MODELLING THE INFORMATIVE CONTENT OF MULTISPECTRAL IMAGES FOR OPTIMUM POSITIONING THE SCANNED POINTS OF DEGRADED ZONE

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ABSTRACT

We have actual problems (land-use, oil pollutions, water-logging, landslides, mudslides, sea level changes etc) that need a new approach in space technology and spatial modeling to be used for optimum decision. All that processes have in main common behavior characters and need a single key of approach.

The critical state of any anthropogenic and natural processes in ecosystems including disasters and hazards we have defined using main critical state(s) parameter that need to be recognized and controlled in planned coordinates distribution for each type of remotely sensed ecosystem's evolution and each degradation state. But simulation of degradation process is needed not only for defining the critical parameters of evolution but just for planning optimum distribution of coordinates the main information have to be measured in. Thus main area of our activity have been directed on the next purposes

1.Planning the survey optimum strategy for using the airborne multi-spectral scanner data combining with generalized satellite information to increase the precision of ecosystem's evolution model.

2.Separation of instability zones on considered territory and definition of main critical parameters for degradation process to be recognized, evaluated and predicted.

Planning aircraft scanning we have to account of any restriction on each kind of aerospace information for both – airborne and satellite data. On generalized satellite image we can overview the distribution of degradation zones and common spatial variance of its characteristics. It‘s well known that airborne scanner imagery gives more in detail the spectral information of objects. And in spite of local character we can derive enough information of variable object‘s state since spectral characteristics are sensitive to one.

Researching the states of variable object on airborne multi-spectral imagery we can spread derived results to wide territory using coordinate distribution planned for measuring beforehand. We have information in different scales for spatial variability of contrast’s variance. That’s why considering the general spatial variability of a radiance balance we have to account of contrast’s all spectral components and its evolution.

At first we define coordinates of homogeneous sites for measuring and separate ones as determined samples for further image processing. The planned coordinates of measured points on large homogeneous are not to be changed as coordinate basis for its positioning here. And basis for further development of planning the aerospace environmental monitoring of degraded ecosystem is use large-scale estimation of its violation degree as sequences of different kind impacts. And all changes in measured points distribution for its planning we have on areas with high frequency components of contrast variability. This is way we define the directions of degradation process.

Thus we have large scale (low-frequency) for contrast variance defining violations intensity where we position main coordinate basis not being mobile and on other hand we have the small scale of contrast variance (high frequency) defining main direction of violations evolution and here we have to position mobile coordinate basis. The multi-layer submission of specific fields of contrasts, reference reach type and stage of a predictable ecological process is offered for this purpose. Apparently these types presented in layers should be differed not only in reference spatial-temporary variability, but also in

intensity instituted by proximity to a stagnation point, being in appropriate way mirrored in reference fields of contrasts. Now we spend activities on simulation of spectral - optical and radiation indicators of instabilities of dynamic ecosystems and influencing of affinity them to critical states. And the main attention among advanced researches is given to extremely dynamic natural processes: to landslides, mudslides, high waters and floods.

So we are planning the coordinates distribution on measured area of degraded ecosystem. Then we use satellite image processing to calculate informative content of all overviewed sites with degradation and extracts more informative one among those for prediction of desertification evolution's main directions. It becomes possible on base the nonlinear dynamic diffusion equation considered. Using it we simulate outside impacts for deriving available distribution function of contrasts. In result simulated ranges of coordinate distribution with maximum informative content are supposed to be evaluated. Considering the spatial contrast as main recognized tag of degradation process we can choose the distribution function of contrast using measured and above shown real curve of radiation balance function for searching the simulated decision. Thus we need at least that initial information from preprocessed satellite imagery to be used for planning the aircraft scanner measurement in defined coordinate distribution. In turn those include optimum information of process development for predicted directions. We can use aircraft scanner images surveyed in derived coordinates with maximum information supposed.

The further improving of the similar modeling is connected to an outlook of more broad usage of some perfected models & algorithms for the recognized process to be simulated numerically. It's necessary for all main factors influencing on violations of ecosystems stability to be counted & determined to define the gear of optical and spectral contrasts deformation as a result of radiation balance violation. Meanwhile, the accuracy of anticipated outcomes at these stages can succumb to a latitude of models scope attracted for all initial capabilities to be reviewed.

And such kind of applied programs for interface with plenty application directions is supposed to be main guarantee for providing any further benefit of GPS perspective use.