Pitfalls in Trend Analysis: Sampling, Drifts, and Orthogonality

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Recent years have seen a flurry of activity related to the use of numerous satellite data records spanning the last four decades to assess the status of stratospheric ozone and its potential recovery. Utilizing a myriad of regression approaches, these analyses are in reasonable agreement on resulting trends but exhibit discrepancies as they pertain to resulting uncertainties. However, previous analyses have generally not accounted for sampling biases or drifts between instruments, which can actually be major pitfalls in certain trend analyses. We have applied a recently developed technique that can be used to account for these problems to several occultation data sets and show how potential recovery trends can be impacted by as much as ∼1% per decade from sampling and ∼2% per decade from drifts in this analysis. Limitations inherent to all regression techniques and their impacts are also discussed and a potential path forward towards resolution is presented.