How to Make Composites out of Multiple Observations

Thierry Dudok de Wit [ddwit@cnrs-orleans.fr], The Laboratory of Physics and Chemistry of the Environment and Space (LPC2E), Centre National de la Recherche Scientifique (CNRS) & University of Orléans, France; Greg Kopp, Laboratory for Atmospheric and Space Physics (LASP), University of Colorado, Boulder; and the SOLID and ISSI teams.

A timely but also very challenging issue in solar irradiance analysis is the making of a single composite out of measurements that come from different instruments, with various characteristics, number of data gaps, observation windows, etc. Large efforts are being spent on the making of such composites for the TSI, for the MgII index, but also for the full spectral irradiance.

Composites can be built in many ways, but the Bayesian approach arguably provides the most adequate framework for dealing with measurement uncertainties and incorporating prior knowledge. While the idea is very simple, the practical implementation is much more challenging. In particular, the observations first need to be decomposed into different time-scales, because some of their characteristics can be strongly time-scale dependent. Here, we outline the procedure for making composites, apply it to the TSI, and discuss the results in regard of other reconstructions.

This work has been done in direct collaboration with an ISSI team on TSI reconstruction (lead by Greg Kopp) and the European SOLID project (lead by Margit Haberreiter).