Trump proposes big cuts to science in 2018 US budget: how will they affect Australia?

I often complain about low levels of investment in science by Australian governments, whether they be Labor or the Coalition. At least most of them recognise the importance of Research and Development, even if the rhetoric isn’t always backed up by the numbers in the budgets.

Not so Donald Trump. His 2018 budget request as presented to Congress appears to be a bad deal for science, health, and all research unless it involves nuclear technology and defence.

The outlays proposed by Trump for 2018 will be approximately the same as in 2016 but $47 billion more will be allocated to the military, $20 billion more to infrastructure and there will be miscellaneous increases of $5 billion. Consequently, to achieve the same outlay, savings of $72 billion will have to be found in other areas.

It should be noted that in 2016 US military investment was estimated as more than the total military spending from the next eight biggest-spending countries. To put this in perspective, the increase requested in one year is larger than Japan’s total annual military spending in 2016.

Before some of the detailed programmes are considered, it is worthwhile comparing the size of the US budget with Australia’s.

Table 1 compares the overall outlays in USS for the US and Australia. The annual per-capita investment is USS12,500 in the US and USS14,000 in Australia. The debt/GDP value is much worse in the US, but the R & D investment in the US (according to the latest OECD report https://data.oecd.org/rd/gross-domestic-spending-on-r-d.htm) at 2.8% GDP is much better than Australia’s 2.1% GDP, which is below the OECD average of 2.4%.

Cuts to US science agencies

Figure 1 from http://www.sciencemag.org/news/2017/03/trumps-first-budget-analysis-and-reaction shows how the main science agencies fared in the President’s budget request. Since the President tabled his requests in June 2017, a House of Representatives appropriations subcommittee has already advanced a $37.5 billion energy and water bill that would slash funding for renewable and efficiency programmes and eliminate the Advanced Research Projects Agency-Energy agency, which had a budget of over $300 million in 2017.

Fortunately all the President’s proposals will have to be approved by Congress, so the lobbying will already have started to amend his proposals. The estimated R & D investment by the US Science Agencies in 2017 was about $140 billion, of which half was spent by the Department of Defence. Therefore, there must be savings from the other agencies of approximately $70 billion to meet the overall budget outlays. In this context the USGS, which had a budget of just over $1 billion in 2017 is small, but significant. Its role and functions are similar to Geoscience Australia’s.

How did the USGS fare?

The President Trump has proposed a $922.2 million allocation for the US Geological Survey in 2018. This amounts to a saving of $137.8 million from the FY 2017 allocation or a cut of 13 percent.

The Minerals and Energy programmes remain intact, which is good, but there is a 19% cut in the Natural Hazards Programme from the $145 million provided in 2017 to the $118 million, requested. A good summary of what the impact would be is at: https://www.usgs.gov/news/president-proposes-922-million-fy18-budget-usgs

This two-page document has been prepared by the USGS and is accessible in the public domain, presumably for consideration by lobbyists, stakeholders, and clients. It contains summaries of the goals of the different programmes and what the impact would be if the President’s budget is accepted.

There is no equivalent process in Australia. It’s like the Director of the National Library of Australia producing a public document to outline the impact of the efficiency divided cuts on the NLA’s programme. I don’t think the Government would allow such openness.

Table 2 summarises the situation for each of the Hazard Programmes in the USGS.

The most significant of these proposals is probably the elimination of the Geomagnetic Programme, a component of the multi-agency US National Space Weather Programme. This would not only affect the United States, but has global implications. It would mean there would be almost no reliable, real-time,
Canberra observed

open access of geomagnetic data from
the US and its Territories (including
Antarctica).

The long time-series of geomagnetic
activity, some covering periods of more
than 100 years, would be interrupted
and the standard geomagnetic indices
would not be measured over a significant
part of the globe. These data are used
to provide geomagnetic storm alerts
for aeromagnetic surveys, operators of
electricity grids and satellite systems.

The accuracy of the International
Geomagnetic Reference Field (IGRF)
would be degraded without US input of
both data and modelling capability. This
will affect the results from aeromagnetic
surveys where the data are blended with
earlier and overlapping surveys and
where the IGRF is used to determine the
anomalies.

The US commitments to the World Data
Centres in Japan and Germany will no
longer be met. The Paris Climate Accord
revisited?

How will these changes affect
Australia?

At least four issues could/would affect
Australia:

1. The geomagnetic global data-set
    will be degraded and the quality of

2. The global expertise in recording,
    analysing, and using the geomagnetic
data will be significantly reduced.

Although only 15 people are employed
in this programme, they have very
special skills that will be lost to the
global geophysical community.

3. The anti-science factor in the
    Australian Parliament may use the
    Trump budget as an opportunity to
    reduce the Australian capability, not
    just in geomagnetism but throughout
    the science sector. Notice that the
global seismological programme has
also been cut by Trump.

4. If the US withdraws from this
discipline, it could withdraw from
other global studies carried out by
NOAA and NASA and this would
result in a bad outcome for everyone
on planet Earth.

The Agencies like NOAA, NASA, the
USGS and the NSF are the ones that
have made America great. There is no
point in spending big on defence if there
is not enough to sustain these wonderful
institutions.

I hope that the value of these agencies
will be recognised and the resources
needed to carry on their good work will
be provided, but lobbying from Australia
is unlikely to work – we would just be
asked to contribute to the short fall!

Table 2. Impact of Donald Trump’s 2018 budget request on the USGS Hazard Programmes

<table>
<thead>
<tr>
<th>Programme</th>
<th>Budget request</th>
<th>FTE</th>
<th>Reduction from 2017</th>
<th>FTE losses</th>
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<tr>
<td>Earthquake Hazards</td>
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<td>Volcano Hazards</td>
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<td>Landslide Hazards</td>
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<td>Geomagnetism</td>
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<td>Global Seismographic Network</td>
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<td>$1455000</td>
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<tr>
<td>Coastal-Marine Hazards and Resources</td>
<td>$35774000</td>
<td>188</td>
<td>$4659000</td>
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</tr>
</tbody>
</table>

FTE, full-time equivalent staff.
New World Stress Map released

For the 30th anniversary of the World Stress Map project a new database, WSM 2016, has been released. It now contains 42,870 data records from a number of regions including Australia, Canada, Great Britain, Iceland, Texas, Oklahoma, Switzerland, China, Italy, and New Zealand. The number of data records has almost doubled since the last major release in 2008. They have all been added in a standardized format and quality-ranked for reliability and comparability on a global scale. The new database includes observations from approximately 4000 boreholes.

The WSM project started in 1986 as a project of the International Lithosphere Programme (ILP), under the leadership of Mary-Lou Zoback. From 1995 to 2008 it was a project of the Heidelberg Academy of Sciences and Humanities headed by Karl Fuchs and Friedemann Wenzel. Since 2012 the WSM is a member of the ICSU World Data System. The data are maintained at the Helmholtz Centre Potsdam GFZ German Research Centre.

All stress information is analysed and compiled. The WSM is an open-access public database and is used by various academic and industrial institutions working in a wide range of Earth science disciplines such as geodynamics, hazard assessment, hydrocarbon exploitations and engineering. The main operational areas are:

- Reservoir characterisation and management
- Stability of mines, tunnels, boreholes and waste disposal sites
- Calibration of geomechanical-numerical models
- 4D Thermo-Hydro-Mechanical (THM) simulations
- Hazard assessment, e.g. by means of fault-slip tendency and fracture potential analysis.

The website is: http://www.world-stress-map.org/ and Figure 1 shows the detail of data in the World Stress Map in the Australian region.

References


Figure 1. Detail of data in the World Stress Map in the Australian region. Source: http://www.world-stress-map.org/