Leveraging Climate Science for Water and Energy Management

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Climate models virtual worlds



Climate Models vs Real World





2.5° / ~ 300km

Climate Models vs Real World



animation online: http://www.youtube.com/ watch?v=n0mupl4FZsQ&feature=related

animation online: http://www.youtube.com/ watch?v=m2Gy8V0Dv78



Climate Model Evolution





Adaptation Example I: Hydro Generation System Expansion - What are the prospects of operation in a future climate?



Example: Manitoba Hydro







Example: Manitoba Hydro – How?

- get involved with climate experts
- built own hydro climate task force
- study observed climate
- study climate model projections
- assess future water availability from GCMs
- asses options using an impact model (SPLASH)
- set up a complex hydro model

courtesv of







Manitoba + OURANOS

Adaptation Example II: Equipment refurbishment - Are future changes in water availability to be taken into account?



Hydro-Québec: Are CC impacts an issue for renovations?

- Installations will need refurbishment
- Request: « We need your best climate change scenario! »
- Response: Show why there is no single « best CC scenario » and propose alternative.



THE best simulation? Uncertainty explained by N simulations





Response: Selection of four scenarios at 5%, 25%, 50% and 75% of change

Selcection Criteria: Δ in energy production / temp





Response: Selection of four scenarios at 5%, 25%, 50% and 75% of change





Climate Information Variety



source: Isabelle Charron, A Guidbook on Climate Scenarios, 2014, Ouranos

Climate Services

- a bidirectional learning and communication process that should maintain
 Simple
 Robust
 - a critical spirit
 - transparency
 - credibility
 - responsibility
 - traceability

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Climate Services

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- can range from basic information and support to detailed, custom tailored analysis including R&D
- climate change information needs to include variability and uncertainties



Conclusions

- Climate simulators (=models) provide climate information in abundance at different scales. The complexity of these data must be understood.
- Downscaling can be employed to meet scales and correct biases.
- Climate impact models can be driven with climate data (hydro models, management models, etc.)
- Appropriate assessment and documentation of uncertainties is required for all levels of scenario production and use (emission scenarios, models, natural variability, impact models, ...)
- Climate experts can help in interpreting and processing these data into value added products (connect users + Climate Services)
- Despite all remaining climate projection caveats and uncertainties the information we have is sufficiently mature to show anticipated changes and the underlying level of confidence



Thank You For Your Attention!

Questions? Comments?

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