

GNSS Doldrums

Now is the summer of our content, made inglorious winter by, well, just a bunch of stuff.

Name your poison. Brexit. Terrorism near and far. An unpopularity contest passed off as the U.S. presidential election. Yapping dogs in the neighbor's yard. The Chicago Cubs threatening to blow their World Series chances once again. And global warming? Even the lawn-grass has stopped growing in the heat.

Congress has closed up shop and decamped for the hustings, spreading the locus of partisan bickering across the nation's geography until after Labor Day. (Perhaps the Capitol dwellers' only common cause with Europe is a bipartisan affinity for lengthy summer vacations.) The \$2.57 per gallon price of gasoline at the service station on the corner hasn't changed for a month.

And somewhere out in the Atlantic Ocean, perhaps not too far from Null Island (see GNSS Hotspots), the Intertropical Convergence Zone putters along, probably filled with small pieces of plastic and other debris, leaving us stuck in the doldrums.

Daylight hours lengthen and progress on projects slows to an inertial crawl. But enough about OCX, which is the GPS control segment of the next generation . . . and apparently always will be.

The Global Positioning System got a 20-year jump on just about every other GNSS program and appears ready to rest on its "gold standard of PNT" laurels. At the same time, GLONASS has been brought back from the dead, BeiDou rushes forward, and Galileo is actually threatening to arrive.

So, while we have this momentary interlude of summer, let's muse about these four systems.

Could we have expected that, with the sterling example of the Global Positioning System — a program more technologically successful and practi-

cally significant than its creators ever imagined, those GNSS programs that came after would find an easier course to completion? Nope.

For its own part, lulled by expectations of a U.S. monopoly on GNSS that persisted into the George W. Bush administration, GPS appears to have fallen victim to its own success.

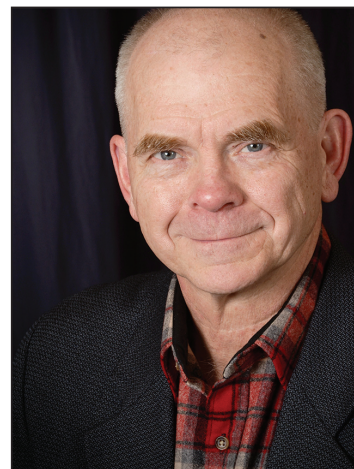
The false mindset of austerity in our wealthy nation fuels political battles that cripple efforts to sustain programs and improve infrastructures. Resources are promised and then withdrawn, second-guessing by executive departments and Congress becomes a way of life, changes in military strategy and personnel alter priorities and initiatives, technical improvements turn out to be harder than expected and abandoned or deferred.

The tortoises of the GNSS race are looking more like thoroughbreds.

Resurrection of Russia's GNSS — completed, then left to decay in the wake of Soviet disintegration and the chaos of the Yeltsin years — appears as remarkable as Lazarus rising from his funerary linens.

True, GLONASS modernization has been hindered by corruption and Western technology boycotts in the wake of Crimea. Still, seven GLONASS-M satellites on the ground and improved performance of spacecraft and ground control, suggests that the program may hang on until Russia sorts out its political mess. That, plus President Putin's apparent resolve to retain GLONASS as a showpiece of national achievement.

China seems to be the only latter-day GNSS provider that truly learned from the lessons of its predecessors — assembling and proceeding step by disciplined step along a carefully plotted and financed path. It distilled and adopted the best features of earlier



systems while adding its own innovations. The result: an expedited implementation that simultaneously built homegrown capabilities.

Europe, after tentative overtures to the United States to join the GPS program, began getting in touch with its own inner GNSS in 1993. Now, 23 years later, the 28-nation confederation has paddled out of a becalmed stretch of political indecision and changes of direction. Galileo is dem-

onstrating the benefit of hard-won consensus and European technological prowess. If it succeeds with four-satellite launches beginning in October, Europe will have outdone even the Chinese in showing how to build a constellation in a hurry and reduce launch costs along the way.

Unlike the doldrums of the oceans, the doldrums of human endeavor can appear anywhere and anytime. Some GNSS programs will flounder into them again, others will emerge chastened and recharged. The world will turn, and fortunes, too.

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