General comments:

The paper discusses an interesting worthwhile approach. However, it is not a calibration in the normal sense that is traceable to the world reference radiometer since these instruments are used for calibration under stable weather conditions. By calculating the ratio under all weather conditions (assuming that statement is correct) the ratio is heavily influenced by the extreme solar zenith angles where the cosine of the solar zenith angles is small and hence small deviations can lead to large differences in the DNI values. In addition when the DNI values are small, the ratios can be very large.

By calculating the ratio over large time periods, much of the detailed characteristics of RSI problems can be obscured by the averaging process.

That said, longer term trends such as seasonal variations in the ratio can be uncovered as shown in the article. Note that seasonal variation in the aerosol composition of the atmosphere can show up in many instruments, but are particularly interesting when photodiodes are used for pyranometers because the aerosol load and water vapor content of the atmosphere affect the spectral distribution of the incoming solar radiation. Properly assessing the magnitude of these affects is very useful especially since the seasonal affects caused by atmospheric constituents might also be encountered in location with different atmospheric constituents.

Specific comments:

GHI_{RSI} = CFG x GHI_{cor} eq. 1

Eq. 1 is slightly confusing. If GHI_{RSI} is the GHI as measured by the RSI instrument and GHI_{cor} is the reference GHI obtained from the reference instrument, then the equation looks like one is trying to calculate GHI_{RSI} instead of correcting GHI_{RSI}. It would seem more logical if one was trying to obtain GHI_{cos} from GHI_{RSI} instead.

This would lead to

GHI_{cor} = RSCFG * GHI_{RSI}

where RSCFG is the Responsivity Correction Function for Global (this is just to avoid confusion with CFG). The responsivity is 1 over the calibration factor, so I it is up to the author to decide what to call and label the correction function.

A reference GHI value is more accurately obtained from DNI * Cos(SZA) + DHI than is measured with a pyranometer. If one has high quality DHI measurements, one usually has the capability of making reference DNI measurements.

Pages 10257 and 10258. One has RMSD for DHI measurements and RMSD for DNI measurements. Differentiate the labels.

Look into CFn

DNIRSI = CFn (GHIRSI – DHIRSI)/cos(SZA)

Equation 10- Usually the reference is in the denominator.

It is not clear from the description what is being taken for the calibration (eqs. 10 to 13). The motivation for the moving average is not clear. It seems that all the data for the period is being used. That is usually not the case as some DNI values are new zero. This requires a more complete explanation. My guess is that the calculation is for the entire period of data (-T/2 to T/2) at a given time t_d. In other words you are doing this for 10:50 each day for the entire period of record. Then you calculate another value for 11:00, and so on. Is that correct?
It seems to be the average of all values over all times. This doesn't make since to me because the values at 8:00 will be different from 12:00 and they should not be thrown together. This is especially true because the ratio is dependent on the solar zenith angle, particularly at the beginning and end of the day.

Another way to do this would be to bin the DNI values and do this procedure for all DNI values at time t_d between say 900 and 1000 W/m^2, etc.