Data4SDG: challenges and opportunities

Dr. Gregory Giuliani, Dr. Nicolas Ray, Prof. Anthony Lehmann
University of Geneva/enviroSPACE
Global Sustainability Challenges

Dec 2015 - COP21 Paris Declaration

Selected Significant Climate Anomalies and Events in 2015

ALASKA
The year 2015 tied with 2002 as the second warmest year since statewide records began in 1950, behind 2014.

CANADA
Parts of western Canada had their warmest summer on record. Moderate to extreme drought developed across parts of western Canada due to the unusual warmth and dryness.

EASTERN NORTH PACIFIC BASIN
August 2015
At the end of August, three storms—Kilo, Ignacio, and Jimena—represented the first simultaneous occurrence of three major hurricanes in the basin since records began in 1949.

CONTIGUOUS UNITED STATES
The contiguous U.S. had its second warmest year (behind 2012) and third wettest year since national records began in 1895. May 2015 was the wettest month of any month on record.

ARCTIC SEA ICE EXTENT
During its growth season, the Arctic had its smallest annual maximum extent. During its melt season, the Arctic reached its fourth smallest minimum extent on record.

EUROPE
Europe, as a whole, experienced its second warmest year on record, behind 2014. Several countries had a top 5 year: Spain (warmest), Finland (warmest), Austria (2nd), Germany (2nd), France (3rd), and The Netherlands (5th).

INDIA
A major heatwave affected India from 21 May–10 June. Average temperatures over 45°C were observed, with some locations reaching 48°C. Over 2000 fatalities were blamed on the excessive heat.

Morocco
On Aug 6th, Marrakech received over 13 times its monthly average in one hour.

CHINA
Heavy rain from May–Oct caused floods that affected 75 million people. Provinces in southern China experienced their wettest May in 45 years.

WESTERN PACIFIC OCEAN TYPHOON SEASON
Above average activity 28 storms, 21 typhoons

CYCLONE CHAPALA
(October 28th–November 4th, 2015)
Maximum winds - 250 km/hr Chapala was the first hurricane-strength storm (Category 1 in the Saffir-Simpson scale) on record to make landfall in Yemen.

AFRICA
2015 was the second warmest year, behind 2010, since continental records began in 1910.

NORTH INDIAN OCEAN CYCLONE SEASON
Near average activity 5 storms, 2 cyclones

SOUTH WEST INDIAN OCEAN CYCLONE SEASON
Near average activity 13 storms, 6 cyclones

AUSTRAILIAN CYCLONE SEASON
Near average activity 9 storms, 7 cyclones

SOUTH WEST PACIFIC CYCLONE SEASON
Near average activity 6 storms, 2 cyclones

ARGENTINA
Second warmest year, behind 2012, since national records began in 1961. The four warmest years on record have occurred since 2012.

CHILE
Jan 2015 was the driest Jan in at least five decades.

SOUTH AFRICA
Jul 2014–Jun 2015 was the driest season since 1991/92 and third driest since records began in 1932/33.

SOUTH AMERICA
Much warmer-than-average conditions engulfed much of the region during the year, resulting in the warmest year since continental records began in 1910.

ANTARCTIC SEA ICE EXTENT
During its growth season, the Antarctic had its 16th largest annual maximum extent. During its melt season, the Antarctic reached its fourth largest minimum extent on record.

Please Note: Material provided in this map was compiled from NOAA’s NCEI State of the Climate in Reports and the WMO Provisional Status of the Climate in 2015. For more information please visit: http://www.ncdc.noaa.gov/sotc
Global Sustainability Challenges

The Ecological Footprint

Measures: how fast we consume resources and generate waste

- Energy
- Settlement
- Timber & paper
- Food & fibre
- Seafood

Compared to: how fast nature can absorb our waste and generate new resources.

- Carbon Footprint
- Built-up land
- Forest
- Cropland & pasture
- Fisheries
Global Sustainability Challenges

Issues and challenges related to SDGs

2. Zero hunger
6. Clean water and sanitation
7. Affordable and clean energy
11. Sustainable cities and communities
13. Climate action
14. Life below water
15. Life on land

Lehmann & al., in prep.
Issues and challenges related to SDGs

Lehmann & al., in prep.
Data to knowledge

DATA
signals, know-nothing

INFORMATION
useful, organized, structured

KNOWLEDGE
contextual, synthesized, learning

WISDOM
understanding, integrated, actionable

DECISIONS
change, movement

FUTURE
WHAT ACTION?
reveals direction

WHAT IS BEST?
reveals principles

PAST
WHY?
reveals patterns

WHAT?
reveals relationships

What EnviroSPACE is doing?


http://www.unige.ch/envirospace
What enviroSPACE is doing?

Lehmann, Schlaepfer, PhD Fasel, Masters

Lehmann, Schlaepfer, Giuliani, Ray, Lacroix, Guigoz, PhD Lacayo, PhD Fasel, PhD Favre, PhD Fornacca, Masters

Ray, Masters

Ray, Lacroix, Guigoz, Masters

Giuliani, Lacroix, Guigoz, Ray, Lehmann, PhD Lacayo, PhD da Silva, PhD Rodila, Masters
EnviroSPACE research projects:

**FNS:**
SWATCH21: ES of Swiss rivers (Sept. 2016)
neCHsus: Nexus approach of Swiss rivers (Sinergia, Dec. 2016)
SDGs agent based with CUI (Sinergia, Jun 2017)
Sustainable Caucasus with Jörg Balsiger (SCOPES)

**H2020:**
ERA-PLANET: Essential Variables for SDGs (on going)
BLUES: nature-based solutions in Geneva (submitted)
BATEMAN: ES interface for decision making (Mar 2017)
In-situ observatory with Bas Ibelings ? (Mar 2017)

**Others:**
Map-X: mapping the extractive industry and its impacts
Data4SDGs: Global Partnership
mySDGs: phone application
PhD on Geneva ecosystem services with CJB (Jan 2017)
...
Collaborations around Geomatics

UNIVERSITE DE GENEVE

GSEM

CUI

ENVIROMATICS

SDS

Dép. géographie

Labo INFOGEO

ISE

Labo ISE/GRID

Sciences

Dpt. Forel

Labo enviroSPACE

Certificat de géomatique

TIGERS

Forum utilisateurs

SITG

Représentant Commission Technique (CT)
Links with GEO/GEOSS and Geneva-based IO

Societal Benefit Areas

- Water Resources Management
- Sustainable Urban Development
- Public Health Surveillance
- Infrastructure and Transport Management
- Food Security and Sustainable Agriculture
- Energy and Mineral Resources Management
- Disaster Resilience
- Biodiversity and Ecosystem Sustainability

Collaborations with: UNEP, UNDP, UNESCO, WHO, PCDMB
Links with GEO/GEOSS and Geneva-based IO

Monitoring of Essential Climate Variables (ECVs) & Essential Biodiversity Variables (EBVs)

Funded by FOEN
Partners: UNEP/GRID, UNIGE, GEO, CNR
Links with GEO/GEOSS and Geneva-based IO
Swiss Data Cube: Analyze the environnement through space and time

Funded by FOEN
Partners: UNEP/GRID, UNIGE, GEO, CEOS, Geoscience Australia
Challenges and opportunities for ISE

• Earth Observations and geospatial information are complementary to traditional statistics for measuring progress towards SDGs.
• SDGs as a cross-cutting theme within ISE >> working group within ISE to exchange ideas, develop projects.
• enviroSPACE has good capabilities in data discovery, access, handling, and processing >> coordinate data sharing across ISE and UNIGE.

• Concerted and coordinated approach in order to get new (big) projects (e.g., Millenium Institute, new Master SDG, …)

>> new NCCR on SDGs
- SWATCH21: ES of Swiss rivers
- neCHsus: Nexus approach of Swiss rivers
- H2020:
  - ERA-PLANET: Essential Variables for SDGs
  - BLUES: nature-based solutions in Geneva
  - BATEMAN: ES interface for decision making
- Other:
  - Map-X: mapping the extractive industry and its impacts
  - Data4SDGs:
  - mySDGs: phone application
  - Agent based SDGs: global assessment of SDGs

gregory.giuliani@unige.ch/gregory.giuliani@unepgrid.ch/
http://www.unige.ch/envirospace/People/giuliani/