

Summary Statement from the C-ROADS Scientific Review Panel

C-ROADS (Climate Rapid Overview And Decision-support Simulator) is a timely simulation tool that provides policymakers and policy analysts in government, NGOs and the private sector, as well as the general public, a better understanding and intuitive feel for the broad brush, long term consequences of climate change given various GHG reduction strategies. This very rapid simulation model reproduces the response properties of state-of-the-art three dimensional climate models very well – well within the uncertainties of the high resolution models—and with sufficient precision to provide useful information for its intended audience. The dynamic non-linear model is sufficiently sensitive that C-ROADS can be used as a decision support tool in understanding and discussing efforts aimed at limiting temperature change to 2 degrees C of warming, which is the goal of the European Union and supported by many in the scientific and NGO communities. The ability to rapidly test a range of policy proposals for future emissions is particularly useful for audiences wanting to understand the implications of different decisions in real time. The model draws on a number of creative indicators (emissions per capita and per \$ GDP) to explore potential emission reduction regimes.

In using C-ROADS, it is important to remember that the simulation is a sensitivity tool, rather than a tool to provide precise quantitative estimates of projected emissions, CO₂ concentrations, and temperature and sea level responses. To ensure effective communication on the capabilities of the model simulations, we recommend that the simulations be more explicit on the uncertainties about the climate system, e.g., in the form of probability relationships within and outcomes of the model. We also suggest that the model not be justified as a reduced physics model. As the dramatic impacts associated with sea level rise are on a longer multi-century time scale, we recommend that sea level be represented for more than 100 years, or the risk be conveyed by alternate means.

Over time, improvements could be made to the simulation and its presentation. We recommend including feedback from global temperature on ocean and land processes in the C-ROADS model, e.g., feedbacks on the carbon cycle, and consider a module on ocean acidification. We also recommend that the model be further developed to explicitly include the six Kyoto gasses plus other human-induced drivers of climate change (e.g. soot, ozone, SO₂). In running the simulation, presenters could provide additional detail on the assumptions behind the emissions scenarios used, particularly for any business as usual scenario and possibly by providing more than one emissions scenario, i.e. not just using a single high emissions baseline scenario. The CROADS team makes effective use of the “bath-tub” diagram to illustrate some of the complicated underpinnings of the simulation; additional use of such diagrams would be helpful. For the web-based version of C-ROADS, the C-ROADS team should consider having direct links to sites with up-to-date and authoritative information and make direct comparisons with officially stated national emission reduction targets.

Extensions to C-ROADS, from global to regional projections of climate change, would improve the policy-relevance and allow for better communication of the impacts of climate change and provide a useful means for examining the societal implications of particular emission reduction scenarios. A simple mapping extension could also be used show the land area impacted by rising sea levels. In addition, we recommend that the C-ROADS development team explore tying emissions scenarios and outcomes with the economic impacts of different mitigation strategies, i.e., avoided costs of impacts as well as mitigation costs, although this is not to say we are recommending a full cost-benefit analysis be performed given the difficulties associated with monetizing certain impacts and the issue of discount rates. Linking emissions scenarios to specific costs in specific sectors – in power generation, transportation, agriculture and others – would also facilitate the policy debate.

Given the model’s capabilities and its close alignment with a range of scenarios published in the Fourth Assessment Report of the IPCC we support its widespread use among a broad range of users and recommend that it be considered as an official United Nations tool.

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¹ The review panel’s endorsement of C-Roads represents the views of the members of the review panel in their individual capacity and does not necessarily imply any endorsement by the organizations with which they are affiliated.