1

What in the world
is
the WMO GAW QA SAC – Americas?

2

How can NADP contribute
to the quality of
global precipitation chemistry measurements?

IGACO

GESAMP

GAW

NMHS

SAC

EPAC SSC

What in the world
is
the WMO GAW QA SAC – Americas?

SDS-WAS

GURME

WDCPC

GAWSIS

WMO

ET-WDC

SAG-PC

World Meteorological Organization

Weather • Climate • Water

RADAR

Numerical Wx Prediction Models

ENIAC

- WMO is an agency of the United Nations.
- WMO was formed in 1950.
- Goal of WMO was (and is) to foster international cooperation in matters related to weather, climate, water (hydrology) and **related geophysical sciences**.
  1) promotes establishment of networks, standardized procedures, training & tech' transfer
  2) facilitates free and unrestricted exchange of data and information

World Meteorological Organization

Weather • Climate • Water

* * * 1950 * * *

Seasonal Ozone Hole

Acid Rain Damage to Forests & Fisheries

Greenhouse Gases > Climate Change

* * * 1989 * * *

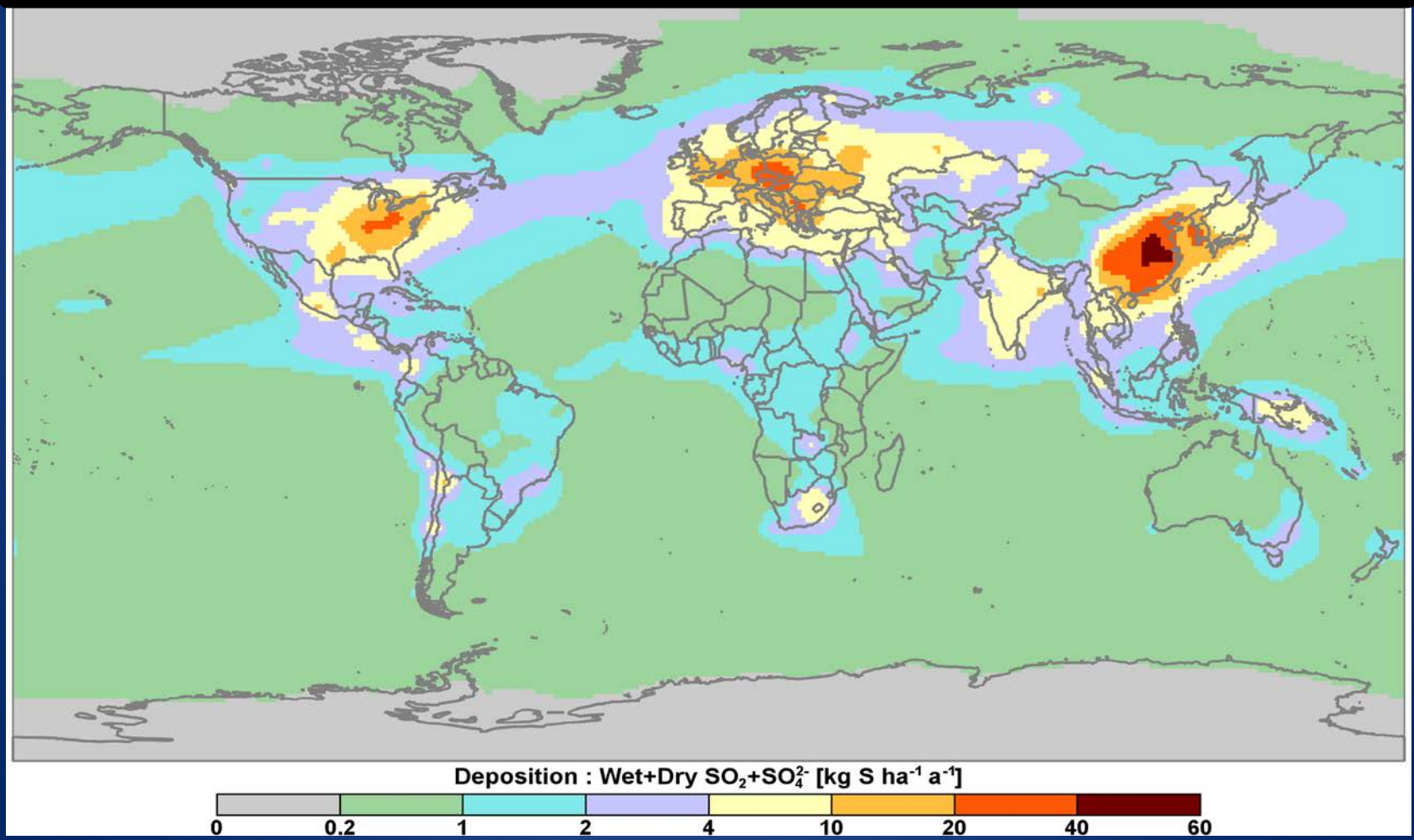
* * * Important Discoveries * * *

[The Global Atmosphere Watch Programme: 25 Years of Global Coordinated Atmospheric Composition Observations and Analyses]

GAW

The Global Atmosphere Watch Programme: 25 Years of Global Coordinated Atmospheric Composition Observations and Analyses

Atmospheric Deposition



The Global Atmosphere Watch Programme: 25 Years of Global Coordinated Atmospheric Composition Observations and Analyses

The mission of GAW is:

- **IGACO** = record **I**ntegrated **G**lobal long-term **A**tmospheric **C**hemistry **O**bservations to evaluate environmental risk & conventions
- emphasize **D**ata **Q**uality **O**bjectives (QA/QC)
- deliver data/products/services of relevance to users
- contribute to scientific assessments and strengthen predictive capabilities (i.e., models)

The Global Atmosphere Watch Programme: 25 Years of Global Coordinated Atmospheric Composition Observations and Analyses

Initial Problems

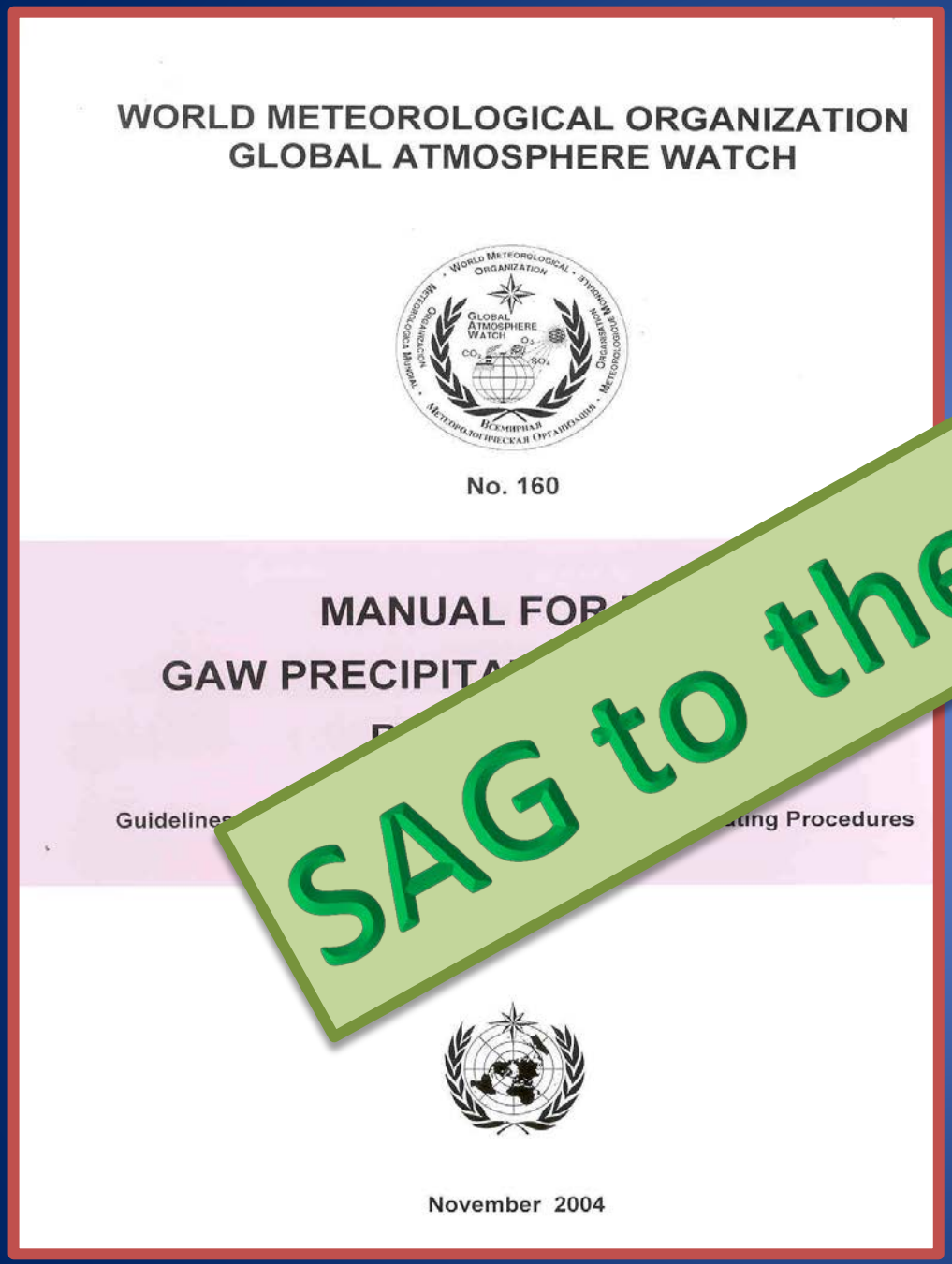
- GAW [illegible] (weather/climate/flood) per[illegible]
- standard proto[illegible]
- trace-level measurements
- QA/QC poorly established

SAG to the rescue!

Science Advisory Group – Precipitation Chemistry

Rick Artz, Chair
NOAA, USA

Bob Vet, Canada
Silvina Carou, Canada
Hiroshi Hara, Japan
Wenche Aas, Norway
Tamara Khodzher, Russia
Kobus Pienaar, S. Africa
Van Bowersox, USA



SAG to the rescue!

1) Equipment & p lures for collecting w sition and m n
2) edures
ations:
t calibration
ytical instruments
analysis methods
d – data verification
4) Data reporting & flagging

5) QA/QC
a – data quality objectives
b – QA Plans
c – tests of instruments, containers, handling procedures
d – measurement accuracy, completeness, representativeness

Atmospheric Environment

Available online 12 December 2013

In Press, Accepted Manuscript — Note to users

KUDOS

A global assessment of precipitation chemistry and deposition of [illegible], nitrogen, sea salt, base cations, organic acids, acidity and pH, and phosphorus *

Robert Vet[a], Richard S. Artz[b], Silvina Carou[a], Mike Shaw[a], Chul-Un Ro[a], Wenche Aas[c], Alex Baker[d], Van C. Bowersox[e], Frank Dentener[f], Corinne Galy-Lacaux[g], Amy Hou[a], Jacobus J. Pienaar[h], Robert Gillett[i], M. Cristina Forti[j], Sergey Gromov[k], Hiroshi Hara[l], Tamara Khodzher[m], Natalie M. Mahowald[n], Slobodan Nickovic[o], P.S.P. Rao[p], Neville W. Reid[q]

[a] Atmospheric Science and Technology, Environment Canada, Toronto, Ontario, Canada

[b] Air Resources Laboratory, National Oceanic and Atmospheric Administration (NOAA), College Park, MD, U.S.A

[c] Norwegian Institute for Air Research (NILU), Kjeller, Norway

[d] School of Environmental Sciences, University of East Anglia, Norwich, UK

[e] QA/SAC Americas, World Meteorological Organization Global Atmosphere Watch, Champaign, IL, U.S

[f] European Commission, Joint Research Centre, Institute for Environment and Sustainability, Ispra, Italy

[g] Laboratoire d'Aérologie, Observatoire Midi Pyrénées, Toulouse, France

[h] Faculty of Natural Sciences, North-West University, Potchefstroom, South Africa

[i] CSIRO Marine and Atmospheric Research, Aspendale, Victoria, Australia

[j] Instituto Nacional de Pesquisas Espaciais, Ministério da Ciência, Tecnologia e Inovação, São José dos Campos, São Paulo, Brazil

[k] Institute of Global Climate and Ecology, Roshydromet and RAS, Moscow, Russian Federation

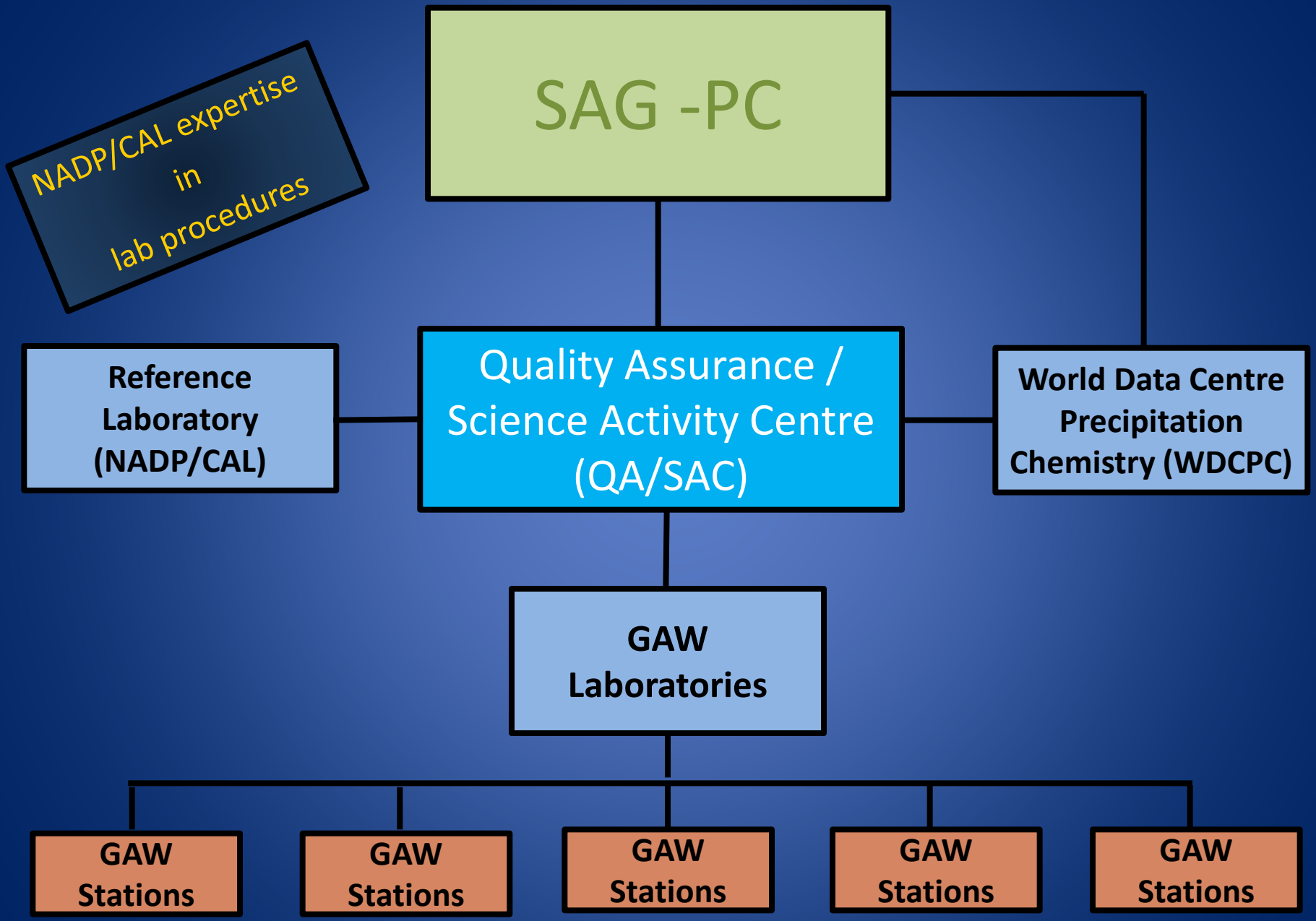
[l] Department of Agriculture, Tokyo University of Agriculture and Technology, Tokyo, Japan

[m] Limnological Institute, Siberian Branch of the Russian Academy of Sciences, Irkutsk, Russian Federation

[n] Earth and Atmospheric Sciences, Cornell University, Ithaca, New York, U.S

[o] Atmospheric Research and Environment Branch (AREB), World Meteorological Organization, Geneva, Switzerland

[p] Indian Institute of Tropical Meteorology, Pune, India

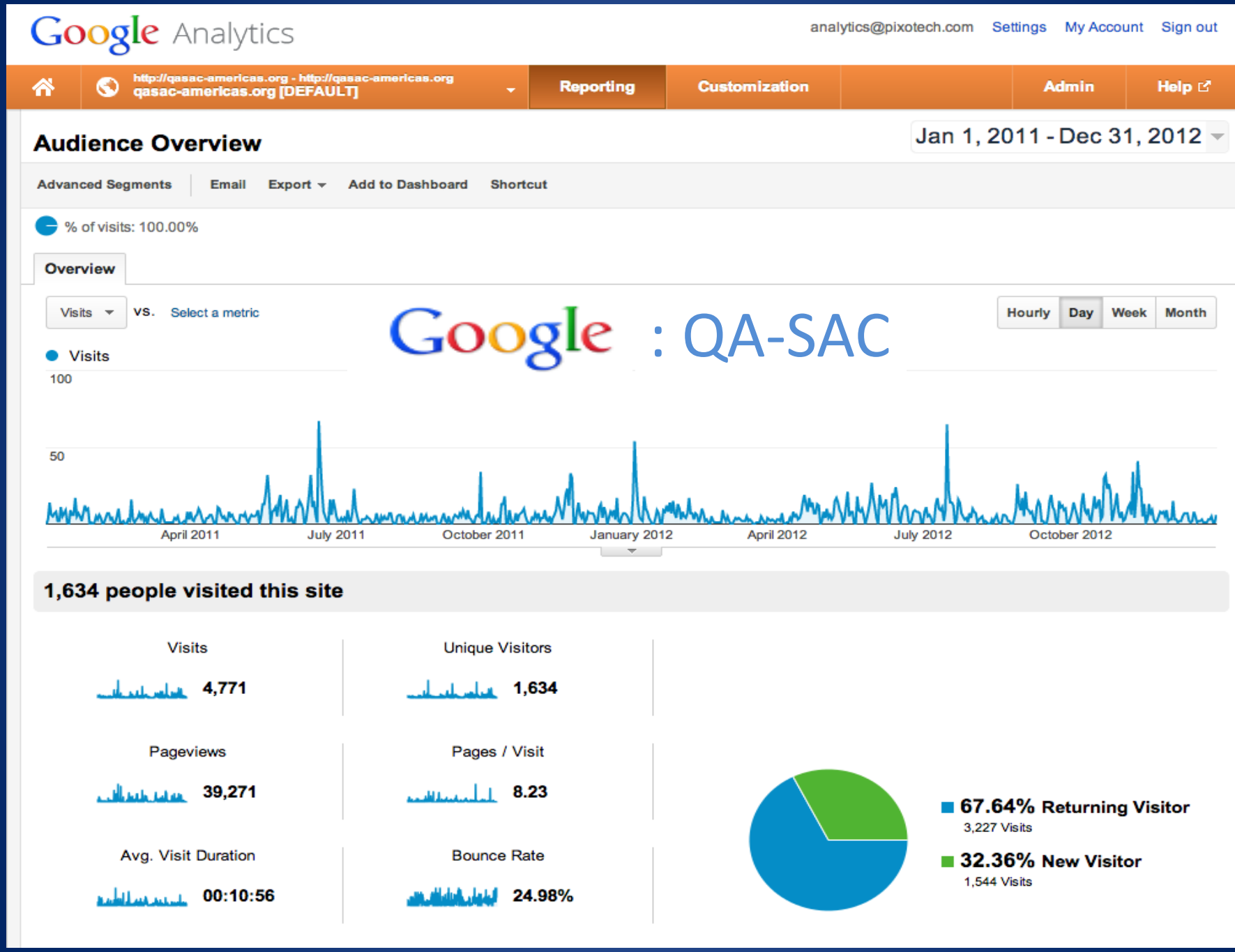

NADP/CAL expertise in lab procedures
SAG -PC
Reference Laboratory (NADP/CAL)
Quality Assurance / Science Activity Centre (QA/SAC)
World Data Centre Precipitation Chemistry (WDCPC)
GAW Laboratories
GAW Stations
GAW Stations
GAW Stations
GAW Stations
GAW Stations

http://qasac-americas.org/

By activating this tab, Lab Managers can log in with a User Name and Password.

When Lab Managers log into the QA/SAC system, they can:

- Update contact information
- Edit shipping address, latitude/longitude, etc.
- Enter biannual Inter-laboratory Comparison Study reports.

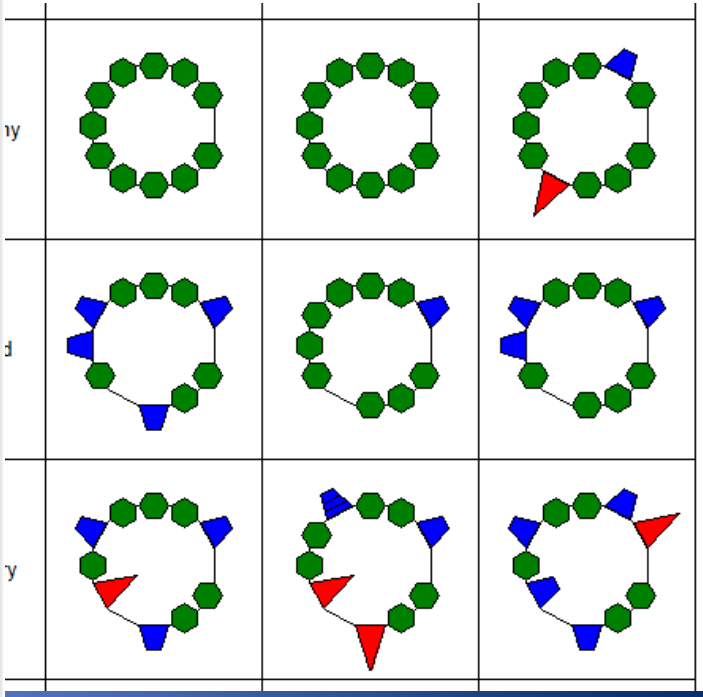

Google Analytics
analytics@pixotech.com Settings My Account Sign out
http://qasac-americas.org - http://qasac-americas.org
qasac-americas.org [DEFAULT]
Reporting
Customization
Admin
Help
Audience Overview
Jan 1, 2011 - Dec 31, 2012
Advanced Segments
Email
Export
Add to Dashboard
Shortcut
% of visits: 100.00%
Overview
Visits
vs.
Select a metric
Google : QA-SAC
Hourly
Day
Week
Month
Visits
100
50
April 2011
July 2011
October 2011
January 2012
April 2012
July 2012
October 2012
1,634 people visited this site
Visits
4,771
Unique Visitors
1,634
Pageviews
39,271
Pages / Visit
8.23
Avg. Visit Duration
00:10:56
Bounce Rate
24.98%
67.64% Returning Visitor
3,227 Visits
32.36% New Visitor
1,544 Visits

Study Results : Tabular Summary

Sample 1 Results

Measurement	Units	N	Target	Median	$Sigma_{est.}$	Good (25th perce
pH	pH units	73	4.75	4.80	0.06	4.76
Conductivity	µS/cm	67	20.8	20.4	0.5	20.0
Acidity (optional)	µeq/L	10	N/A	15.1	2.6	13.2
Sulfate as SO_4^{2-}	mg/L	73	1.935	1.930	0.110	1.872
Nitrate as NO_3^-	mg/L	77	0.978	0.962	0.042	0.930
Ammonium as NH_4^+	mg/L	73	0.381	0.376	0.019	0.365
Fluoride (optional)	mg/L	22	0.054	0.051	0.005	0.048
Chloride	mg/L	74	2.032	2.013	0.060	1.974
Sodium	mg/L	70	1.124	1.104	0.043	1.062
Potassium	mg/L	72	0.219	0.215	0.014	0.200
Calcium	mg/L	70	0.270	0.266	0.034	0.250
Magnesium	mg/L	69	0.119	0.117	0.005	0.113

Study Results : Ring Diagrams



Select Data Sets

1. Choose Action:

- ○ Download
- ◉ View

Would you like to download data files or view data?

2. Choose Data:

- ☑ Ring Diagrams
- ☐ HTML Table
- ☐ Comma-delimited CSV

3. Choose Lab:

All Labs

Select a single lab, or all for entire dataset.

4. Choose Period:

LIS 2014 50

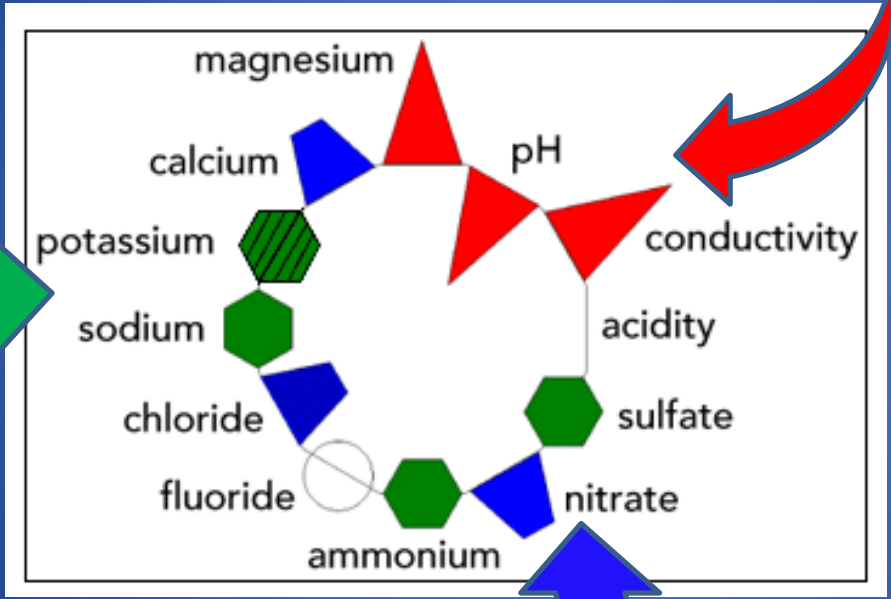
Go!

download csv file

Lab	pH pH units	conductivity µS/cm	acidity µeq/L	potassium K^+ mg/L	calcium Ca^{2+} mg/L	magnesium Mg^{2+} mg/L	Ring Diagram
700003 Sample 1	4.76 Z= - 0.67	20.8 Z= 0.80	m	0.219 Z= 0.29	0.261 Z= - 0.15	0.119 Z= 0.40	
700003 Sample 2	4.58 Z= - 0.50	15.9 Z= 0.71	m	0.028 Z= 0.14	0.115 Z= - 0.24	0.033 Z= 0.00	
700003 Sample 3	5.35 Z= 0.18	22.1 Z= 0.20	m	0.324 Z= 0.45	0.458 Z= - 0.16	0.214 Z= 0.43	
700006 Sample 1	4.53 Z= - 4.50	20.3 Z= - 0.20	15.0 Z= - 0.0	0.178 Z= - 2.64	0.352 Z= 2.53	0.132 Z= 3.00	
700006 Sample 2	4.41 Z= - 4.75	15.4 Z= 0.00	29.0 Z= 0.5	<0.03	0.130 Z= 0.48	0.035 Z= 0.29	

Study Results: HTML Table (CSV) with Z-scores

UNSATISFACTORY
outside (median ± Sigma)



SATISFACTORY
between Good
&
Unsatisfactory

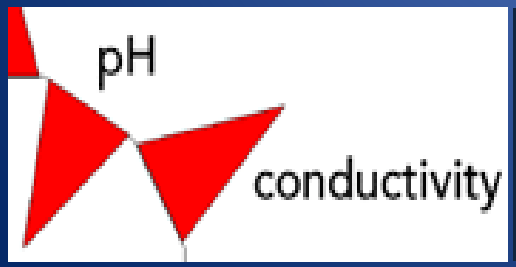
GOOD
within interquartile range

How can NADP contribute to the quality of global precipitation chemistry measurements?

- YouTube demonstration : “How To” enter lab study measurements on-line (6-minute video)

  https://www.youtube.com/watch?v=O1h1-dEgdXg

- On-line data entry is secure, quality-assured (measurements are entered twice and both entries must match), and efficient (participant receives report that lists measurements and target values by e-mail)
- Over 3 years, participation has grown to 2/3rd of labs



YouTube video addressing correct measurement procedures

World Data Center for
Precipitation Chemistry

HOME | DATA | PUBLICATIONS | CONTACT

Precipitation Chemistry Labs and Stations

Select Lab
Select Station
Select WMO Region

Lab 700035 Switzerland

Location: Region 6, Europe

Swiss Federal Laboratories for
Materials Science & Technology (EMPA)
Überlandstrasse 129
Dübendorf

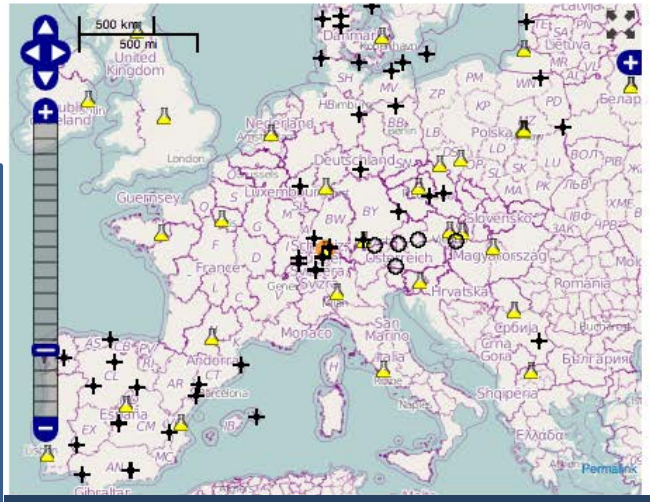
CH-8600 SWITZERLAND

Website:
http://www.empa.ch/plugin/template/empa/704/*/---/l=1

Stations Served:
- Tänikon
- Payerne
- Jungfraujoch
- Chaumont
- Rigi
- Jungfraujoch
- Payerne
- Rigi
- Tänikon

Intercomparison Data:
Select LIS Study

Lab 700035 Switzerland



Laboratory Information

- Lab Website link
- List of stations served by the lab
- Link to Ring Diagrams for lab

IGACO

GESAMP

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SPS-WAS

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