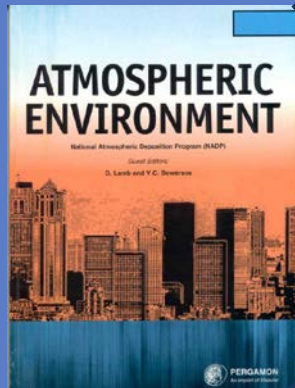


# Science Advisory Group on Precipitation Chemistry (SAG-PC) Meeting & 1<sup>st</sup> Global Precipitation Chemistry Assessment Writing Workshop

May 9-11, 2009

World Meteorological Organization (WMO), Geneva, Switzerland



## Atmospheric Environment

Available online 12 December 2013

In Press, Accepted Manuscript — Note to users



**A global assessment of precipitation chemistry and deposition of sulfur, nitrogen, sea salt, base cations, organic acids, acidity and pH, and phosphorus <sup>\*</sup>**

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

**Assessment data set to be posted on WDCPC Website**

**1- precipitation chemistry (major inorganics + P and selected organic acids)**

**2- dry deposition**

**3- gridded mean model estimates**

# QA SAC – AMERICAS Home Page



The Quality Assurance  
Science Activity Centre – Americas



Helping ensure the high quality of  
precipitation chemistry measurements

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PUBLICATIONS

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RING DIAGRAMS

LAB STUDY 47

PC-SAG

## QA/SAC-Americas



Welcome to the Quality Assurance/Science Activity Centre – Americas (QA/SAC-Americas), one of four QA/SACs operating to ensure data quality and support science activities in the [World Meteorological Organization Global Atmosphere Watch \(GAW\)](#).

The QA/SAC-Americas seeks to document and help improve the quality of precipitation chemistry measurements from around the world. It conducts semi-annual laboratory intercomparison studies. Graphical and tabular results of past studies are available by accessing [Study Results](#).

Guidance on all aspects of collecting precipitation for chemical analysis is provided in the [Manual for the GAW Precipitation Chemistry Programme \(WMO-GAW Report No. 160\)](#).

**Visit the [World Data Centre for Precipitation Chemistry Web site](#) to view a copy of the last Global Acid Deposition Assessment.**

The Quality Assurance/Science Activity Centre – Americas is sponsored by the National Oceanic and Atmospheric Administration Air Resources Laboratory. Data and information on this website are in the public domain, unless otherwise indicated, and may be used freely by the public. See [QA/SAC-Americas Data and Information Use](#).

Lab Manager Login

**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 and other laboratory information
- Enter biannual Lab Intercomparison Study reports.



HOME

PRECIP CHEM MANUAL

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LAB STUDY UPDATE

SAG-PC

## LIS Study 49

- Study Summary
- Ring Diagrams
- Study Data HTML
- Study Data CSV

LIS Study 49 ▼

### 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

Go!

## LABORATORY INTERCOMPARISON STUDY 49

Laboratory Intercomparison Study 49 (LIS 49) has been completed and results are posted under the [Study Results](#) tab. 78 laboratories participated in this study and more than half entered their measurements directly on-line. To view a demonstration on how to enter your measurements directly on-line see <https://www.youtube.com/watch?v=O1h1-dEgdXg>.

LIS 49 results are available in four different formats:

- (1) The [Study Summary](#) presents a table that lists a summary of statistics based on measurements from the 78 participants. All measurements, but those reported as missing or detection limit, are included in the statistical calculations.
- (2) [Ring Diagrams](#) depict a dodecahedron for each sample. Each side of the figure presents a measure of performance for each of the 12 possible measurements for each sample. Ring diagrams are described under the [Ring Diagrams](#) tab.
- (3) Numerical measurements are listed in HTML format for all three samples for each LIS 49 participant under [Study Data HTML](#). This presentation includes a Z-value for each measurement, as well as a ring diagram for each set of sample measurements. Z-values are calculated as follows:  $(\text{Measurement} - \text{Median}) / \text{Sigma}$ , using the Median and Sigma reported in the Study Summary table.
- (4) Data are in "comma-separated-value" format under [Study Data CSV](#). Data in this format can be loaded directly into a spreadsheet.

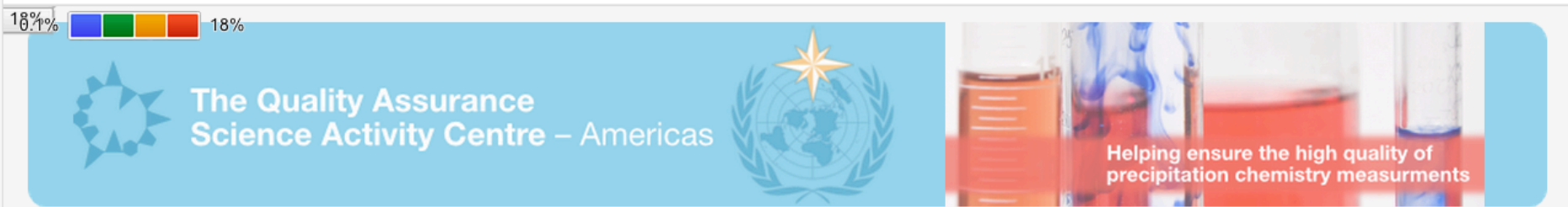
Thank you to all LIS 49 participants. The next study (LIS 50) will be conducted in April 2014. If you have questions, contact [manager@qasac-americas.org](mailto:manager@qasac-americas.org).

> More than half of participants now enter LIS  
reports directly on-line.

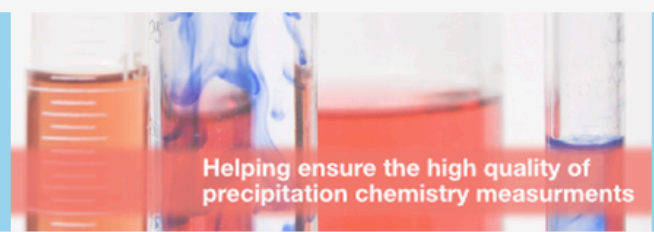
Site Usage

Pageviews	Unique Pageviews	Avg. Time on Page	Avg. Page Load Time (sec)	Bounce Rate	% Exit
<b>12,959</b> % of Total: 17.32% (74,822)	<b>7,487</b> % of Total: 17.73% (42,231)	<b>00:01:08</b> Site Avg: 00:01:31 (-25.24%)	<b>2.65</b> Site Avg: 2.46 (7.65%)	<b>25.88%</b> Site Avg: 25.85% (0.15%)	<b>27.59%</b> Site Avg: 13.54% (103.70%)

Clicks with more than: 0.10% | 
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## The Quality Assurance Science Activity Centre – Americas



### QA/SAC-Americas



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~18% Clicks below ↓

The Quality Assurance/Science Activity Centre – Americas is sponsored by the [Environmental and Atmospheric Sciences Division](#), [Chemical Analysis Section](#), [Chemical Administration](#), [Air Resources Laboratory](#). Data and information on this



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

100% of visits: 100.00%

### Overview

Visits vs. Select a metric

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



Unique Visitors



Pageviews



Pages / Visit



Avg. Visit Duration



Bounce Rate



67.64% Returning Visitor

3,227 Visits

32.36% New Visitor

1,544 Visits



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### LIS Study 47

- Study Summary
- ▶ Ring Diagrams
- Study Data HTML
- Study Data CSV

LIS Study 47

### 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

## Lab Intercomparison Study Data

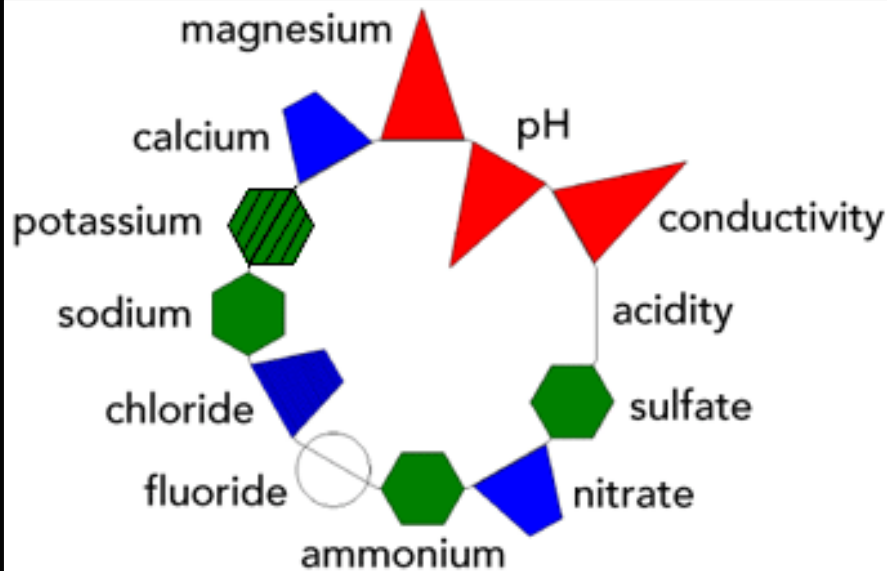
### All labs, LIS 2012 47 Ring Diagrams

Lab	Sample #1	Sample #2	Sample #3
700001 USA			
700003 USA			

An example of two U.S. labs, one that performs well and one with some analytical problems.

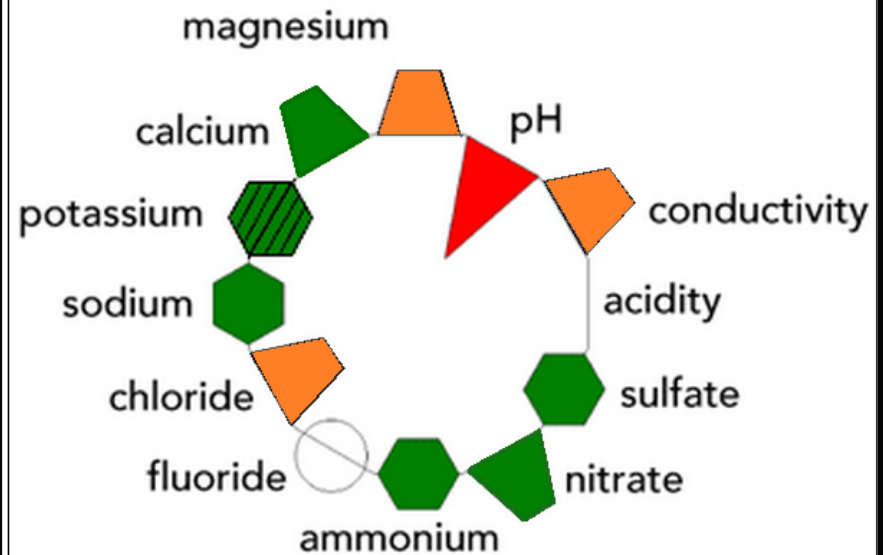
# New Ring Diagrams under Review

OLD



- ❖ Good
- ❖ Satisfactory
- ❖ Unsatisfactory

New



- ❖ Good
- ❖ Satisfactory
- ❖ Marginal
- ❖ Biased



# WDCPC Home Page



World Data Center for  
Precipitation Chemistry



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## Precipitation Chemistry Labs and Stations

Select Lab

Select Station

Select WMO Region

## WDCPC

To enhance geographic data coverage, the WDCPC maintains close cooperation with a number of regional precipitation monitoring programmes, including:

- Acid Deposition Monitoring Network in East Asia (EANET)
- Canadian Air and Precipitation Monitoring Network (CAPMoN)
- Co-Operative Programme for Monitoring and Evaluation of the Long Range Transmissions of Air Pollutants in Europe (EMEP)
- Deposition of Biogeochemically Important Trace Species (DEBITS)
- US Global Precipitation Chemistry Program (GPCP) See Galloway, et al., *Science* 16 November 1984. Vol. 226 (No. 4676): pp. 829-831.
- US National Atmospheric Deposition Program

Please contact [manager@qasac-america.org](mailto:manager@qasac-america.org), if there are publicly available, quality assured, data that meet GAW precipitation chemistry programme standards but are not accessible through the WDCPC. Questions can be addressed to [manager@qasac-america.org](mailto:manager@qasac-america.org).

The World Data Centre for Precipitation Chemistry is sponsored by the National Oceanic and Atmospheric Administration Air Resources Laboratory Data and information on this website are in the public domain, unless otherwise indicated and may be used freely by the public. See WDCPC Data and information use.

©CCBYSA 2010 OpenStreetMap.org contributors

Station Manager Login



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## Precipitation Chemistry Labs and Stations

Select Lab ▾

No Stations in this Region ▾

Select WMO Region ▾

### Lab 700011 Canada

**Location:** Region 4, North/Central  
America

Canadian Air & Precipitation Monitoring Net  
Science and Technology Branch  
Environment Canada  
4905 Dufferin Street  
Toronto, Ontario  
CANADA M3H 5T4

#### Website:

[http://www.ec.gc.ca/rs-  
mn/default.asp?  
lang=En&n=752CE271-1](http://www.ec.gc.ca/rs-mn/default.asp?lang=En&n=752CE271-1)

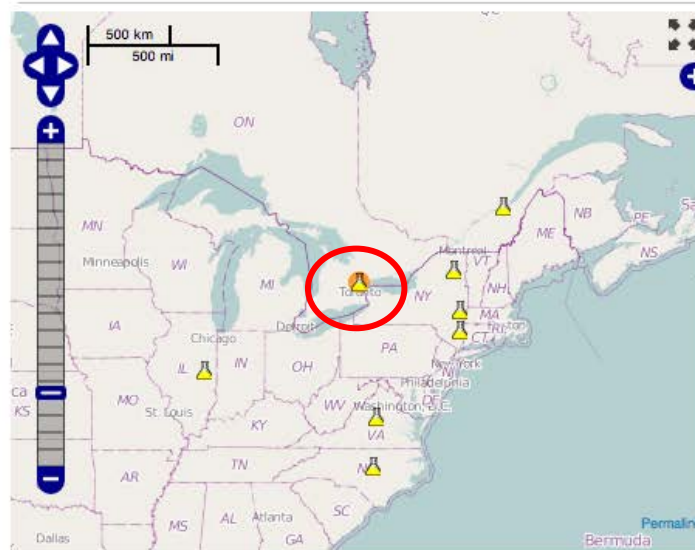
#### Stations Served:

Canadian Air and Precipitation  
Monitoring Network (CAPMoN)  
- Description  
CAPMoN Station Map  
CAPMoN Data

#### Intercomparison Data:

Select LIS Study ▾

## Lab 700011 Canada



In selecting a lab, the location is highlighted on the map. The address, Website, and 'Stations Served' appear. For the CAPMoN lab, the CAPMoN Station Map and CAPMoN Data are links to Websites where CAPMoN data can be accessed and retrieved. In addition, there is a link ← to laboratory performance/quality assurance data .



### 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](http://www.empa.ch/plugin/template/empa/704/*/--/l=1)

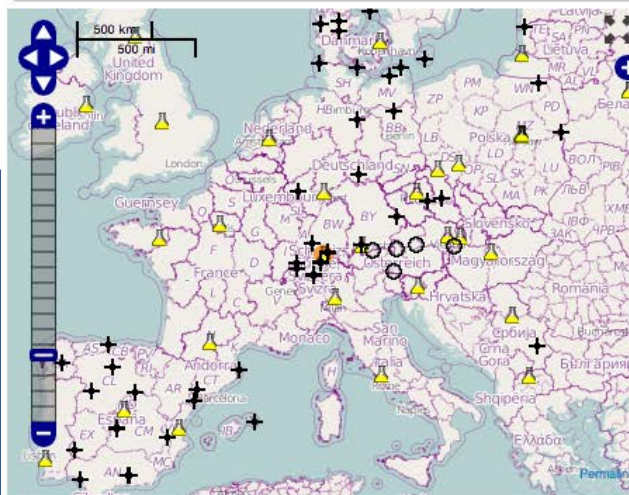
#### Stations Served:

- Tänikon
- Payerne
- Jungfrauoch
- Chaumont
- Rigi
- Jungfrauoch
- 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



### Precipitation Chemistry Labs and Stations

Select Lab

Select Station

Select WMO Region

#### Station JFJ

Station Name: Jungfrauoch

WMO Region: 6 - Europe

GAW ID: JFJ

Lab ID: 700035

Operational Dates:  
1981-05-01 to 1992-12-31

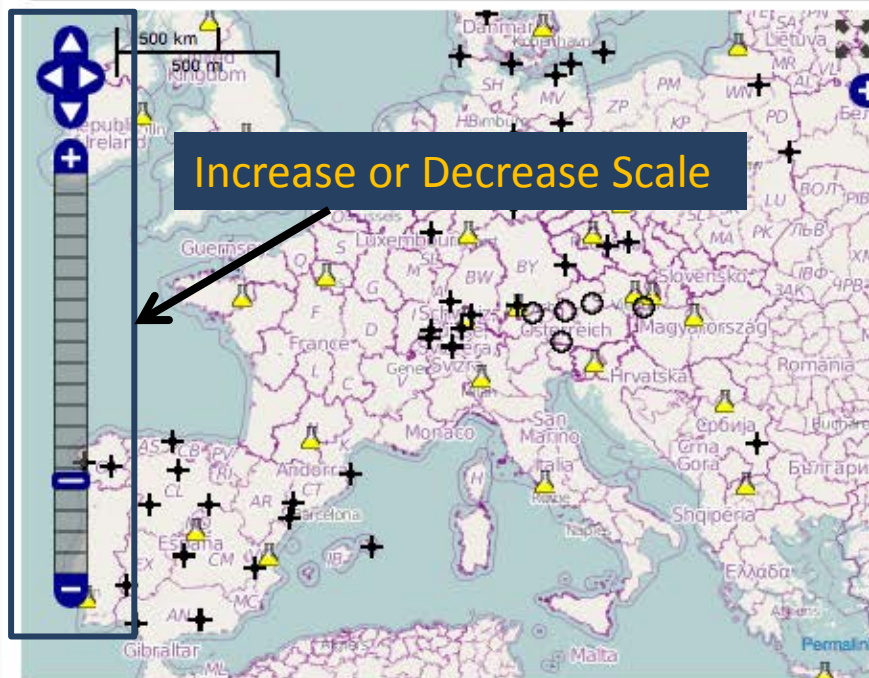
Latitude: 46.5475

Longitude: 7.985

Elevation: 3580 meters ASL

Station Data

### Station JFJ



### Station Information

- Lab ID links to Lab Information
- Station Data links to EBAS Website

# WDCPC Priorities

- Post assessment data on WDCPC Website – high priority
- Finalize procedures for data from stations unaffiliated with major programmes (e.g., CAPMoN, EMEP)
  - > capture metadata
- Complete the addition of stations with links to EBAS

## Comments/Questions

- Clarification on procedures for adding existing or new stations to the GAW programme
- SAG-PC and GAWTEC in communication – goal to coordinate future training of precipitation chemistry site technicians

# WMO/GAW WORLD DATA CENTRE for PRECIPITATION CHEMISTRY (WDCPC)

## Report for Major Inorganic Ions in Precipitation (version 2014)

Date of Report (dd-mm-yyyy)		Principal Contact (name) <span style="float: right;">(e-mail address)</span>

The WDCPC will provide the metadata in Parts 1 through 5, below, when precipitation chemistry data for the station indicated in Part 3 is requested. Scientists and other data users are expected to acknowledge the data provider by using the citation in Part 1.

### Part 1. Agency Information

(Provide a citation for the precipitation chemistry data provided by your agency. This is how scientists and others will cite your agency in publications.)

Global Atmosphere Watch, World Data Centre for Precipitation Chemistry Data, 2014, data provided by:

### Part 2. Laboratory Information

Laboratory ID Number	Measurement	Analysis Method	Measurement	Analysis Method	Detection Limit	Units
	pH		Sulfate as SO <sub>4</sub> <sup>2-</sup>			mg/L
	Conductivity		Nitrate as NO <sub>3</sub> <sup>-</sup>			mg/L
	Acidity		Ammonium as NH <sub>4</sub> <sup>+</sup>			mg/L
			Fluoride			mg/L
			Chloride			mg/L
			Sodium			mg/L
			Potassium			mg/L
			Calcium			mg/L
			Magnesium			mg/L

### Part 3. Station Information

GAW ID	Country	Station Name	Location		
			Latitude (xxx.xxxxx)		<== Indicate N or S
			Longitude (xxx.xxxxx)		<== Indicate E or W
			Elevation (m.a.s.l.)		

### Part 4. Sampling Instrumentation

Standard (Precipitation) Gauge			Precipitation Chemistry Collector		
Manufacturer	Model	Wind Shield	Manufacturer	Model	Area of Orifice

### Part 5. Sampling Protocol

Period (check one or describe)	Type (check one or describe)	Sample Preservation (List all that apply-examples include: filter/filter type, chloroform, refrigeration, other-describe)
daily	automated wet-only	
weekly	manual wet-only	
monthly	bulk (continuously open)	
other (describe below)	other (describe below)	