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MODEL-DATA INTEGRATION: WORKING TOGETHER AND SYSTEMATICALLY RESOLVING DISCREPANCIES

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ABSTRACT

Models and data have an important but sometimes uneasy relationship. Data provide snapshots of what is happening in the system, whilst models can explore the underlying processes driving the observed behavior. Thus models and data together provide a more comprehensive description of the system than either one alone. However, engagement between modelers and those who collect data can sometimes be challenging, especially if there are discrepancies between models and the data. This presentation showcases our recent work to bridge this divide by introducing (1) a systematic framework for addressing model-data discrepancies, and (2) an action plan to improve relationships between those who model and those who measure. The systematic framework aims to equally balance the potential for discrepancies to arise from data and/or models. The action plan is presented as a light-hearted animation which highlights that modelers and data collectors both want the same thing: better decisions from better science.

1 INTRODUCTION

Models are developed to guide decision-makers and managers by supporting sound scientific understanding of environmental systems (Jakeman et al. 2006). Accordingly, data are key to develop and assess fit-for-purpose models (Hamilton et al. 2022). However, just as mathematical models are only ever simplified representations of a real system, data are only a snapshot of the system in time and space, so discrepancies can arise due to the limitations of either (or both) of these different types of information. Good communication between modelers and those who collect data can help to identify the root causes of any discrepancies between models and data. Overcoming any relationship issues between modelers and data collectors is paramount to ensuring that the benefits of both the models and data are maximized for improved decision-making. This presentation showcases our recent work to bridge this divide by introducing (1) a systematic framework for addressing model-data discrepancies, and (2) an action plan to improve relationships between those who model and those who measure.

2 RESOLVING MODEL-DATA DISCREPANCIES

The systematic framework for resolving model-data discrepancies (Vilas et al. in preparation) consists of a series of steps after an initial trigger. Discrepancies are articulated, and potential causes are listed. Then, further knowledge is sought through which it is hoped that the discrepancy can be resolved. In the step of articulating discrepancies we recommend that both model and data causes are considered, to equally balance the potential for the found discrepancies to arise from data and/or models. In the presentation, case study examples of how this framework has been used to resolve model-data discrepancies are described.

3 IMPROVING MODEL-DATA COMMUNICATION

Good communication between the people who build and use models, the people who collect the data, can help to get the most out of both models and data. To support this, the presentation concludes by presenting a light-hearted animation whereby a modeler and a data monitor visit a marriage counsellor to sort out their differences. This animation has potentially wide applicability, as it can be used for science communication to highlight that modelers and data collectors have the same goals: improving science and decision-making.

REFERENCES

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