
  - Indoors

- Data Sources
  - Geoscience Australia airborne survey
  - CARI-6
    - Australian DEM
    - ‘96-’08 Solar Cycle
  - 1990 ARL Radon Survey
  - ABS Census 2011

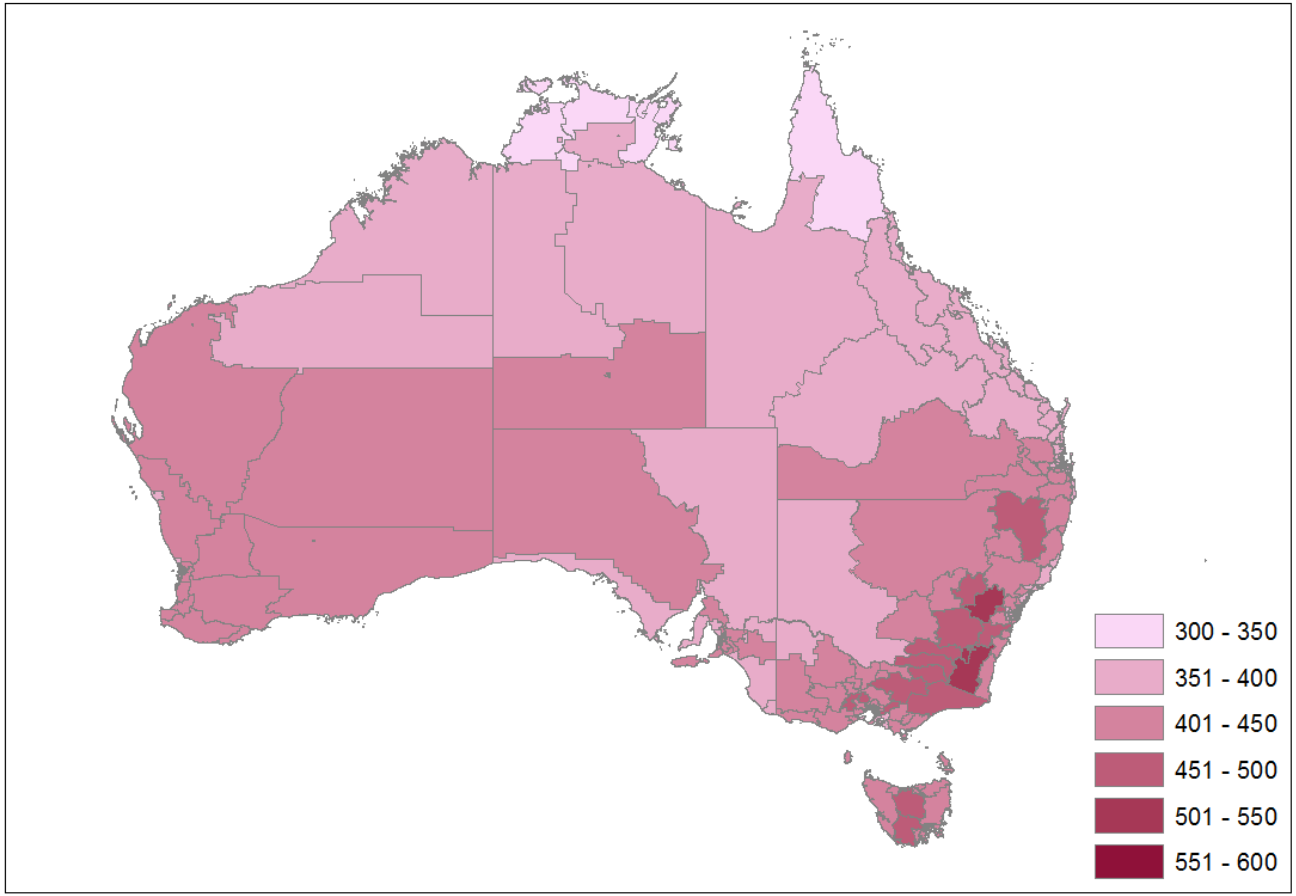
DATA ANALYSIS

- ArcGIS
- Kriging
  - Geostatistical analysis
- Aggregation to Census districts
  - Population weighted dose

Terrestrial Pathway



Cosmic Pathway

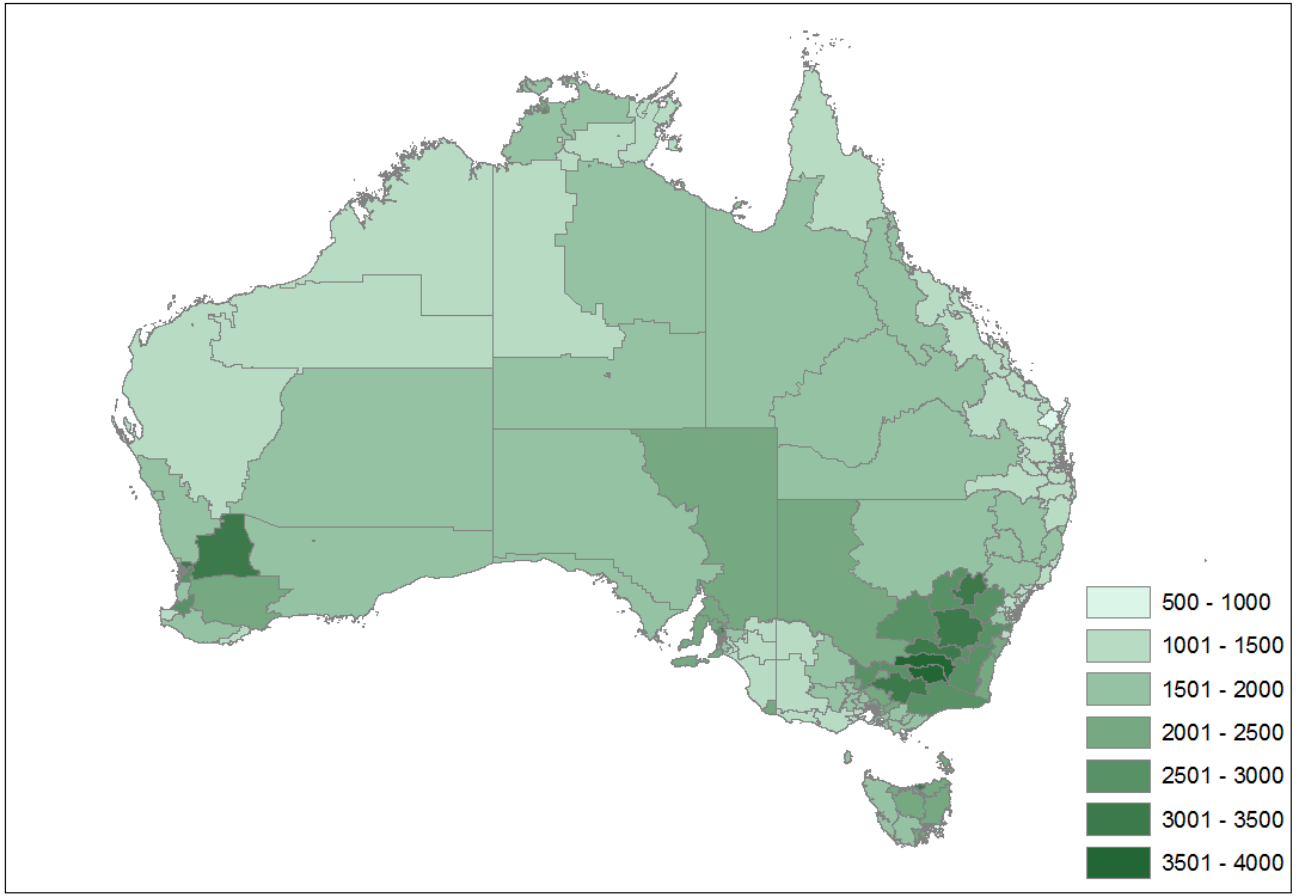


Total Annual Effective Dose (uSv) [Cosmic Pathway]

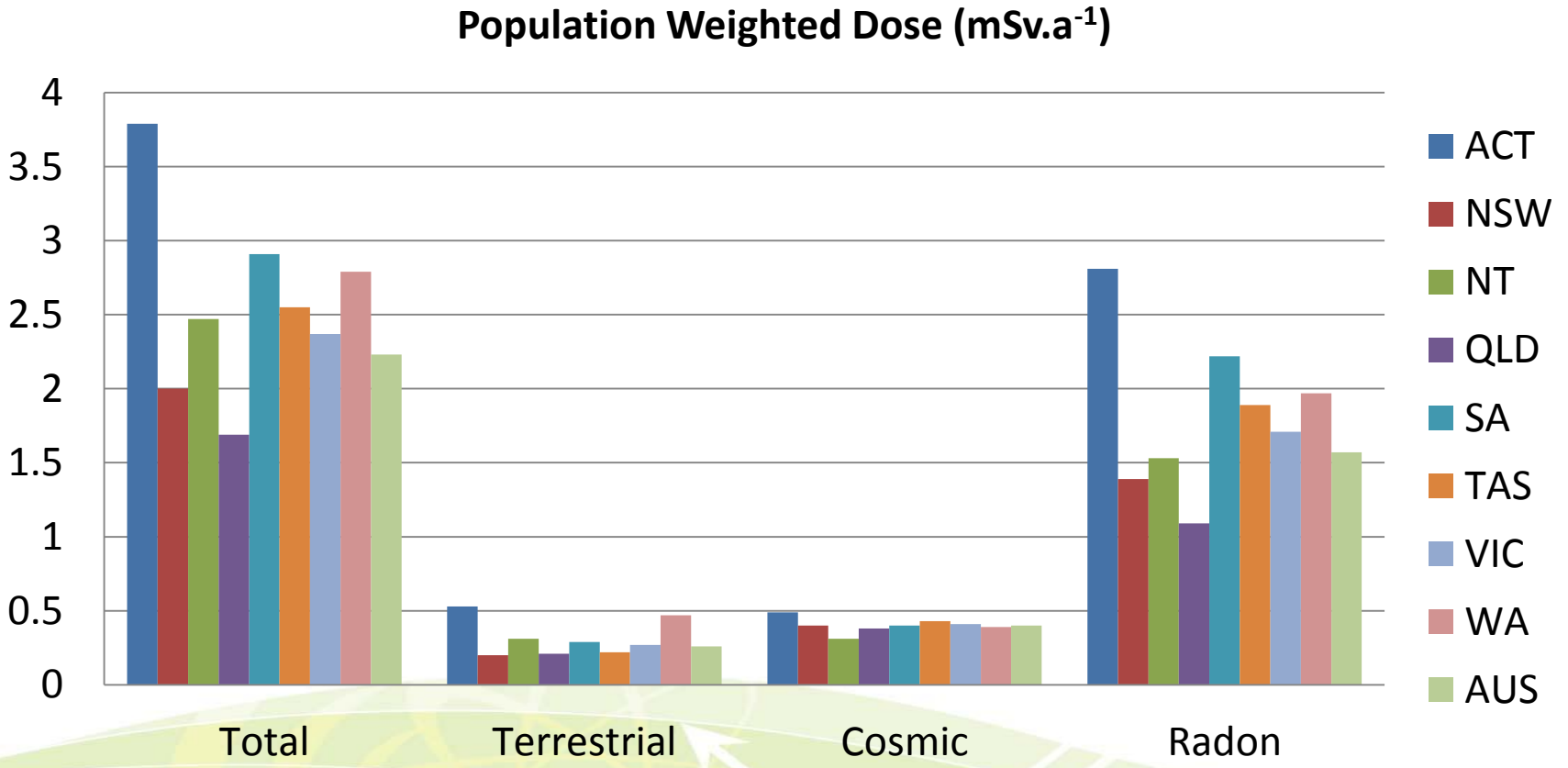
Radon Analysis

- 1990 Study
  - Representative population
  - Random spatial distribution
  - Housing factors influence measurements
- Overcome by
  - Normalising Radon values
  - Conservative dose assessment

Radon Pathway



Total Annual Effective Dose (uSv) [Radon Pathway]

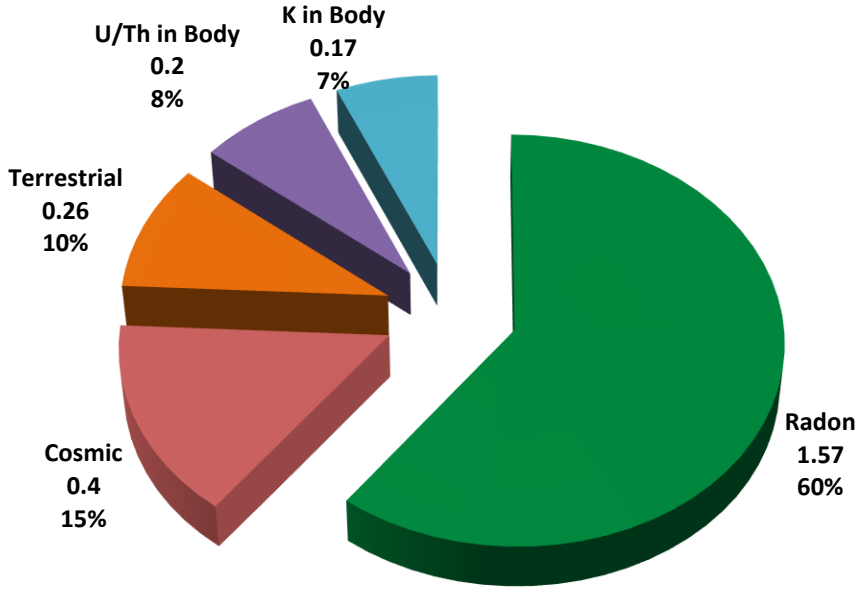

Population Weighted Dose (mSv.a-1)
4
3.5
3
2.5
2
1.5
1
0.5
0
Total
Terrestrial
Cosmic
Radon
ACT
NSW
NT
QLD
SA
TAS
VIC
WA
AUS

Comparison

	Australia *Webb et al. 1999*	Spatial Variability Project		Change
	Mean (mSv)	Population weighted Mean (mSv)	Range (mSv)	(mSv)
Terrestrial	0.6	0.26	0.20 – 0.53	0.34 ↓
Cosmic	0.3	0.4	0.31 – 0.49	0.10 ↑
Radon	0.2 (0.6)*	1.57	1.09 – 2.81	1.37 (0.97) ↑
Other^	0.4	0.4	0.4	0
Total	1.5 (1.9)	2.6	1.69 – 3.79	1.1 (0.7) ↑
UNSCEAR Worldwide	-	2.4	1-13	-

*Brackets denotes dose calculated by Langroo in 1990
^Doses outside scope of this project, U/Th in body 0.2 & K in body 0.2

Contribution to annual dose (mSv)



Discussion

- Based on IAEA GSR part 3 (BSS)
  - Requirement 47
  - Identify and evaluate potential existing exposure situation
  - Determine Radon action plan
    - Involves setting reference levels if required
    - Optimisation of protection

FUTURE WORK

- Investigate additional pathways
  - ARPANSA/FSANZ Food Basket Study
- New studies to acquire better data
- Publishing interactive maps
- Further development of existing exposure code

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THANK YOU

CONTACT ARPANSA

Email: info@arpansa.gov.au
Website: www.arpansa.gov.au
Telephone: +61 3 9433 2211
Freecall 1800 022 333
General Fax: +61 3 9432 1835