The recent and unusually long period of low solar activity has revealed how important the understanding of the mid-term (i.e. time scales from days to years) solar spectral variability is for assessing variations on decadal and longer time scales, and their impact on the terrestrial environment. One of the key issues here is the derivation of proper solar proxies for extending the observations to periods where they were not available. This requires a careful statistical assessment for the short time spans during which both proxies and direct observations are available.

Here, we shall address several and so far often overlooked aspects of this problem:

1) Do different bands of the solar spectrum vary in phase (on time scales of days to decades)? Recent observations suggest that they may not in the UV, at least for the last solar minimum; this could significantly impact the solar forcing of the stratosphere. Several solar cycles will be compared.

2) Can short transients such as flares significantly contribute to long-term changes in the solar radiative forcing?

3) How can concurrent forcings, such as the impact of the solar EUV irradiance and geomagnetic activity on the thermosphere, be properly disentangled? Transfer function models can help assess the dynamical response to each of these individual inputs.