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**1. INTRODUCTION**

Tourists are interested about the air temperature (thermal conditions) and especially about precipitation information in the vacation area, when they decide about their holidays.

Energy balance models of the human body that integrate thermal conditions for different climate zones and climatic areas provide a useful method for the evaluation of the acceptability of thermal climate conditions for tourism and outdoor recreation (Matzarakis et al., 2000, Matzarakis, 2001). The resulting thermal indices PMV and PET are well recommended and are used for decades in different issues of applied climatology (Matzarakis, 2001).

By adding precipitation information to the thermal indices, a more complete picture of climate conditions and their significance in tourism climatology is gained.

The objective of this paper is to present a simple climate tourism index which includes precipitation for a tropical country namely Cuba.

**2. METHODS**

Using existing methods from Human-biometeorology and easy available climatological data, a Tourism Climate Index has been developed. The Index is called Thermal Conditions and Precipitation TC\_P, which is equal to the Tourism Climate Potential and can be applied on daily basis.

The new developed index is based on the definition of an outdoor potential which ranges from bad, low, adequate, good to excellent (Table 1). As thermal index is taken the Predicted Mean Vote (PMV) or Physiological Equivalent Temperature (PET) with the known

grades of thermal perception for human beings and physiological stress, with a internal heat production of 80 W and a heat transfer resistance of the clothing of 0.9 clo (VDI, 1998, Matzarakis et al., 1999). The PMV and PET values are averages and have been calculated for 7:00 to 19:00 local time for each day of the year.

TABLE 1. Definition of Potential of Thermal Comfort and Precipitation Index (TC\_P) and the based values of Predicted Mean Vote (PMV), Physiological Equivalent Temperature (PET) and duration of Precipitation (DP) for the evaluation of tourism climate potential.

Outdoor Potential	PMV	PET (°C)	DP. (h)
Bad	< -3.5	< 4.0	> 6
Low	-2.5 to -3.5	4.1 to 8.0	to 6
Adequate	-1.5 to -2.5	8.1 to 13.0	to 3
Good	-0.5 to -1.5	13.1 to 18.0	to 1
Excellent	-0.5 to 0.5	18.1 to 23.0	0
Good	0.5 to 1.5	23.1 to 29.0	to 1
Adequate	1.5 to 2.5	29.1 to 35.0	to 3
Low	2.5 to 3.5	35.1 to 41.0	to 6
Bad	> 3.5	> 41.0	> 6

Rain duration is also categorized in five classes, which are ranging from no precipitation to one, three, six and more than six hours of precipitation (Table 1).

From the calculated grades of daily PMV and PET values and the category of duration of precipitation a monthly distribution of the tourism potential has been analyzed (Moya et al., 2001). The percentages of the days for each category have been done. The value 1 receives the percentage of days with excellent conditions, 0.8 for days with good conditions, 0.6 with adequate conditions, 0.4 for low conditions and 0.2 with bad conditions. Finally we

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receive an TC\_P which is close to 100 will be ideal, 80 shows good conditions, 60 adequate, 40 low and lower than 20 the most worse conditions. The more TC\_P approaches 100 the more favourable it is for outdoor activities and an ideal Tourism Climate Potential is existing.

### 3. RESULTS

The TC\_P index has been devised and applied at a daily resolution to a tropical area, namely, Varadero, Cuba during 2000. In Table 2 the categories of TC\_P and the total vales for each month of the year 2000 are listed.

The total value of the index is 100 and the results show for a typical sommer month July a value of 61, for the transition months April 72 and October 74.2. For January results a value of 90, which shows an ideal touristic potential for this area.

### CONCLUSIONS

The new developed Tourism Climate Index which is based on thermal comfort conditions and duration of daily precipitation can be applied for tourism climatology issues. Further analyses for more stations in Cuba and other countries are under investigation.

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TABLE 2. Values for categories and total values of the Thermal Comfort and Precipitation Index TC\_P for Varadero/Cuba during the year 2000

Categories/ Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Excellent	55.0	41.4	45.3	10.0	9.7					9.7	53.3	22.6
Good	31.2	35.9	41.3	32.0	46.4	10.7	10.4	12.9	8.0	49.0	29.3	56.8
Adequate	3.6	8.3	1.9	30.0	19.4	48.0	46.2	40.6	50.0	11.6	4.0	1.9
Low						2.7	4.0	6.4	2.7	3.9	1.3	1.3
Bad												
Total	89.8	85.5	88.4	72.0	75.5	61.3	60.6	59.6	60.7	74.2	88.0	82.6