

Latest developments in temporal GIS

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One of the true challenges of geographical information science is the handling of spatiotemporal data. Our environment changes, both in space and time and tools like geographical information systems (GIS) try to deal with these dynamics. Still, a GIS can be considered mostly a static system dealing with time slices instead of time volumes. This is not necessarily a problem as many application fields are dealing with geographical situations at a certain point in time. Dynamic information can be obtained by comparing two or more of these situations, e.g. by monitoring land use change between 1950 and 2000. A problem could occur with the introduction and acceptance of GIS in atmospheric sciences, a development that can be clearly identified since the end of the last century.

Atmospheric data is spatiotemporal by definition. Atmospheric instruments produce an enormous amount of data, each day again, which are processed by dedicated systems and infrastructures. GIS can help to streamline this data flow during different phases of processing, but not replace this very often efficient sequence of standard procedures. Instead, it is more fruitful to investigate how the best of both worlds can be brought together. The merge of atmospheric information systems (AIS) and GIS could for example result in better spatiotemporal data handling, advanced visualizations and efficient storage (large data volumes!).

But first we need to know exactly what these systems can offer. Therefore, an inventory of state-of-the-art GIS and AIS systems has been carried out, with emphasis on spatiotemporal functionality. Remarkable is the increase of scientific publications on the issue of time in GIS, whereas the implementation of proposed ideas is far behind. Clearly, a dynamic GIS has to offer more than cartographic visualizations like animations. It is about data models and spatiotemporal databases that allow for spatiotemporal queries in which time slices are used to reconstruct a time volume.

This paper will deal with the status of current GIS systems as far as temporal functionality is concerned. Furthermore, some specifications of a temporal GIS are discussed that are essential for the handling of atmospheric data sets.