

GCP view of the 2020 Presidential Election

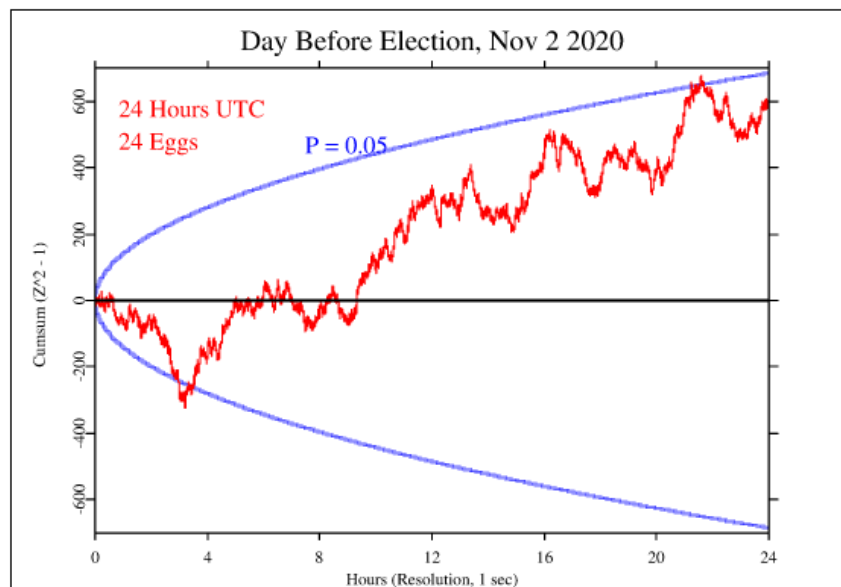
Roger Nelson, November 6 2020, additions Nov 9.

Because the US has an outsize influence in the world, its political processes are of interest around the globe. People pay attention to US Presidential elections in general, but perhaps more so in 2020 than is usual because the President has been so unusual. In any case, this occasion is one we have assessed every four years since 2000, and will again this year. The following is a brief report on what the GCP data look like day by day, even while the vote counting continues. The outcome as I write has not yet been officially determined, but it appears that Joe Biden is likely to be declared the winner, based on his lead in 4 of 5 states where mail-in and provisional ballots have not yet all been tabulated.

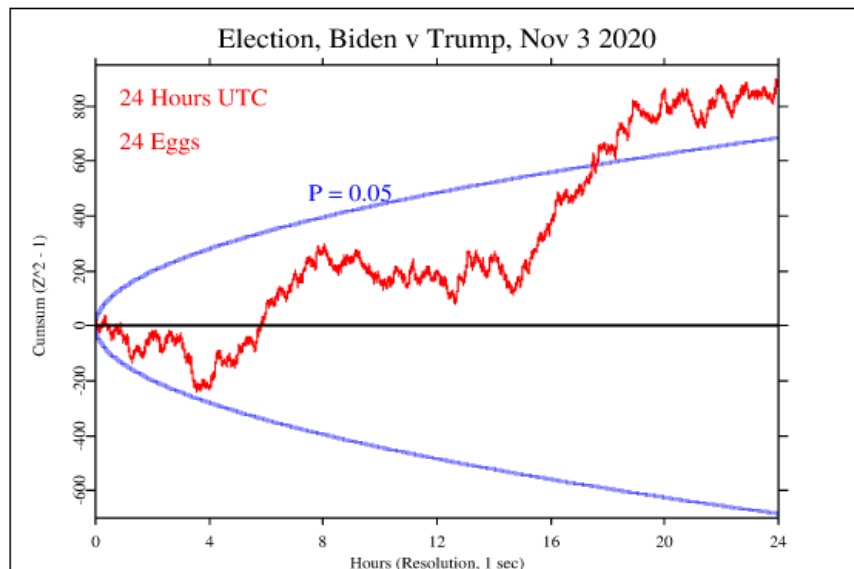
The Coronavirus pandemic continues, and it has caused major alterations in voting patterns. Early voting was available in most states, and was heavily utilized. In many or most states a strong push was made for people to use mail-in ballots, and as a result, vote counting has been delayed for a large proportion of ballots. Democrats heeded the suggestion while Republicans tended to follow President Trump's exhortations to vote in person. That has resulted in big changes in the vote totals over time, with the in-person votes (favoring Trump) being counted first, and the mail-in ballots (favoring Biden) taking multiple days.

The analysis and graphs I will show here cover a much longer period than usual, Typical specifications are a few hours for events with a sharply defined starting time like an explosion or an attack, up to a full day for events that don't have specific times, like holiday celebrations, peace demonstrations, etc. The election is obviously in the latter category.

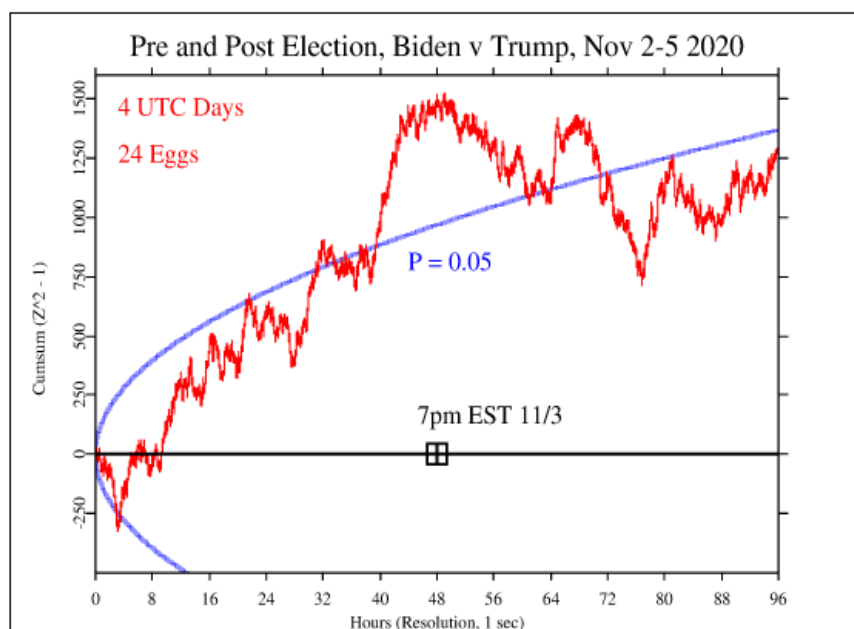
The first data I examined was for the 2nd of November, the day before the election, but well into the "election" mood. It shows a modest but persistent incline, indicating a consistent but non-significant positive deviation of the RNG output. Note that the hours indicated for the horizontal axis are in UTC.



Next, we look at November 3, the actual Election Day. The horizontal axis shows UTC (GMT) time, which is 5 hours ahead of US Eastern Time. 7:00 pm EST corresponds to 12:00 midnight UTC. The data show a positive trend and the terminal value is significant with chance odds of about 1 in 50.

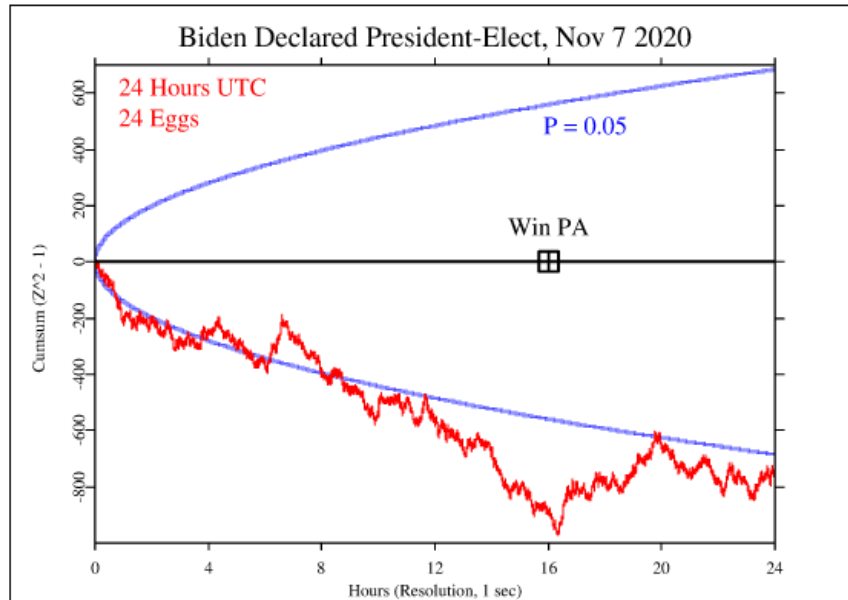


The concatenation of these two days with Nov 4 and 5 puts the election day trend in context. It looks like the positive trends on Nov 2 and 3 are replaced with a more-or-less level although varied output for the next two days when the election news was a litany of small but non-decisive increments in the counts of several states with narrow margins between the two candidate vote totals. By the end of this period the indications of a Biden victory were strong but not yet conclusive. The closing of polls at 7pm in most states on the east coast is marked.



Finally, on November 7th, the media reported that Joe Biden had won more than 270 electoral votes, and thus the Presidency. The vote counting continues in other closely contested states, and Trump has

not conceded but continues to proclaim fraud and cheating (without evidence), but the declaration for Biden/Harris aroused mass celebrations around the country, and in other parts of the world. The next figure shows the data for the 24 hour UTC day of November 7. It shows a strong downward trend that is broken shortly before noon by a sharp (and visually powerful) inflection followed by a strong upward trend for the next few hours.



Below, we look at a detailed picture of the four-hour period starting at the time NPR declared Biden the winner: 11:26 Eastern time. This is an exploratory analysis of course. We had no good model for making an a priori prediction, but my colleague Bryan Williams independently set almost exactly the same parameters for his analysis of data from all US RNGs, lending support for the parameter choices. The graph is persuasive in showing a clear and steady response of the network. The trend is consistent and the terminal value is marginally significant with odds of about 15 to 1 against chance.

