

## Editorial

Climate science has grown especially fast during the last two decades mainly because of the potentially rapid global climate change as a consequence of the observed changes in atmospheric composition, land cover and land use. Despite this growth, both in the number of scientists from a multitude of disciplines and internationally co-ordinated national funding the questions asked by policy makers and the public can still not be answered reliably enough in many cases. While there is a “yes” if asked whether mankind has a considerable influence on global climate, we are far from answers to questions like “How is the Asian monsoon variability tied to tropical sea surface temperature and Asian snow cover anomalies and can it be forecast?” or “Where does soil moisture decrease if global warming continues?” For answers we need a better understanding of climate variability, which is caused by strong and non-linear interaction of the climate system components having time-scales differing over orders of magnitude, from hours for the planetary boundary layer to millennia for ice-sheets (and many million years for continental drift). For this better understanding, we also have to study distinct climate processes like the ventilation of the stratosphere by tropical cumulonimbi determining stratospheric chemistry and like the formation of deep ocean water at the sea-ice edges, often forcing us to large international experiments involving ships, aircraft, balloons, satellite and land stations. But also quality-controlled climate diagnosis increasingly done with assimilation of the data into circulation models for a consistent analysis belongs to this research.

The physical and chemical parameterizations derived from these process studies improve global or regional climate models, which have to be validated with data sets from climate diagnosis or trend analysis. Finally, the tested coupled ocean-atmosphere models may be used for projections of future mean climate, shifted or changed variability, i.e. new weather extremes.

What role should Theoretical and Applied Climatology (TAC) – just one of many international scientific journal in climate research-play in this context?

At present TAC has its main contributions from simple statistical analysis of mostly regional or local climate parameter time series, i.e. in the applied regional climatology part. It has recently got papers in global climate model output analysis and regionalization by nesting. But it needs more papers on the theory of climate, on global climate data sets derived from both satellite and in-situ measurements, on the two most important climate processes atmosphere/ocean and cloud aerosol radiation interaction and on regional water budget studies. TAC could also become a forum for land surface climatology data sets urgently needed for impact studies.

TAC should:

- remain truly international with contributions from many countries and without page charges;
- have regular editorials preferably from members of the editorial board for example reporting on co-ordinated research topics in their field;
- improve the review process by strictly adhering to the rule of having at least two reviews by high-ranking scientists, a copy of each paper accepted by a member of the editorial board sent to the managing editor;
- maintain special issues on distinct topics;
- keep controlling the galley proofs by the editorial assistant, and
- allow coloured figures at low cost.

In general TAC has to reflect more strongly the inter-disciplinary character of climate research and its application, it should get more manuscripts on the combination of observations, a-priori information and modelling in order to constrain the results by physical laws. As the new managing editor, I will try to achieve the above also by getting part of the output of the World Climate Research Programme (WCRP) into TAC. Since Climate research has entered the era of physically-based predictions, an exciting period lies ahead of us, in which we should strive for Theoretical and Applied Climatology to become even more important in this domain.

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