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# Research Prioritization at the Planetary Defense Coordination Office

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## ABSTRACT

The development and implementation of effective policy interventions to address the threat of large asteroid and comet impacts is impeded by the presence of uncertainty. Mathematical and computational models serve as the primary tool to reduce and communicate residual uncertainty regarding the likelihood and consequences of a large impact, as well as the effectiveness of proposed deflection and disruption technologies. Within NASA's Planetary Defense Coordination Office (PDCO), decisions about which modeling studies (i.e. which uncertainties) to prioritize are made through complex interactions between modelers, policy-makers, research directors, and other intermediaries. As the timing and likelihood of a possible catastrophic event are uncertain, research prioritization decisions are a crucial – yet understudied – component of planetary defense governance.

This paper investigates the research prioritization process at the PDCO, focusing on the development of 'in-house' impact, trajectory, and intervention models. While the PDCO has been primarily concerned with 'preparatory' modeling studies, the paper also addresses the use of models to reduce uncertainty in 'real-time' during the 2017 TC4 Observation Campaign. Drawing from data collected through interviews and surveys with PDCO modelers, research directors, and policy-makers, this paper sketches out the processes and procedures through which key uncertainties are identified, prioritized, and modeled. It then measures the extent that modelers' tacit expected value of perfect information (EVPI) estimates reflect actual research prioritization and funding decisions. It is proposed that compared to other global catastrophic risk governance institutions like those addressing climate change and

infectious disease outbreaks, PDCO modelers face greater resource constraints but fewer political constraints when influencing research prioritization decisions.

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