Coordination Group for Meteorological Satellites (CGMS) Socioeconomic Benefits Tiger Team (SETT)

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PROGRESS REPORT — JULY 2014

CGMS-40 directed Working Group III to establish the Socioeconomic Benefits Tiger Team (SETT), and agreed that the SETT would be included in CGMS High –Level Priority Plan Sec. 4.1. Last year, CMGS-41 approved the SETT Terms of Reference.

TERMS OF REFERENCE (TOR)

The CGMS established the SETT to develop credible methodology and common terminology for articulating the socio-economic benefit of satellite observing systems, and explore the most effective ways to communicate this information to desired stakeholders.

YEAR ONE ACCOMPLISHMENTS

Consistent with the activities identified in the TOR, during its first year the SETT compiled studies, identified expertise, and held the first SETT workshop to assess the recent socioeconomic benefit studies and activities of member agencies, develop the future work plan, and prepare the presentation for the CGMS-42 Plenary.

WORKSHOP OUTCOMES

EUMETSAT hosted the first workshop 24-25 April 2014 in Darmstadt, Germany. Participating agencies included the Chinese Meteorological Administration (CMA), EUMETSAT, Japan Meteorological Agency (JMA), NASA, National Oceanic and Atmospheric Administration (NOAA), and the World Meteorological Organization (WMO). In addition, invited experts from Resources for the Future (RFF) and the University of New Mexico presented at the conference.

WORKSHOP THEMES

The speakers presented on a subset of the studies compiled by the SETT. The participants noted the commonalities across the studies and identified eight (8) key themes.

(1) Context is essential. The most useful socioeconomic benefit studies focus on a specific question or objective. Prior to conducting a study, the sponsor must identify needed resources, time constraints, and the intended audience. However, it is not enough to identify the study's intended audience; the sponsor must also understand what questions face the audience and how they will use the study's results to make decisions.

Some of the specific questions addressed by the studies presented to the SETT include "Possible contribution of meteorological satellites to energy savings in Japan" and "What is the potential use of Earth observations for volcanic ash advisories?" These questions demonstrate the need to go beyond the impact of the observation on numerical weather prediction to specific applications.

(2) Methods are critical. To answer the study's specific question(s), the sponsor must understand and explain the logical connections between the observations and socioeconomic benefits. Determining the value in use of an observation or system requires a demonstration of how and why the data is a component in decision-making. End user engagement must inform the methods.

(3) Understanding relative impact of satellite observations is crucial. The WMO and the operational agencies are placing great efforts in using Observing System Experiments (OSE) or Forecast Sensitivity to Observations (FSO) to understand the role of satellite

observations in the context of all observing systems and their relative impact on NWP (See Figure 1). Analysts can use this information to extrapolate the socio-economic benefits derived from a particular observing system. For example, an indicative "impact per cost" ranking can be generated by dividing the impact by the estimated annual cost for an observing system.

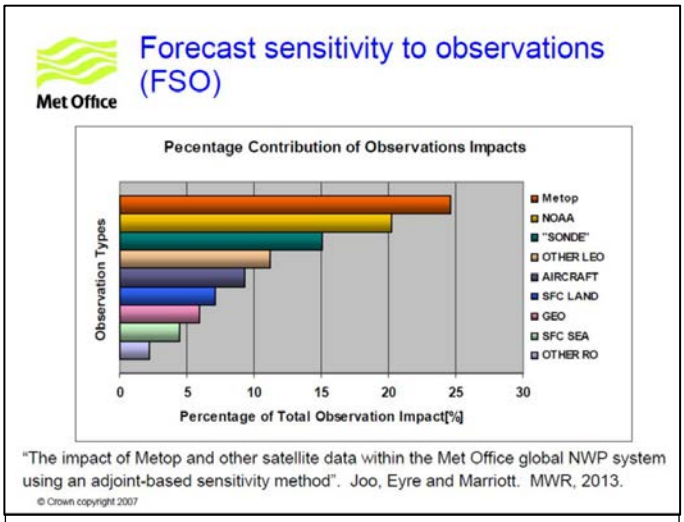

Figure 1: Forecast Sensitivity to Observations (FSO) can inform the cost/benefit analysis of meteorological observations.[1]

(4) Quantitative and qualitative methodologies are valid approaches. While a quantitative approach may be more convincing, there are caveats. When employing a quantitative approach, the sponsor must ensure the analysis is sufficiently rigorous to withstand scrutiny by economists and social scientists. In addition, sponsors of quantitative studies must balance the need for economic rigor with the ability to represent the full value of a system recognizing conservative estimates of benefits may lead to undervaluing of the data or products.

The sponsors must able to communicate the results along with any underlying socio-economic assumptions or limitations so that decision makers understand the findings and their context. It is important to state which factors are measured and which excluded as well as to state any assumptions.

For example, Figure 2 clearly identifies the factors measured quantitatively, and the accompanying study clearly states that the analysis does not account for benefits from reductions in loss of life, benefits of observations to climate applications, strategic contributions to defense and security, or positive impacts on specialized forecasts of weather-dependent phenomena such as air quality.

BENEFIT AREAS	SOCIO-ECONOMIC BENEFIT (over 20 years of EPS/Metop-SG)	
	MINIMUM	BENEFIT AREA
Protection of property and infrastructure	€1.3 billion/year	€5.5 billion/year
Added value to the European economy	€10 billion/year	€41 billion/year
Private use by European citizens	€4 billion/year	€15 billion/year
TOTAL	€15 billion/year	€61 billion/year

Figure 2: Estimated socio-economic benefits of EPS/METOP-SG Observations due to their Positive Impact on Forecasting in 2010 e.c. with a discount rate of 4%.[2]

(5) "The cost of perfect information may not be worth the cost of acquisition." Cost benefit analyses are increasingly time-consuming and costly as you move down the value chain. A decision about the scope and methodology of a proposed study must factor in the cost of conducting the study.

(6) Data availability matters. Study planning should examine the need for ancillary data, and determine if the data needed to undertake a socioeconomic study is publicly available or commercially restricted. Building relationships with user communities can help facilitate access to ancillary data sets. For example, calculating the costs attributable to Volcanic Ash Advisories requires data from the airline industry, and estimating the contribution of earth observations to a Malaria Early Warning System requires access to public health data. Developing relationships with end users are an important aspect of planning a study.

(7) Interdisciplinary expertise is required. The most robust studies bring together experts from across the physical and social sciences over the lifetime of the project allowing for repeat analyses, and recalculation of benefits. For example, the study represented in Figure 3 shows the breadth of expertise – including

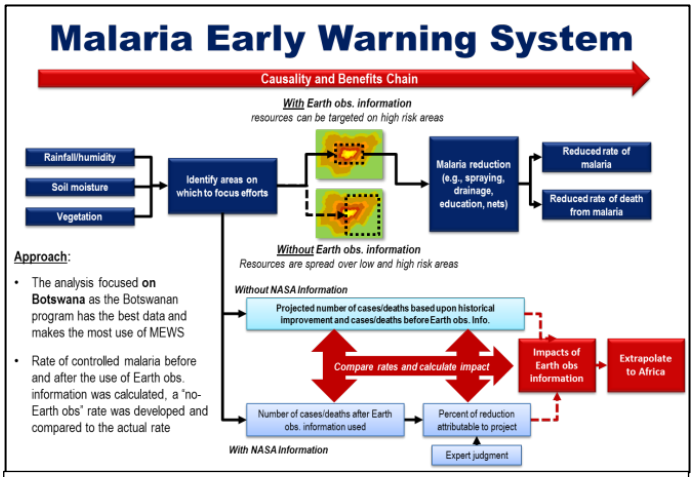

Figure 3: *Contribution of Earth observation information to MEWS.*[3]

social scientists and public health experts - required to undertake a socioeconomic analysis of the value of Earth observation information to a Malaria Early Warning System (MEWS) in Botswana.

(8) Operational Agencies can leverage Research Agency perspectives/expertise. Cooperation across operational and research agencies combined with increased collaboration with end users will shed light on different perspectives and uses of observations providing a more complete picture of the full value chain. The SETT proposes to work with end users and economists to complete a case study of the end-to-end value of an Earth observation/product system help determine best practices that can inform future studies.

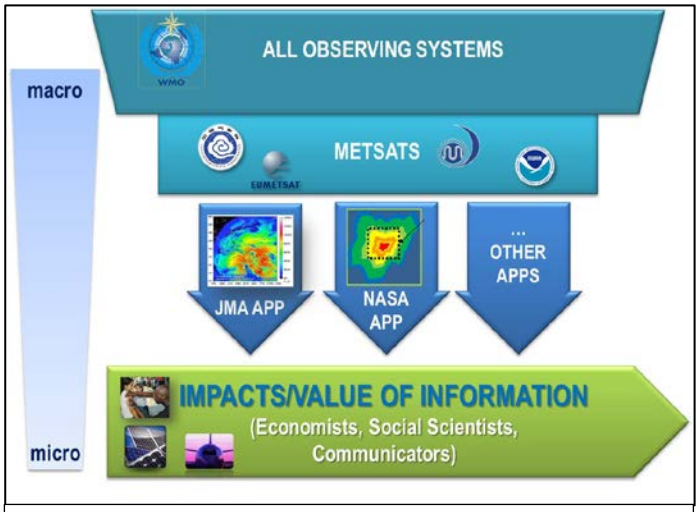

Figure 4: Graphical representation of the proposed end-to-end approach[4].

STUDIES PRESENTED

The following studies were presented at the workshop:

- *EPS Second Generation Cost benefit Analysis*
- *European Space Policy Institute EUM-NOAA Collaboration Study*
- *Cost-benefit studies for observing systems*
- *Socio-economic Benefits of Satellite Missions: The Value of Information in Life-or-Death Decisions*
- *GFCS User Case Studies: Demonstrating the Value of Satellite Data for Climate Services*
- *Benefits of NASA Earth Science and Earth observing satellites*
- *Working with early adopters to determine the socio-economic benefits of SMAP data*
- *Application of Satellite Remote Sensing for Solar Energy Engineering*
- *Economic Analysis of the Value of Earth Observation (EO) Information*
- *NOAA's JPSS Economic Benefits Assessment*

WORKSHOP ATTENDEES

Participants in the workshop included Paul Counet, EUMETSAT, Molly Brown, NASA, Vanessa Escobar, NASA, John Furgerson, NOAA, Charles Wooldridge, NOAA, Yasushi Izumikawa, JMA, Toshiyuki Kurino, JMA, Ajay Mehta, NOAA, Richard Eckman, WMO/NASA, Stephan Bojinski, WMO, Molly Macauley, NASA and Resources for the Future, and Fang Xiang, CMA.

YEAR TWO PLANNING (JUNE 2014 – MAY 2015)

In addition to publishing this overview document, the SETT will hold a second workshop in Washington, D.C., and work across agencies focusing on the operational meteorology mandate of CGMS and leveraging expertise of research agencies. In addition, the SETT will develop an example of the MACRO approach on weather beginning with the observing systems as a whole, and then drill down to a MICRO case study to demonstrate a concrete example of the value of information within a specific application. Figure 4 illustrates this concept.

Long-term, the SETT will identify opportunities to incorporate socioeconomic best practices, and integrate these into additional or subsequent phases of work on new instruments and satellites. In addition, the SETT will plan a keynote event for CGMS-43 on socioeconomic benefits, and develop recommendations the future of the SETT post CGMS-43.

[1]Presented by Stephan Bojinski, WMO, to the CGMS SETT Workshop 24 - 25 April 2014, "Cost-benefit studies for observing systems," John Eyre, UK Met Office
[2]The Case for EPS-SG: Socio Economic Benefits, EUMETSAT, December 2013
[3]Benefits of NASA Earth Science & Earth Observing Satellites, Friedl
[4]Presentation to the WMO 12th Consultative Meeting on High-level Satellite Matters, Charles Wooldridge