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REMOTE SENSING OF THE EURASIAN ENVIRONMENT

A draft proposal by the Institute for Environment and Sustainability, Joint Research Centre (JRC) of the European Community (EC), the Regional Environmental Center (REC) for Central and Eastern Europe and the European Environment Agency (EEA)[1]

INTRODUCTION

1. A proper use of remote sensing (RS) techniques, considered as a component of an integrated set of observations, can provide an important contribution to monitoring and reporting on the state of the environment (CEP/AC.10/2001/10). This contribution is particularly significant when the observations aim to assess large-scale and long-term environmental conditions, over the regional to continental range, and over the entire seasonal cycle.

2. Indicators derived from RS data are powerful, if not unique, tools for studying and monitoring various processes on the planetary surface, provided that basic earth observation (EO) concepts — including both potentials and limitations — are well understood (CEP/AC.10/2002/9). The main problem to be solved, in order to fully exploit the capabilities of the technique, is that RS produces large amounts of data, which must undergo several levels of processing (requiring special facilities and expertise) to derive suitable indicators, before reaching the end-user.

[1] Prepared by by Messrs. Vittorio Barale (JRC), Jerome Simpson (REC) and David Stanners (EEA).

3. In the present draft proposal, it is suggested that a key set of indicators, derived from RS data, should be identified and mapped in cooperation with end-users, by means of a pilot programme for environmental assessment of the Eurasian macro-region. Albeit of limited nature – and based on existing activities of the European Environment Agency (EEA), the Regional Environmental Centre (REC) for Central and Eastern Europe, and the Joint Research Centre (JRC) of the European Commission (EC) – such a programme would complement other actions aiming at reporting on the state of the environment, in relation to the Kiev Assessment (CEP/AC.10/2002/3). A set of complementary measures, consisting of an application demonstration exercise, an awareness campaign for potential end-users and a suitable set of training activities, will be recommended.

I. ENVIRONMENTAL INDICATORS

4. The demonstration of an environmental assessment for the Eurasian macro-region, based on EO data, should focus on a single critical theme, and should aim to provide a baseline map of some specific indicators. In the present case, it is suggested to exploit the potential of optical RS to observe the Earth's surface in the visible spectral range, and to derive from such observations quantitative parameters that would complement ground-based measurements related to the Kiev Assessment. Further, it is proposed to consider parameters related to surface vegetation, both on land and in the surrounding marginal and enclosed basins, as the starting point for the derivation of specific indicators and for the evaluation of the continental state of the biosphere.

5. Terrestrial and marine vegetation indices (available for instance as vegetation cover on land or as plankton concentration in surface waters) are classical, basic parameters derived by means of optical RS techniques. They provide indications on: (a) carbon stocks and fluxes, a topic of particular relevance for understanding climatic changes, especially in the context of international conventions on this subject; (b) natural resources of the biosphere, as related to issues ranging from biodiversity to food security; and (c) environmental impact of anthropic activities such as the development of urban areas, transport corridors, or coastal infrastructures.

6. A pilot programme is proposed here to produce continental maps of suitable indicators derived from vegetation cover/concentration data, at high space/time resolution, in selected Eurasian regions (e.g. Eastern Europe, Siberia, Central Asia) and marine basins (e.g. Black Sea, Baltic Sea, Caspian Sea) – or at the full continental scale, if an appropriate reduced resolution can be identified. The best suited indicators, and the corresponding space/time scales, should be determined on the basis of the Kiev Assessment's requirements, and by means of intensive end-users consultations. The production of demonstration indicators should be accompanied by an opportunity awareness campaign and training activities aimed at the same end-user community.

II. PILOT PROGRAMME

7. The proposed application demonstration exercise should be based on the experience acquired by EC on the exploitation of RS techniques for the development of its environmental policies. JRC is currently supporting such policies with a number of projects, in the fields of space applications and spatial information management, that could provide the technical basis for the pilot programme. A first review of existing indicators should be performed, with feedback from end-users originated by an opportunity awareness campaign (see below). Then, an assessment of the optical RS data (e.g. vegetation-related parameters) currently available to

satisfy the information requirements should be performed, involving once again the end-users participating in the opportunity awareness campaign (see below). This would lead to the development of methodologies and sample results to be used in the remainder of the pilot programme.

8. An opportunity awareness campaign should be initiated to foster the integration of RS-derived information into existing state-of-the-environment reporting initiatives. In order to achieve this goal, end-user consultations should be organized, in two consecutive steps: (i) contact points should be identified in the participating countries, and links established between environmental managers and decision makers on one side, and technical developers on the other; (ii) consultation sessions should be held, bringing selected EO expert teams in direct contact with the national experts in charge of establishing RS capabilities in the participating countries, so as to provide feedback in the indicator(s) selection process and cooperation in the indicator(s) map production.

9. A series of training activities should be conducted, after the initial development of demonstration data products, to familiarize end-users with the operational exploitation of RS-derived information. The training activities could be thematic workshops and/or documentation and staff exchanges, and would involve the same contact points of the opportunity awareness campaign.

III. ADDITIONAL MEASURES

10. As partners of the initiative on Global Monitoring for Environment and Security (GMES), EEA/REC/JRC should promote the present proposal in that forum to foster the integration of its results into the operational systems that will monitor natural processes and the impact of anthropogenic activities in the Eurasian macro-region. Thus, in the future, RS would be used to calibrate - or complement – ground-based data, and would offset the need to collect extensive amounts of additional field data to update the indicators in time.