

TREND INDICATORS OF ATMOSPHERIC CLIMATE CHANGE BASED ON GLOBAL CLIMATE MODEL SCENARIOS

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The upper troposphere-lower stratosphere (UTLS) region is reacting particularly sensitive to climate change. Thus, changes of the thermodynamic state of this part of the atmosphere, especially variations of its key parameters, are promising candidates for the monitoring and diagnosis of climate change. This study aims at revealing optimal atmospheric climate change indicators with respect to radio occultation (RO) measurements, which feature high accuracy, long-term stability, and global coverage. As a first step, due to the currently limited time length of RO observations, we investigate 'proxy' climatologies from global climate model runs. We use three representative climate models with two representative scenarios for the IPCC 4th Assessment Report serving as multi-decadal datasets out to year 2050. The datasets are systematically explored for finding the most robust and sensitive trend indicators by testing pre-defined potentially useful atmospheric parameters such as refractivity, geopotential height, temperature, and specific humidity. These key climate variables were chosen since they are provided by RO measurements with highest accuracy. Temporal characteristics of trends are analyzed on the basis of a seasonal resolution. Different investigated spatial domains (e.g., northern/southern hemisphere, tropics, mid-latitudes, as well as UT, LS) allow a mapping of regions, which are particularly suitable for trend indicators. Least squares fitting of a linear trend provide parameter estimates (slope, intercept) and interval estimates (standard deviations of the parameters). The significance of the trend is derived for an estimate of the signal to noise ratio (SNR). Sensitive and robust indicators need comparatively low residual variance and favorable SNR for all scenarios of the multi-ensemble database. First results for optimal UTLS trend indicators of climate change, including the most promising parameters and their spatio-temporal characteristics, will be presented.