Abstract

Data generated by computer-based simulation models have not generally received the same level of attention as observational data from a data management perspective. However, computer models in areas such as climate change are increasingly being used in interdisciplinary research and assessment efforts and in national and international policy discussions. Inter-comparison of different models and results, often developed by different research groups around the world, is vital in a time frame that is difficult for traditional processes of scientific review and publication to accommodate.

Working closely with Working Group III of the Intergovernmental Panel on Climate Change (IPCC), CIESIN developed an online World Wide Web (WWW) site to support an “open process” of international scientific review and exchange for the Special Report on Emission Scenarios (SRES). This WWW site provided interactive access to a variety of scenarios and supporting materials developed by the Working Group and a means for the international scientific community to submit comments and new scenarios for Working Group consideration. The collaborative effort also gave the writing team an opportunity to deal with the archiving and documentation needs of an unusual set of model-generated data. This paper describes key lessons learned in supporting the IPCC Open Process and in managing complex model-based data sets.

The SRES Open Process Site

Beginning in early 1998, CIESIN developed and implemented an online system to facilitate access to the SRES data and stimulate international participation. The open process WWW site contains extensive documentation about the SRES approach and scenarios (Figure 1) and interactive tools for visualizing and downloading preliminary data from the SRES writing team. In addition, from mid 1998 to early 1999, the site provided a means for users to submit comments and new scenarios in a format compatible with the SRES needs.

The design of the SRES site was driven by the need to convey a complex and evolving set of data and information developed by the SRES writing team. The site provides detailed descriptions of four key storylines and “marker” scenarios that are based on the model results from six different modeling groups. The interactive visualization system offers users the ability to view, plot, and map results for a range of emission scenarios. The visualizations are tailored to the needs of scientists already familiar with integrated assessment models and emission scenarios, rather than more general users.

Further development of an Internet-based clearinghouse system for SRES scenarios and associated computer models is being recommended by the SRES writing team and the IPCC Bureau (pending final approval of the SRES report). In particular, the writing team and the IPCC have agreed to allow CIESIN to archive and disseminate the final set of scenarios through CIESIN’s Socioeconomic Data and Application Center (SEDAC), after formal approval and release of the SRES.

Introduction

In 1996, the IPCC charged its Working Group III to develop the Special Report on Emissions Scenarios as an input into the IPCC Third Assessment. The purpose of this report is to assess future emissions of greenhouse and related gases under the assumption of no intervention, i.e., no explicit additional climate policies.

In response to experience during the previous assessments, the IPCC asked the SRES writing team to implement an “open process” for soliciting feedback and suggestions for new scenarios from the international scientific community. Such an open process is especially critical in light of the diversity of views and model-based projections of future economic, social, and technological development as well as the need to address important differences across world regions and sectors of society. Although the writing team already includes some 40 scientists from 25 different countries, the team felt that even broader international review and input were vital.

3. Significant effort is needed to fully document and carefully disseminate model-generated datasets. Model-generated datasets are very sensitive to variable and category definitions, input parameters, initial and boundary conditions, exogenous datasets, spatial and temporal resolution, computational algorithms and numerical schemes, and other aspects of model implementation. Ensuring complete documentation of all of these factors is extremely difficult, even when different modeling groups collaborate on model inter-comparison.

4. Greater attention is needed to archived and documentation of models and associated scenarios used in periodic assessments. CIESIN encountered one situation in which critical information used in the Second IPCC Assessment was at high risk of loss due to the lack of attention to data archiving and documentation. Loss of this information would have hampered rigorous inter-comparison of SRES scenarios with previous baseline scenarios (IS92). Looking ahead to future IPCC assessments and continuing research on future emission pathways, it is vital that current work is fully documented, preserved, and made accessible for future review and analysis.

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