GPS Observations:
Applying CORS Base Station Data to Kinematic BPS

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In the United States, a number of bodies including federal/state/municipal government agencies, universities and private firms have banded together under the direction of the U.S. National Geodetic Survey (NGS) to implement and maintain a series of Continually Operating Reference Stations (CORS). These permanent GPS stations are distributed throughout the United States, the Caribbean and Central America. The network currently numbers nearly 200 stations and is growing at a rate of a few sites per month. The close proximity of a number of CORS stations makes medium accuracy GPS (1 to 5 m) possible in many parts of Canada. CORS data is particularly attractive because it is available over the Internet for free.

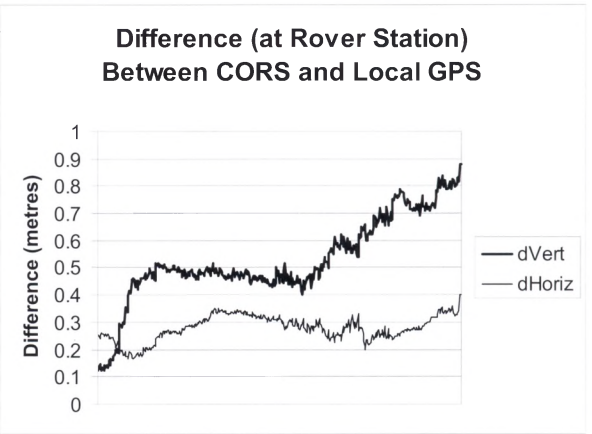
NGS provides an informative web site with detailed download instructions, graphical indices showing station locations and tips to help you make good use of the data. To get started point your browser to http://www.ngs.noaa.gov/CORS/

While CORS provides a ready source of GPS reference data, many of the sites within the network log data at intervals as high as 30 seconds. This poses a challenge to those attempting to use CORS data for kinematic GPS observations – methodology commonly used for GIS-type mapping. Route mapping applications in a moving vehicle, for instance, become problematic when you consider that points collected at 80 km/h would be separated by 666 metres. One solution might be to interpolate GPS positions from 30 seconds down to a more reasonable interval. This solution would be less than ideal because the accuracy of the interpolation would depend on how far one deviated from a straight line within that 666 metre distance. It is unlikely that this method of *positional interpolation* would succeed for an accuracy expectation of 1 to 5 metres.

This problem can be overcome through the use of *observational interpolation*. This involves interpolation not of the ultimate 30 second positions, but of the actual GPS observations themselves. These individual satellite signals include pseudo-range, carrier phase and Doppler. This method of interpolation is superior because GPS satellite orbital paths are stable and well known. Orbits can be predicted in such a way to maintain the integrity of the differential GPS solution. Interpolation software is available for free from NGS at their CORS web site. Note that the user's GPS must still collect data at a high data rate.

Tests recently completed by the author on airborne kinematic data collected in Prince Edward Island show good comparisons between solutions calculated using a resident GPS base station and observational interpolation of CORS data from a station 250 km south-west of the test area. The interpolated CORS solution differed from the local solution by a maximum of 0.9 m (see graph). For further information, including graphs and other diagrams, point your browser to http://www.Everest Geodetics.com/CORS/.

When combined with observational interpolation, CORS data provides a cost effective reference solution for post-processed kinematic GPS observation.



Comparison from a distance of 250 km shows CORS to be suitable for mapping grade applications.

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SITES TO SEE

http://www.gis.com

GIS.com is a portal to GIS information on the Web and was created by ESRI, a GIS software developer. The site is intended to educate anyone interested in geographic technology on the value that technology brings to their day-to-day activities. The site also provides GIS users with resources to help them in their work.

http://www.fourmilab.ch/earthview/vplanet.html

Earth and moon viewer allows you to view a map of the earth from the Sun, the Moon, by latitude, longitude and altitude or above various cities around the globe. You can also view the moon from the Earth, the Sun or above named formations on the lunar surface.