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ANALYSIS OF EXTREME TEMPERATURE IN TERRA NOVA BAY, ANTARCTICA

ABSTRACT: BRANCUCCI G. & SILVESTRO M., *Analysis of extreme temperature in Terra Nova Bay, Antarctica.* (IT ISSN 0391-9838, 1997).

In a previous study the main statistical-mathematical characteristics of the temperatures, surveyed in the automatic stations around the Italian base of Terra Nova Bay in Antarctic, have been analysed and discussed.

In this note the daily extreme values (absolute maximum and minimum) are carefully considered in order to improve our understanding the dynamics of the temperatures.

KEY WORDS: Extreme temperature, Coreless winter, Katabatic wind, Terra Nova Bay, Antarctica.

RIASSUNTO: BRANCUCCI G. & SILVESTRO M., *Analisi delle temperature estreme di Baia Terra Nova, Antartide.* (IT ISSN 0391-9838, 1997).

In un precedente lavoro sono state analizzate le caratteristiche matematico-statistiche salienti delle temperature rilevate a mezzo di centraline automatiche della base italiana di Terra Nova Bay in Antartide. In questa nota si analizzano i valori estremi (massime e minime assolute) al fine di meglio comprendere la dinamica delle temperature. In particolare, attraverso l'utilizzo di un modello matematico si comparano i valori delle temperature estreme e si individuano:

- Tre «stagioni» con caratteri termici peculiari.
- Si localizza con maggiore precisione il periodo di passaggio di masse d'aria relativamente calde che influenzano la temperatura nel periodo in cui manca il contributo della radiazione solare.
- Si individua un incremento tendenziale delle temperature.

TERMINI CHIAVE: Temperature estreme, Coreless winter, Vento catabatico, Baia Terra Nova, Antartide.

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Research carried out in the framework of a Project on Glaciology and Paleoclimatology of the Italian Programme for Antarctic Research, and financially supported by Enea through a cooperation agreement with Università degli Studi di Milano.

We would like to thank Prof. Arnaldo Longhetto, University of Torino, for his useful advice and critical revision of the manuscript. Dr. P. Grigioni and A. Pellegrini of Enea: U.O. Acquisizione dati Meteorologici in Antartide del Progetto Osservatori Geofisici e Geodetici del Pna for the data supplied necessary to this elaboration.

CONSISTENCY OF THE DATA

In table 1 the geographical characteristics of the data analysed (columns 1-4) and the periods of operations with the availability of observations (column 5-6) are summarised.

All the stations (fig. 1) present working periods statistically acceptable except for 7354 which is not considered in the following note. The data are confirmed in fig. 2, in which we can observe that the recordings of the stations show a discontinuity in the survey of the series, concentrated particularly in the first years of operation and, for some stations, also in the year 1991-1992; such anomalies are due to instrumental breakdowns.

ANALYSIS OF THE DATA

Figs. 2 and 3 show data concerning the daily maximum and minimum value of temperature. It is clear that the temperature values present three characteristic trends: a considerable decrease in the first period of the year, a more homogeneous course in the middle period and finally a sudden increase. It also clear that there is considerable variability. In the values of both sets considered within the limits of the respective trends, which shows that the standard deviation, through which the variability has been analysed (fig. 4), is greater in the middle periods of the years considered.

For a better definition of the thermic conditions observed, mathematical instruments were used because they allow to attenuate the variability without altering the original series too much. This is possible using various mathematical instruments such as the moving average (Picone, 1990) and the pentadic average (Grigioni, 1991). These methods involve the loss of data at the beginning and at the end of the series considered. Such loss had to be eliminated or minimised in our situation. That is why we decided to use a numeric «filter» to replace the daily datum,