

# Temporal Modelling Consideration for Geospatial Data to Support Time-Aware Operations

Ho Sin-Yi (Chinese Taipei)

**Key words:** Cadastre; Land management; Standards; Time-aware; valid time; standardized temporal description; Interoperability

## SUMMARY

The success of GIS heavily relies on the correct use of diverse built-in operation modules. While the design of every operation has its intended purpose and limitations, the temporal aspect is unfortunately often overlooked during operation design. The time-aware operations in this paper imply those operations whose results must depend on the correct availability and interpretation of temporal information. Since the world phenomena may continuously change, the content of geographic data is only regarded as the situation at a specific time, such that all operations involving the processing of multiple datasets with different valid time are potentially time-aware operations. Whether and how time information is recorded, as well as how its topology is determined, will limit the subsequent analysis and applications of geographic data. For time-aware operations, two requirements must be considered, standardized temporal modelling based on the valid time concept and workflow redesign of time-aware operations. One important argument is the GIS operation outcome must also have its own valid time. We first explore 5 factors that must be considered for designing standardized time description, then further analyze the time-aware characteristics of 4 commonly used GIS operations and propose refined design strategies for determining the valid time of the operation outcomes. Meanwhile, the proposed system should be able to visually present the analyzed results for decision making. The preliminary results show the proposed time-aware GIS operations are not only advantageous for providing useful reference information, but even necessary for making correct decisions. Mandatory requirements on the availability of standardized valid time information must be enforced while designing the geospatial features. As the sharing of geospatial resources become increasingly popular, we demonstrate in this research even the most commonly used GIS operations may require brand new design strategies about temporal information to deal with the seemingly simple data integration issue.

---

Temporal Modelling Consideration for Geospatial Data to Support Time-Aware Operations (11938)  
Ho Sin-Yi (Chinese Taipei)

FIG Working Week 2023  
Protecting Our World, Conquering New Frontiers  
Orlando, Florida, USA, 28 May–1 June 2023