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Monsoon signatures in data of a German climate station – a predictability experiment

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Aimed at offering a view on, and qualitative understanding of, regional climate dynamics at the (intra-) seasonal timescale which is useful and tractable to both farmers and public authorities, climate data of station Lindenberg (Germany) have been analyzed. Here the focus is on the daily surface air temperature (SAT) series, and notably on two exceptional years, namely 2013 and 2016. Method of analysis is the Matching Pursuit (MP) procedure of data decomposition (Mallat and Zhang, 1993), equipped with a very flexible, frequency-modulated (FM) test signal as 'analyzing wavelet' (Carl, 2015). Of primary interest are leading 'slow' MP-FM components.
Intraseasonal dynamic modes of the 30-60 days band, corresponding to the major activity cycle of the planetary monsoon system, are often seen in these Central European midlatitude SAT data. In 2013, the summer of severe flooding across the German Elbe river basin, this sort of monsoon signature occupies utmost ranks in the hierarchy of local temperature modes. Details confirm in an unexpectedly clear manner the dynamics as seen in a low-resolution, yet temporally and physically resolved, General Circulation Model (GCM) that simulates the boreal summer monsoon – a notoriously difficult matter – in a qualitatively correct way (Carl, 2013).
Another case of predictable subseasonal dynamics happened in 2016, where the 30-60 days SAT mode at station Lindenberg developed later the season and ran into a late summer dynamics to which the early seasonal transition in autumn 2016 was borne. Premature termination of the season and transition into the winter circulation was recognizable by mid-August. Data experiments are presented that addressed the predictability issue also for the 2017 season (Carl, 2017) with a view on information that might have been given in advance to farmers and other stakeholders. The approach is portable to the monsoon region, of course, and close to the very heart of the dynamics at issue the signals to which it has recourse for prediction should be more prominent – and thus even better predictable.