Fractal Dimension of the Ground Surface and the Turbulent Mixing

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The Iizawa and others (lecture on the previous state) showed the possibility that the heat inertia of the city part was estimated small because it did not consider the heat island circulation. In the phenomenon in daytime, the cause of estimating the heat inertia of the city part small is and there is another though it is night that the effect of the heat island circulation appears greatly. It is a ground level temperature of the city part and suburbs of daytime. The city part rises more than suburbs at about 10K when the ground level temperature is requested from the LANDSAT image. If the heat inertia of the city part is large, it has been thought that this is because the heat inertia of the city part is not too large it is not to be sure to go up easily in the surface temperature. Moreover, it has been thought that the surface temperature is suppressed to low by the perspiration in suburbs. However, water more than precipitation is necessary and not realistic to absorb solar energy by the perspiration. In addition, when the image of LANDSAT is often seen, it is understood to scatter the place where the surface temperature is high in the mountain. Many of these are golf courses, and the temperatures at the residential quarter level of the city part. That is, it seems to decide the ground level temperature according to whether it is covered only whether be covered with the plant with the tree (Takagi) with a fractal structure.

The fractal dimension has little measurement example though it is true that the tree of nature has the fractal structure known well. The most is a dimension measured on the paper of two dimensions though various fractal dimensions were measured after the 1980's when the fractal got into the news. Then, the fractal dimension was requested measuring an actual tree by three dimension space by three laser dimensions. The measured tree is Kusunoki in front of the clock tower of Kyoto University, and, similarly, a zelkova in the Kyoto University campus. It is not pruned to straighten the form of a tree for ..age of a tree.. 70 years or more Kusunoki especially because of the typhoon etc. ..things except chopping off the broken branch... It measured from two or more directions to avoid causing the part where the branch in this side was not able to be measured by secretly becoming it, they were synthesized, and the fractal dimension (BOX dimension) was requested. As a result, it has been understood it has almost two both with Kusunoki as a fractal dimension in the zelkova though the form of a tree is greatly different.

What meaning does two the fractal dimension have?First of all, because the tree should absorb the light of the sun, the dimension of two or more is necessary. Then, when it occasions to distribute the leaves of the same number at random by three dimensions and the fractal is distributed by two dimensions, it is a size of the gap what is different. An extremely big gap exists in two dimension fractal distribution while a big gap doesn't exist more than the average distance between two leaves at random distribution.

A very big whirlpool can exist in two dimension fractal distribution while only a small whirlpool can exist in the tree canopy in the random distribution when this is seen in the viewpoint of the turbulent diffusion. In the turbulent diffusion, this difference has a big meaning when thinking it is