Earth Observation Data for Official Statistics and Environmental Accounts

The ground truth 'problem'

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EO data for official statistics

In this session:

- Extending cost benefit criteria ground truth and uncertainty
- The ground truth 'problem'

- Extending cost benefit criteria ground truth and uncertainty
- EO and environmental accounting

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EO data for official statistics

Conducting a cost benefit analysis

- Costs
- Reduction in provider load;
- Sustainability of new source;
- Accuracy, relevance, consistency, interpretability, and timeliness of outputs stipulated in Data Quality Framework;
- Availability of knowledge for processing of EO data adequately
- Policy implications
- Ground truth and uncertainty

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The ground truth 'problem'

Ground truth is data from other sources e.g. surveys, field measurements, administrative data sets, etc.

Key focus of my research is getting around the problems of not enough ground truth.

How much directly measured data do you need to validate your model?

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The ground truth 'problem'

EO based statistics have a generally lower site specific accuracy compared with direct measurement,

but can:

- provide more information with greater spatial extent;
- be acquired faster and more cost effectively than traditional survey methods;
- be extrapolated across large regions and unsampled regions effectively (UN Satellite Imagery and Geospatial Task Team handbook, p.25).

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Ground truth and uncertainty

Ground truth and uncertainty:

What ground truth is available and how can it inform your statistical output?

How much would it cost to collect the amount of ground truth you need to meet your appetite for uncertainty and statistical risk for your statistical output?

Is it feasible to invest in extensive ground truth collection as a one–off to choose and validate a model, then going forward produce statistics based on that model?

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Ground truth and uncertainty

How important is it to have confidence intervals? Could an appropriate disclaimer about uncertainty of the estimates meet this need?

What is the minimum ground truth you can get away with?

Uncertainty around official statistics isn't new

As an NSO, ABS doesn't claim to have the one 'true number'.

Australian Statistician, David Kalisch on unemployment figures:

"Any sense that the number is exactly whatever we report to the second decimal point is not an accurate use of those numbers."

When producing official statistics based on satellite imagery with limited ground truth, there will be uncertainty about the true values, and perhaps more than for survey data.

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Source: Martin, P. (2015, February 13). ABS chief David Kalisch: Don't take the employment numbers too seriously. Retrieved from: https://www.smh.com.au/business/abs-chief-david-kalisch-dont-take-the-employment-numbers-too-seriously-20150212-13cjbp.html

Uncertainty around official statistics isn't new

If appropriate disclaimers about interpreting the EO derived figures are provided, as they are now for standard ABS publications, can government departments and the public accept these statistics in the same way?

To use EO data you don't need to eliminate uncertainty around the estimates, but manage communication and interpretation of them.

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EO data for Environmental accounts

The role of the national accountant is to integrate available data sources to provide *a single best picture* of a broader concept.

The maintenance of time series is fundamental

Inclusion of modelled information where there are no direct estimates is standard in national accounting frameworks e.g. estimation of fixed capital consumption using perpetual inventory model (PIM).

EO for environmental accounts

Uncertainty in national accounting contexts:

Degrees of concern about (input) *data would be the subject of description in the reporting of accounting outputs.*

It is plausible to consider publishing some ecosystem accounting aggregates within sensitivity bounds, but this is not generally undertaken.

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My perspective from working on a National Account (Tourism Account)

National accounting at the most basic level is cobbling together data sources in an educated way, doing the best you can with what you have, to give an indication of a larger concept no one data source could hope to answer on its own.

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