

ASWEX Project „Signal Analysis“

ASWEX scientist in charge:	Dr. P. Carl
Synopsis:	Taking systematic frequency modulation into account, a multitude of interannual synchronous motions has been found in a first generation of time-frequency analyses of customary climate time series of the instrumental period. They matter in view of the question for the dynamical status of the climate system, which obviously has not yet been posed and addressed with sufficient consistency. By a new series of studies using methodically extended and technically advanced analyses and syntheses, as well as a considerably extended spatio-temporal and functional data range, the data based foundation for its answer shall be broadened and improved.
Tangible goals:	Confirmation and complementation of former findings, increased turn to monthly (and shorter) time scales, data based empirical regionalization global→regional→river basin, improved exploitation of the information contents borne in singular parts of the data.
Methods:	Matching Pursuit (MP): Extension of the „dictionary“ of analyzing waveforms; use of intelligent searching strategies to accelerate the procedure; development of a databank based methodology for the detection of synchronous motions. Functional Streamflow Disaggregation (FSD): Generalization into a method (GFSD) for the analysis of the whole signal chain precipitation→runoff→sediment, with the ultimate goal of developing a hydrological data transform. Multifractal Analysis (MFA): Attempt to construct a singular runoff component using the Wavelet Transform Modulus Maxima (WTMM) method.
External co-operations:	GeoForschungsZentrum (GFZ) Potsdam, Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB) Berlin, and Potsdam Institute for Climate Impact Research (PIK) – within the framework of common projects (GFZ: submitted, IGB: sketch of the proposal approved; PIK: in preparation)
Envisaged publications:	Journal papers in the signal analysis (IEEE) and climate literature; if indicated, contribution to the Springer series „Mathematics of Planet Earth“
Interfaces:	ASWEX research areas „Impacts of climate change on ecosystems and water bodies“, „Geo-Hydrology“, and „Landscape hydrology“; ASWEX project „Climate dynamics and the water cycle“.
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