The Need for Time Standards in Geospatial Metadata

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Key words: GNSS/GPS; Positioning; Standards

SUMMARY

In the era of simple, high-accuracy and precision, GNSS enabled positioning, the

expansion of time-dependent positioning has grown rapidly. Many countries have begun taking advantage of dynamic geometric reference frames that both acknowledge and depend on the utility of time being a component of position. The International Terrestrial Reference Frame annual updates and the World Geodetic System of 1984's various realization epochs, have accepted this reality for years through their reference data. However, the average practitioner of surveying and GIS has long been able to get away with assumptions of equivalence between common systems and indeed, many commercial software solutions fail to adequately

acknowledge the necessity of proper temporal adjustment of data. As time has progressed since the advent of modern GNSS capabilities, the plates have continued their motion and drifted further from their locations of years ago. Surveyors have long kept pace with these subtle updates of the reference frames, but in the positioning industries at-large, maintaining positions to within one meter has often been considered an acceptable standard. As many of those frames began drifting beyond where the one meter accuracy level, some as early as 20 years ago due to sudden tectonic events, many users collectively shrugged and persisted in the belief that such small differences remained unimportant.

As the international community develops new standards for plate-fixed work in various regions, many new reference frames, such as the currently under development North American Terrestrial Reference Frame of 2022, will be both geocentric and plate fixed at the moment of realization and then drift. The motion of the frame is to be acknowledged and built-in and any transformations of positions in the system will need to know when the data was captured to properly reflect accurate

and precise position of the data and then needs to be maintained in perpetuity, along with the physical spatial position of the data. In modern geospatial referencing data formats, there are many parameters to maintain in metadata that are readable by both man and machine, but almost all concern the physical location, rather than the temporal location or reference. In many commonly used reference standards, there is indeed no way to properly reference time and as such, data inherently loses value as soon as it is separated from the creator unless great care of communication is taken. The need for modernized standards to fully acknowledge time across geospatial data formats is becoming more and more clear and the time we began to need those standards is already in the past.