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Uncertainty about Inventory Estimates A Canadian perspective

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**IPCC Expert Meeting on
Uncertainty and Validation
of Inventory Estimates**

**Utrecht,
23-25 march 2010**

OUTLINE

Canada's experience

Compilation of AI countries uncertainty
reporting

Cross-cutting issues

Canada's Experience with Uncertainty Analysis

Routine reporting of uncertainties for most categories

One full T2 uncertainty analysis in 2005 -
1990 and 2001 estimates – without
LULUCF

Level: -3% - +6%

Trend: 15% point

2010: complete T1 uncertainty analysis
(with LULUCF)

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Findings

Highest relative uncertainties in same
areas as in most other countries eg.

N₂O: mobile sources and agricultural soils

CH₄: fossil fuel combustion, waste

High uncertainty does not necessarily
mean there is potential for improvements in
the foreseeable future !

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Lessons Learned (1)

Results of T2 uncertainty analysis highly dependent on the quality of inputs to category uncertainties

Time better spent improving on category uncertainties than on overall uncertainty analysis

Internal capacity insufficient to reproduce, let alone improve on, T2 analysis

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Lessons Learned (2)

Challenges identifying uncertainty about AD due to:

1. Complex data structures
2. Data combined from multiple sources
3. Insufficient information from data providers
4. Further data manipulations

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Lessons Learned (3)

(Cont'd)

Challenges identifying uncertainty about AD due to:

5. Insufficient knowledge about the uncertainty of survey data

- Majority of AD is survey data
- Uncertainty estimates appear be derived from survey covariance
- Covariance is in most cases only one of many sources of true scientific uncertainty (and likely not the largest)

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Lessons Learned (4)

Challenges identifying uncertainty about EF or parameters due to:

1. Lack of suitable data, eg measurements, especially in Agriculture, LULUCF, Waste sectors
2. Complex dependency patterns in estimation procedures
3. Unavailability of independent expertise

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Lessons Learned (5)

Inability to assess estimate error;
uncertainty estimates often reflect
precision, not accuracy

Most improvements cannot be satisfactorily
reflected in uncertainty estimates

Refining estimates can actually inflate
uncertainty!

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Lessons Learned (6)

Use of uncertainty analysis unclear

Challenge is to prioritise improvements to
uncertainty analysis versus improvements
to inventory.

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AI Uncertainty Reporting

26 inventory submissions for 2009

All but one reported overall uncertainty for the inventory (T1, some T2)

Uncertainty ranges varied between:

1% and 23% (level)

2% and 15% point (trend)

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AI Uncertainty Reporting

Common or Frequent Findings (1)

IPCC 2000 Table 6.1 used

Most frequent citation: « The purpose of uncertainty information is not to dispute the validity of the inventory estimates, but to help prioritise efforts to improve the accuracy of inventories in the future and guide decisions on methodological choice »

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AI Uncertainty Reporting Common or Frequent Findings (2)

N₂O emission factors identified with highest uncertainties

High – and highly variable – uncertainty about N₂O EFs for Ag soils:

from 24% to 200%

Kindly compiled by Belgium, 2009 NIR

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AI Uncertainty Reporting Common or Frequent Findings (3)

Full-blown T2 uncertainty analyses not conducted annually (impractical)

db1

More often, T2 uncertainty analysis conducted at sub-sectoral level, and not necessarily on a reporting category

Structure of T1 and T2 uncertainty models not necessarily same

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Slide 14

db1 Need to mention how many countries conducted T2 at least once.
blaind, 3/19/2010

AI Uncertainty Reporting Variability

Scope of discussion of meaning or implications.

Countries with highest uncertainties:
report with greater detail
have more discussion!

When both are conducted, T1 and T2 analyses yield same order of magnitude, but one does not provide consistently higher estimates than the other.

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Cross-cutting Issues (1)

Need to clarify interpretation of T1 and T2 uncertainty estimates:

1. Can they be compared – if categories are not the same?
2. Meaning of higher T1 (or T2) uncertainty estimates?
 - Effects of correlations and data distribution
3. Could there be different purposes for T1 and T2 uncertainty analyses?

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Cross-cutting Issues (2)

Insufficient knowledge about the uncertainty of survey data

Recommendations:

1. Recognize the critical nature of survey data
2. More studies to determine the true scientific uncertainties of survey data related to GHG inventories

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Cross-cutting Issues (3)

Uncertainty estimates often more to do with precision than with accuracy

Recommendations:

1. Recognize that not all improvements can demonstrably reduce uncertainty
2. Provide examples where improvements lead to a quantified reduction of uncertainty
3. Address cases where high uncertainties cannot realistically be reduced

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Cross-cutting Issues (4)

Use of uncertainty analysis not apparent:

Recommendations:

1. Provide various examples of how uncertainty estimates can be used
2. Need a discussion on balancing resources for category improvements and uncertainty updates