

PUBLIC SELECTION BASED ON QUALIFICATIONS AND INTERVIEW FOR THE AWARDING OF NO.1 GRANT LASTING 12 MONTHS FOR CONDUCTING RESEARCH IN ACCORDANCE WITH ART. 22 OF LAW OF 30.12.2010 NO. 240 AT THE DEPARTMENT OF MANAGEMENT, INFORMATION AND PRODUCTION ENGINEERING OF THE UNIVERSITY OF BERGAMO (ACADEMIC RECRUITMENT FIELD 13/D1 – STATISTICS - ACADEMIC DISCIPLINE SECS-S/02 – STATISTICS FOR EXPERIMENTAL AND TECHNOLOGICAL RESEARCH – (CUP: F52F17000030006)

announced with decree of the Rector Rep. no. 578/2017 of 20.10.2017 and posted on the official registry of the University on 20.10.2017

RESEARCH PROJECT

"Statistical harmonization of atmospheric big data"

Introduction

In the frame of ground measurements of atmospheric climatic variables referred to as ECV (Essential Climate Variables: temperature, humidity etc), radiosondes are of particular importance, in which a balloon is the vector of a set of measurement and data transmission devices.

GRUAN is the network that has the task of defining the "benchmarks" for ECV and conducts research through the GRUAN Working Group (<http://www.wmo.int/pages/prog/gcos/index.php> GRUAN), which is participated by the Environmental Statistics Group of the University of Bergamo.

Aims

Within ECMWF's tender C3S 311.a Lot3, where the CNR is the leader, Unibg develops statistical methods and implementation regarding the time-space harmonization of climate datasets for ECV radiosondes.

Indeed, despite technological innovation is introducing tools with better metrology properties compared to the previous ones (Merlone et al, 2015), instrumental variations can cause discontinuity problems in the global historical series.

Methods

ECV observations made by radiosonde are repeated atmospheric profiles over time and space (4D). In particular, data is sometimes in high resolution vertically, sparsely and irregularly distributed in geographic (non-Euclidean) space and more or less regularly distributed over time (days). So the problem is properly addressed in the recently introduced statistical space time models for functional data (Ignaccolo et al, 2015).

The present project regards the harmonization of GRUAN and IGRA data, the latter with considerable heterogeneity linked to the various radiosonde producers, including Vaisala, Mesisei, Internet, Sippican etc.

In particular, statistical harmonization operates after the reprocessing of Vaisala data based on the GRUAN processing carried out by CNR. For radiosondes from other producers, intercomparison data (WMO-CIMO) will be considered to allow a calibration value of different sensors to be estimated from Vaisala.

Methods of detection and estimation of structural changes for time series and space-time data will then allow to identify outliers and persistent changes by comparing observed data and modeled data.