Geophysical Research Abstracts, Vol. 7, 02910, 2005
SRef-ID: 1607-7962/gra/EGU05-A-02910

A method for the identification of sea breeze fronts in the north-east of Brazil by remote sensing

0.1 O. Planchon, F. Damato, V. Dubreuil, P. Gouéry

COSTEL Laboratory, UMR 6554 LETG / FR 2116 CAREN-CNRS, Rennes-2 University, France

olivier.planchon@uhb.fr

When the sea breeze penetrates inland, its effect on temperature, humidity, cloudiness and precipitation can be well marked. The sea breeze front is a spatial discontinuity associated to a strong thermodynamic contrast. The occurrence of the sea breeze front is linked to the inland penetration of a relatively dense, cool and stable marine air which forces the warmer and unstable land air mass to rise. This upward motion allows the development of a line of cumuliform clouds parallel to the coast and which is pushed inland by the sea breeze circulation. Therefore, the sea breeze front can be identified on satellite images.

A method for the identification of sea breeze fronts by remote sensing (visible and infrared data) has been applied to the North-East of Brazil. The aim of this paper is to estimate the frequency of sea breeze fronts observations and their average distance of penetration inland in the North-East of Brazil from visible data, and to compare these results with infrared data. In tropical climates with a alternation between a rainy period and a period without rain, the « dry » and sunny season is the most favourable period to the development of strong sea breeze circulations and to the identification of the sea breeze front by remote sensing. The remote sensing data used in this paper was stored by the GOES-8 satellite (*Geostationary Operational Environmental Satellite*). The GOES-8 satellite was launched in 1994 above 75˚W and transmits images of the

whole South America. The spatial resolution is 1 km in the visible band and 4 km in the infrared band .

The visible images (wavelength between 0.58 and 0.68 μm) were used because of the well-marked reflectance difference between the low level clouds and the land surface features. The sea breeze fronts was identified with the cloud patterns and all the observed sea breeze fronts were drawn on maps in order to link their occurrence with weather conditions. The sea breeze fronts development was followed in space and time during the dry season (between September and December, 2000), in order to show the monthly variation due to the surface records and to the climatic features. During this period, the highest frequency of sea breeze fronts occurrence was recorded on the northern and relatively flat fringe of the studied area (Ceará). The sea breeze fronts penetrated further inland between September and November, with a maximum distance from the coast of Ceará (70-80 km).

The infrared data allowed to estimate the land-sea monthly temperature difference using several cross-sections perpendicular to the coast. For each selected day, thermal cross-sections were drawn with a synthesis of the daily maximum sea and land surface temperature, for the areas where the inland penetration of sea breeze fronts was observed by the visible satellite data. The land-sea surface temperature difference must reach at least 4˚C in the inter-tropical latitudes, to allow the sea breeze development. A temperature difference of more than 4˚C was recorded for 93,5% of the observations during the dry season. The temperature difference reached 7-8˚C in December.