Using Agent-based Models to Understand Sampling Logistics: An Example of Surveying the Snow

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Abstract. Models and simulations are prevalent in today's professional and social societies to explore outcomes under many potential conditions. Models may be used when demonstrating a scenario to develop an understanding of a particular object, environment, or situation. Simulations may also be used to train and condition a user preparing to perform a task. Data collection in the field can be an expensive endeavor in terms of labor, equipment, and time when compared to many remotely collected data available today. Some data still elude remote sensing platforms and must be collected using field surveys. In these cases, navigation aids, collection equipment, and other tools are required to enable individuals to maintain a particular transect, take accurate measurements, and record the desired data. Designing a feasible collection strategy is crucial to maximizing the return from invested resources. This study explores answers to these questions by using an Agent-Based Model approach to evaluate data collection strategies used in measuring snow. This is often a harsh environment at high elevation requiring much effort, both logistically and physically. Using this approach, we addressed the following questions: 1) What results can one expect when people are used to collect data across a spatial extent? and 2) Can a planner reasonably expect to collect the types and quantities of data expected to provide a representative sample of the desired extent? Communicating an appropriate strategy will enable those individuals responsible for collecting the data to understand their task and how to perform it better in an effort to collect measurements that can increase integration with other data sharing the spatial extent.