Space Climate Observatory

WG Climate Meeting – Marrakech, 20th March 2019

Dr. Selma Cherchali
CNES, SCO Program Director
Potential effects of climate change

Source: Climate Change Impacts in the United States: The Third National Climate Assessment
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SCO Concepts – Need for a coordinated assessment of Climate Change Impacts

Societal Impacts

- **Environmental Degradation**
  - Forced migration, civil conflict, mental health impacts, loss of jobs and income

- **Extreme Heat**
  - Heat-related illness and death, cardiovascular failure

- **Severe Weather**
  - Injuries, fatalities, loss of homes, mental health impacts

- **Water & Food Supply Impacts**
  - Malnutrition, diarrheal disease

- **Degraded Living Conditions & Social Inequities**
  - Exacerbation of existing social and health inequities and vulnerabilities

- **Changes In Vector Ecology**
  - Malaria, dengue, encephalitis, hantavirus, Rift Valley fever, Lyme disease, chikungunya, West Nile virus

- **Air Pollution & Increasing Allergens**
  - Asthma, cardiovascular disease, respiratory allergies

- **Water Quality Impacts**
  - Cholera, cryptosporidiosis, Campylobacter, leptospirosis, harmful algal blooms

Adapted from CDC, J. Petz
“Space Climate Observatory”
A world observatory of
the climate change and its impacts

- **Satellite data**
  - Earth observations at regional, national and local level
  - … and in-situ data, research modelling

- **Climate change and its impacts**
  - Humankind, both as anthropogenic causes and as the victims of the impacts (temperature increase, sea level rise and hazards…)

- **a joint Observatory**
  - A World Heritage system

→ [http://spaceclimateobservatory.org](http://spaceclimateobservatory.org)
Respond to Adaptation needs through international coordination

A global monitoring of CC impacts is so far poorly structured

Case studies in various contexts have been developed but
  - Many methodological approaches are challenging and/or not shared

Contribute to the assessment of impacts of CC in different SBA (water, food security, coastal areas, air quality,..)

Precise impact’s CC monitoring
  - Regional, National, Local scale
  - Will raise awareness, stimulate and support decision making

**Required international coordination specifically focused on impacts of Climate Change**
**SCO Concepts – Main Objectives**

**Principles**

- Science based Program
- Not alone!
  - A country, an agency, an institution... could not make it for all the World/Planet
- Involvement and cooperation with wide range of bodies
  - GEO, CEOS, CGMS and UN Agencies
  - National organizations, Ministries, local entities...
- Building on the exiting capabilities and programs
- Co-construction
  - At international but also national level
    - Across sectors, institutions, research community, and sub-national area (territories)
  - At level of populations
    - Metrics and social indicators to measure the appropriation and acceptance by stakeholders
  - Communities of development (Sharing of capabilities (expertise, computing)
  - Make available to others, freely
  - Exchange of use, best practice
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SCO Concepts – Need for a coordinated assessment of Climate Change Impacts

SCO Policy Drivers

Illustration by David Parkins
Precise impact’s CC monitoring

- Regional, National, Local scale

- By making full access, use and benefit of multi-source data
  - Best use of synergies between data providers (from satellite, in-situ, model, socio-economic research)

- Co-construction of both knowledge and expertise (scientifically, technically and geographically)
  - Products and services

- Develop effective and relevant communication/outreach activities and educational measures
  - Will raise awareness, stimulate and support decision making
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SCO Concepts – Main Objectives

1. Information, Outreach Communication, Learn
- Quality Control and Validation
  - Research & Education
  - Government & Society
  - Traditional & New Medias

2. Improve multi-source data access
   (access – Interoperability – Free)
   - From Earth observations
     - High Resolution Space Data
     - Climate Data Record
   - In-situ data
   - Socio-economic data
   - Climate modelling outputs

3. Products & Services
   - Toolkits and computing capacities
   - Maps & Indicators of Impact of Climate Change
   - Climate Change Impact case studies, projection and adaptation scenarios
Data access

By making full access, use and benefit of multi-source data

- Satellite EO data (global & fine scales)
- Derived EO Products (Land use, DEM, water...)
- ECVs
- In-situ data
- Models data
- Climate Data Records
- Climate Projections

Climate Change Impact + Socioeconomic data

Maps & Indicators of Impact of CC
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3 – Products & Services

Feedback

Example "C3S"

Adapted at the scale of Regional/National/Local scales

Co-construction
Communities of development
Make available to others, freely
Exchange of use, best practices

Scenario, future projections

Products & Services Access

End Users

Request

Feedback

"New" developments

Feedback

Request
Illustration of future scenario and international contributions

Coordinator: Vietnam (VAST-VNSC-Mekong Commission)
User needs: Foot security (Rice), Forest...

Coordinator: Australia (CSIRO)
User needs: Coastal areas, Water quantity & quality...

International HUB
Tools, Data, Products, Scenario
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SCO Concepts – SCO the international landscape

National SCO Data Center

National SCO Products & Services

Space Agencies

International Organization

SCO – HUB
Data access, Information, Products & associated Services

End Users

but always
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SCO Concepts – SCO the international landscape

ECV inventory and gap analysis

Regular updates carried by CEOS-CGMS WG Climate (last exercise: 2016 - 2017)

Improvement / extension of the datasets (e.g. CCI / CCI+)

C3S : ECV provider

CNES 4th contributor after NASA, EUMETSAT and ESA in the last update of the ECV Inventory

Reference Document: “Implementation of the climate monitoring architecture from space”, 2013
Objective #1: Discuss and converge on the SCO concepts

Objective #2: Discuss and build on potential contributions and commitments by partners in SCO implementation

Objective #3: Discuss and converge on implementation and planning

Objective #4: Discuss and converge on governance
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<thead>
<tr>
<th>Time</th>
<th>Agenda Item</th>
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<tr>
<td>9:00</td>
<td>Welcome Remarks</td>
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<tr>
<td>9:05</td>
<td>Welcome Remarks: - Jean-Yves Le Gall (CNES President), Marie Hélène Vuillemin Tusseau (Scientific Director of Environment, Agronomy, Ecology, Earth System and Universe Sciences for the French Ministry of Higher Education, Research and Innovation)</td>
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<tr>
<td>9:20</td>
<td>Strategic importance of observing climate change and its Environmental Impacts from Space – Dr. Anny Cazenave (International Space Science Institute (Bern, Switzerland))</td>
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<tr>
<td>9:30</td>
<td>Objectives of the meeting – Dr. Selma Cherchali (CNES)</td>
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<td>9:40</td>
<td>SCO Concepts (SCO Program Definition): Dr. Selma Cherchali</td>
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<td>10:30</td>
<td>Coffee break – Group Photo</td>
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<td>11:00</td>
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<td>11:00</td>
<td>Significant experiences in Climate Change Impact assessment: Presentations</td>
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<td>13:15</td>
<td>Lunch Offer</td>
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<td>14:00</td>
<td>SCO implementation and planning: Presentation of the proposal: Dr. Selma Cherchali</td>
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<td>14:15</td>
<td>SCO International governance: Presentation of the proposal: Dr. Selma Cherchali</td>
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<td>14:30</td>
<td>SCO International Protocol Agreement: Emilie Le Bert (CNES)</td>
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<td>14:45</td>
<td>Coffee break</td>
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<td>15:00</td>
<td>Summary: Dr. Pierre Tabary (CNES)</td>
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<td>15:15</td>
<td>Next steps: Dr. Selma Cherchali (CNES)</td>
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More than 50 participants from all over the world
Representing more than 25 national space and national agencies, and 4 international organizations
Very fruitful interactions which clearly demonstrates a common willingness to act together towards a common goal → joining forces and collaborating to address the monitoring of climate change impacts
Program definition document greatly appreciated

The scope of SCO is now much clearer.

The articulation of SCO with other international programs and initiatives is better understood ("pulling the same rope in the same direction", "SCO really bridges a gap", ...)

The focus on the climate change impacts (pillar 3 of the space-based architecture for climate monitoring) is highly appreciated;

It is recognized that there is a strong need to structure international collaboration on climate change impact monitoring

Need to adopt the high-quality standards and guidelines that have been developed (in particular in the frame of WG Climate for the production of the ECVs) for all information generated within SCO. Important for the credibility of the community and the consistency of the communication.
SCO seen as a very good way to bridge the gap between science and society, and to develop trans-disciplinary collaborative research and development (e.g. coupling environmental and socio-economic data)

Essential to build upon local (e.g. traditional knowledge) / national expertise / tools / initiatives / infrastructures

SCO could be a unique opportunity (“multiplier”) to “industrialize” or “replicate” local climate change impacts studies / initiatives and generalize them massively.

SCO is seen as a means to also catalyze national coordination and effort on CC impacts;

SCO is seen as a very good way to obtain more feedbacks from end-users, maximize the use of CDRs and gain insight into the needs for future space programs (e.g. develop of new indicators).

Scope of SCO is wide and ambitious, in particular its communication and outreach component. Will need further discussions.
Summary – National experiences in CC impact assessments

- Numerous National plans/strategies in place to understand, monitor and adapt CC impacts;
- Contribution of spatial technologies/space capabilities in understanding Climate, for the management of natural resources (SDG goals);
- Develop of indicators for decision making processes;
- Strong involvement of the research community in the development/validation/use of indicators;
  - Regional/national/local scales of key importance:
    - Key interests/requests from local stakeholders,
    - Easier coordination (e.g. implementation of regional RI Datahub/platform);
    - Ready to use applications (end-users requests);
    - Methods and best practices transferable.
  - Make best use of existing initiatives and programs related to impacts CC (e.g C3S);
- Free and open data access promoted;
- Interoperability: should use existing standards to be chosen between SCO members (like WMO...).
It is time for action: Base of the SCO implementation – not only political.

Need to go fast but also step by step – not get locked with chicken and eggs issues
→ Need prompt feedback on the SCO program definition document.

Everybody is invited within the next weeks to react to the draft declaration of interest that will be proposed just after this meeting.

Contribution are based on existing programs and in kind participation at the start – This may evolve based on progress.
Technical Outcomes

- **Improved multi-source data web-based access**
  - Free access to existing Data products generated outside the SCO
  - Free access to Data products generated by the SCO and SCO Contributors

- **Full description of Climate Change impact Case Studies performed**
  - Climate change impact descriptive sheets
  - Open source code implementing the specifically designed impact study
Nairobi 8-10 March 2019 - 2nd Global Session of the UN SCIENCE-POLICY-BUSINESS FORUM ON THE ENVIRONMENT

SCO Presented at the opening and closing of the 2nd SPB Forum Session

SCO Confirmed as a model project by the SPB Forum Data Working Group chaired by Gilberto Camara (GEO)

GEO Secretariat proposed that SCO GEO Initiative (under evaluation) participates to the GEO Knowledge Hub

Nairobi 8-10 March 2019

SCO Presented on the SPB Forum Stand with scenarios and use cases presented

SCO Presented on the World Situation Room Stand as an example of scientific & data input

Nairobi 14 March 2019

3rd Edition of the One Planet Summit

Participation of Jean-Yves Le Gall in the French Presidential Delegation to represent the SCO

Arona Diedhiou (Climate Expert – IRD, IPCC) cited SCO as a Major Program on Climate Change

20/03/2019

WG Climate Meeting - Marrakech
Some preliminary feedbacks

- WG Climate Chair (CEOS-CGMS-GCOS) recommendations:
  - that it might be advantageous if SCO were to address pillar 3 of the architecture, in order to enhance the uptake of CDRs into applications

- GCOS is pleased that it’s role has been recognised and requested that planned feedback mechanisms and the **advisory role of GCOS** be maintained (See Governance Part)

- WMO confirmed the finding from the WMO/EC earlier case studies that satellite data fulfils only parts of what is needed for applications. *These original case studies done in 2013 should be seen as very embryonic, and maybe the SCO could be used to develop further and more detailed case studies of satellite applications for climate research/services*
From the perspective of WG Climate (October 2018), the SCO might become useful in the context of CEOS/CGMS if it were to:

Focus on impact studies and the tailoring of the associated inputs, with a particular emphasis on the illustration/promotion of the use of CDRs, as well as (where appropriate):

- Identifying opportunities conditions for delivering further Climate Data Records
- Suggesting optimization of the planning of future satellite missions and constellations to expand existing and planned Climate Data Records
- Support GCOS in defining observational requirements for particular applications/services
Next steps

• Signature of the Joint Declaration of interest open for signature from first week of April

• Ceremony of the signature in Biarritz (25-27 August) next to G7 meeting

• Set up the Steering Committee
  • Improvement of the Program Definition Document
  • Implementation Plan for the next two years
  • Governance : put in place the different governing structures (General Assembly, Scientific – Users -Observers Committees).
  • Develop concrete outputs (e.g. indicators and scenarios) in targeted areas and defined them as “proofs of concept” : pilot use cases
    » Develop an “extensive” knowledge on impact case studies worldwide
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SCO Concepts - SCO Users and Service

- SCO Added-Value

  - **Key role of Earth Observation data (Satellite and in-situ)**
    - High resolution data, multi-missions data, ECV
    - Expert tools and processing chains
    - In-situ data

  - **Data, results and indicators produced from studies**
    - Study reports
    - Specific indicators

  - **International coordination**
    - Facilitating agreements between different initiatives and partnership
    - Methodology reproduced, adapted in quasi similar contexts
    - SCO missions/objectives will be deployed in each country by national stakeholders through their dedicated infrastructure and organization

  - **An international shared Data portal**
    - Sharing input data, protocols, knowledge and processing methodology
    - International dissemination – products and associated expertise
    - Improving global knowledge and awareness about the impacts of CC – available to all