

Short Term Scientific Mission – Reference code: COST-STSM-733-03141

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**Scientific Report on the Short Term Scientific Mission
from 08.10.2007 – 13.10.2007
at the Institute of Atmospheric Physics (Prague, Czech Republic)**

Overview

The Short Term Scientific Mission took place from October 8th, 2007 to October 13th, 2007 at the Institute of Atmospheric Physics (Department of Climatology) in Prague, Czech Republic and was attended by Dr. Radan Huth (Director of IAP).

Major objectives of the STSM as briefly outlined in the letter of motivation have been addressed during our stay at the IAP (for details see next section). Considerable progress has been made in particular concerning corporate work on a review paper on circulation classifications.

Besides the work performed directly related to the STSM objectives, an oral presentation of the guest scientists on selected aspects of their recent research activities with relevance for COST733 did help to provoke fruitful discussions and exchange of ideas with scientists of the host institution.

Objectives of the STSM

The main objectives of the STSM were related to the guest scientists contributions to a planned review paper on circulation classifications (lead author: Radan Huth) to be published in a peer reviewed scientific journal (planned submission in January 2008).

The specific topics of the manuscript to which A. Philipp and C. Beck planned to contribute during their STSM are related to recent key questions concerning circulation classifications in general and to major COST733 objectives in particular:

- Systemization of existing classification approaches,
- methods for evaluation and intercomparison of commonly used classification methods,
- recent methodological developments in circulation classification and
- attempts towards optimised objective classification schemes,
- application of circulation classifications in climate change studies on the basis of reconstructed historical circulation data.

Course and outcomes of the STSM

The initial steps of the STSM did comprise iterative discussions between the guest scientists and Radan Huth on the structure of the planned publication and the determination of the guest scientists specific contributions to the manuscript. A preliminary structure for working on the contributions has been developed as a basis for the further process.

The conjointly developed structure in its present state is composed of the following headers (note that not all subparagraphs are listed here yet):

I. Introduction

II. Overview and systemization of methods and basic terms

III. Commonly used classification methods - an inventory

including a paragraph about: "Comparison and evaluation of commonly used classifications"

IV. Recent developments and tendencies in classification

1.) Methodological development of CTC

a) Introduction of nonlinear methods - self organizing maps

b) Objectivication of subjective classification concepts

- Lamb
- Hess-Brezowsky
- Prototypes

c) Efforts to optimize classifications

- using appropriate data, grids, sequences of days, ...
- enhancing cluster algorithms - approximate global optimum
- find an optimal number of classes
- struggle to find a universal, transferable optimum method

2.) Tendencies in application of CTCs

a) Applications in climate change studies from the historical to the future perspective

- Analysing reconstructed datasets
- Analysing recent (20th century) climate change by means of circulation type classifications

b) "Back to Weather prediction"

c) Increasing variety of synoptic-climatological applications

V. Examples of classifications and applications

1.) Historical climatology

a) ADVICE-Project

b) EMULATE-Project

2.) Recent climate change

3.) Use in operational weather forecast

4.) Classification of model data

VI. Conclusions

Subsequently based on the resulting preliminary structure of the manuscript the guest scientists started writing on specific sections of the paper draft.

A first topic deals with the evaluation and comparison of commonly used classifications and thus is closely related to recent work performed within the framework of working group 3 of COST733 in which C. Beck is involved.

Specific contributions to this manuscript-section include:

- an overview of available classification comparison studies,
- the discussion of criteria for evaluating and comparing circulation classifications and
- the presentation of exemplary results from evaluations and comparisons of circulation classifications derived from recent work performed within working group 3 of COST733.

The guest scientists also contributed to those sections of the manuscript that are related to the methodological development of circulation classifications, thus dealing with main topics working group 2 of COST733 (chaired by A. Philipp) is concerned with.

In detail contributions to this section deal with:

- attempts for objectivication of subjective classification concepts,
- the optimisation of circulation classifications with regard to:
- the use of appropriate data (concerning spatial / temporal resolution),
- the enhancement of cluster algorithms and
- the estimation of the adequate number of classes.

Furthermore examples of specific applications of circulation classifications have been contributed by the guest scientists. Referring to the guest scientists experience in applying circulation classifications to reconstructed circulation data, these sub-sections of the manuscript comprise:

- an overview and a discussion of the application of circulation classifications to reconstructed gridded circulation data for periods of the early- or even pre-instrumental historical past,
- an exemplary view on analyses and results of the application of an automated circulation classification to monthly SLP-fields reconstructed back to 1780 and in addition
- the presentation of selected important findings derived by objective circulation classification applied to reconstructed daily SLP-fields for the period 1850 to 2003.

Although not finalized during the STSM the mentioned drafts of the contributions to the manuscript are a valuable basis for the further process of writing on the manuscript during the next weeks.

Concluding Remarks

First of all we would like to thank Radan Huth for providing a very convenient working environment during our STSM and for his valuable contributions to our work. Furthermore we thank the COST733 chair Ole Einar Tveito and as well the COST-Office (C. Petit, C. Sjamsudin) for their help in realizing our stay at the IAP despite the very short-dated planning of the STSM.

Apart from the immediate outcomes of our STSM as summarized above, we think that one major additional positive effect, at least just as much important for the future work within COST733, is the strengthening of cooperation between COST members arising from our STSM.

Augsburg, 11/12/2007

Christoph Beck

Andreas Philipp