



IDC Infrasound Technology – status of station processing, a quick update

Pierrick Mialle, Seismic-Acoustic Officer, PTS
And colleagues from the PTS

Preparatory Commission
for the Comprehensive Nuclear-Test-Ban Treaty Organization
Provisional Technical Secretariat
Vienna International Centre
Vienna, AUSTRIA

Verification regime

4 Monitoring Technologies



Seismic: 170



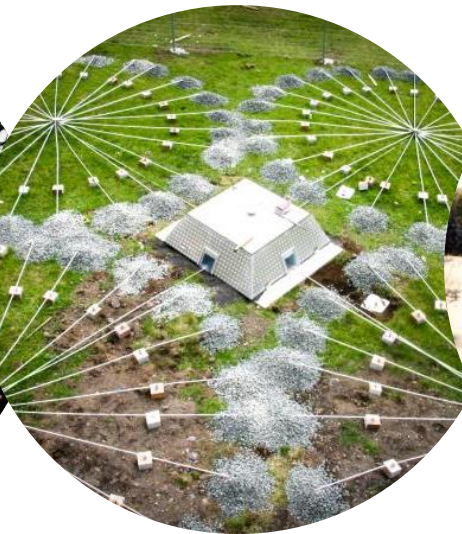
Listening underground



Hydroacoustic: 11



Listening to the
oceans



Infrasound: 60



Listening to the
atmosphere



Radionuclide: 80

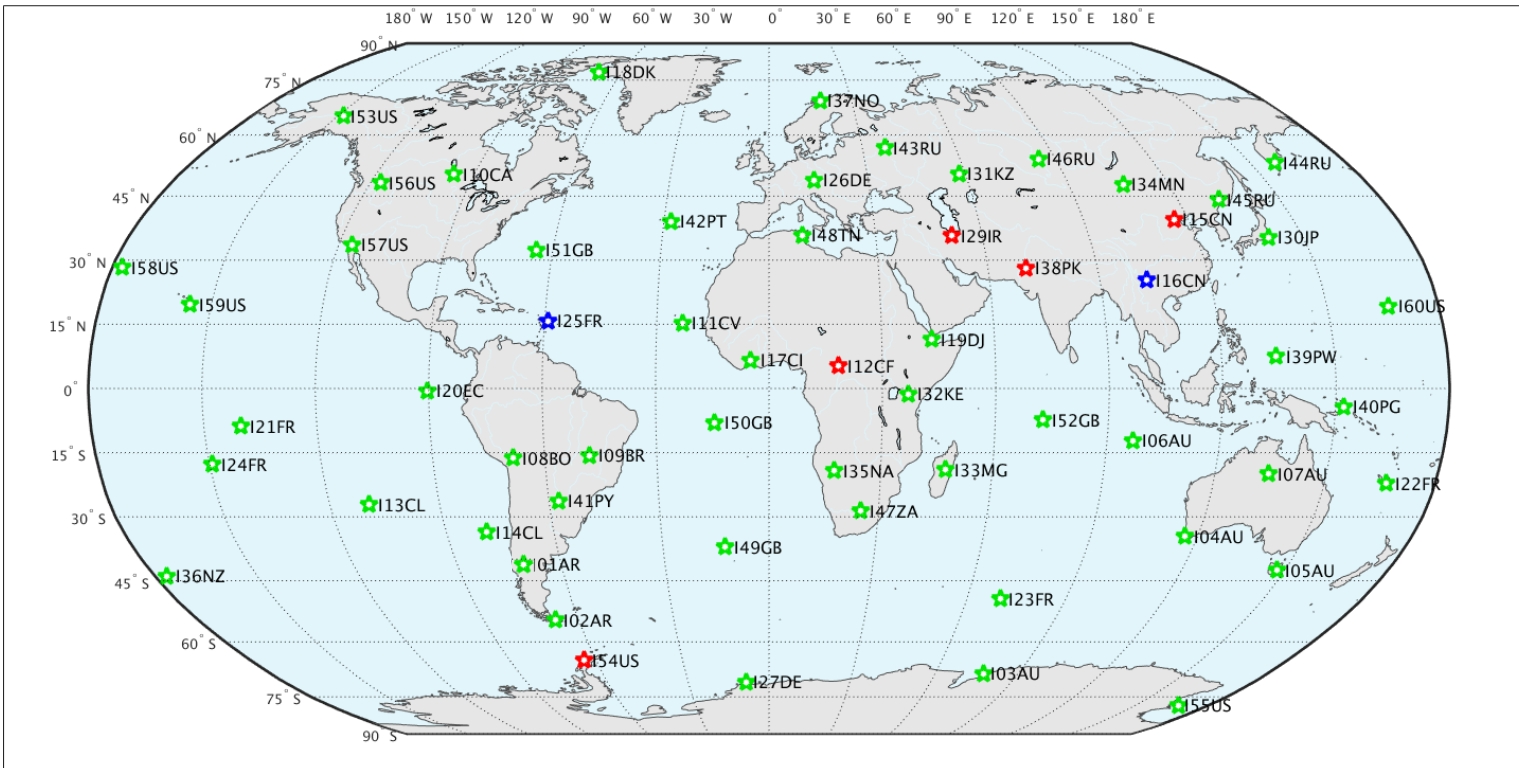


Sniffing the atmosphere
for radiation



OPS Center (2019)

IMS infrasound component Installation and Sustainment



2001 – 2020: **52** IMS infrasound stations certified out of 60
(Infra in IDC OPS: 42 certified in February 2010)

I147ZA, South Africa



I14CL, Juan Fernandez



I55US, Antarctica



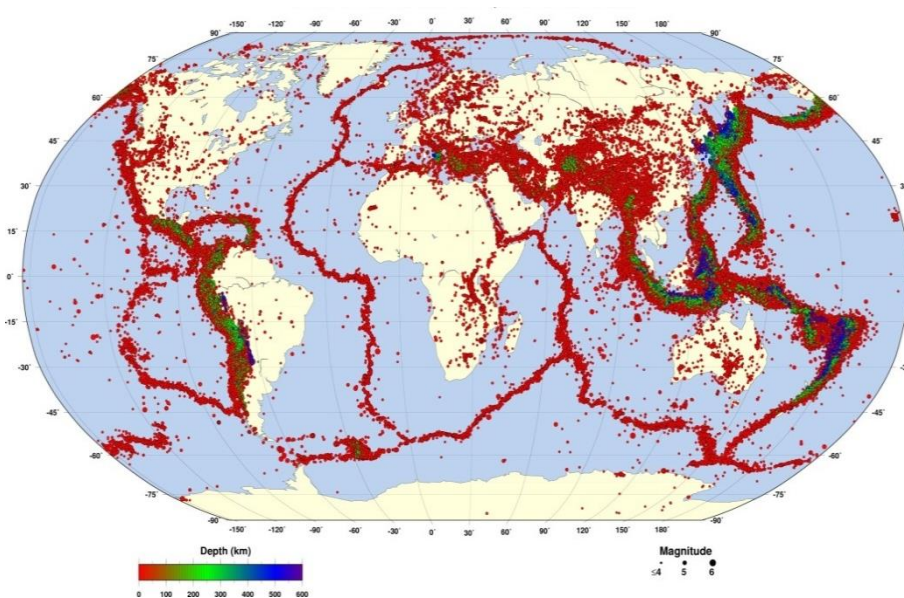
I04AU, Australia

International Data Center

Event locations

Reviewed Event Bulletin (REB) continues to grow (contains Seismic, Hydroacoustic and Infrasound):

Since February 2000

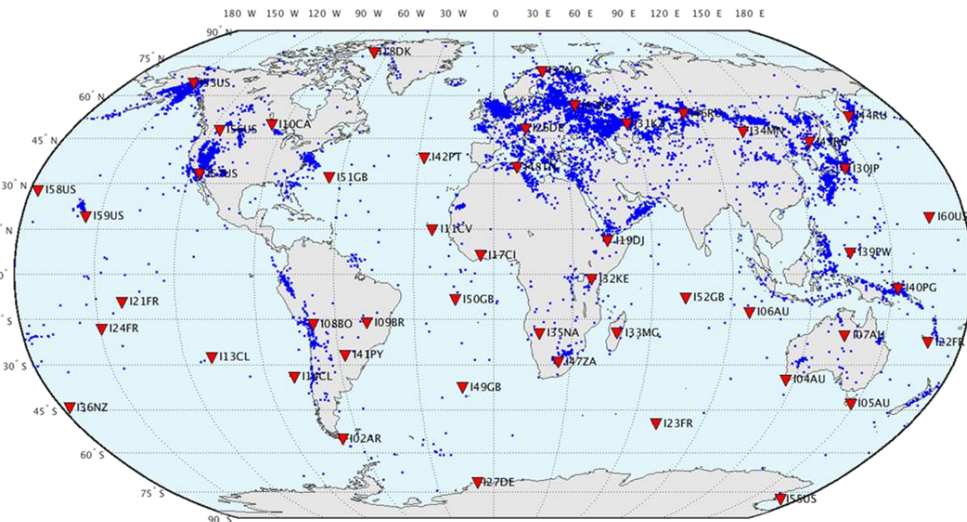


Over 630,000 REB events

~770,000 LEB & ~465,000 since 02/2010 >129 events/day

Status of the Late Event Bulletin (LEB) since infrasound technology fully in IDC Operations:

Since February 2010

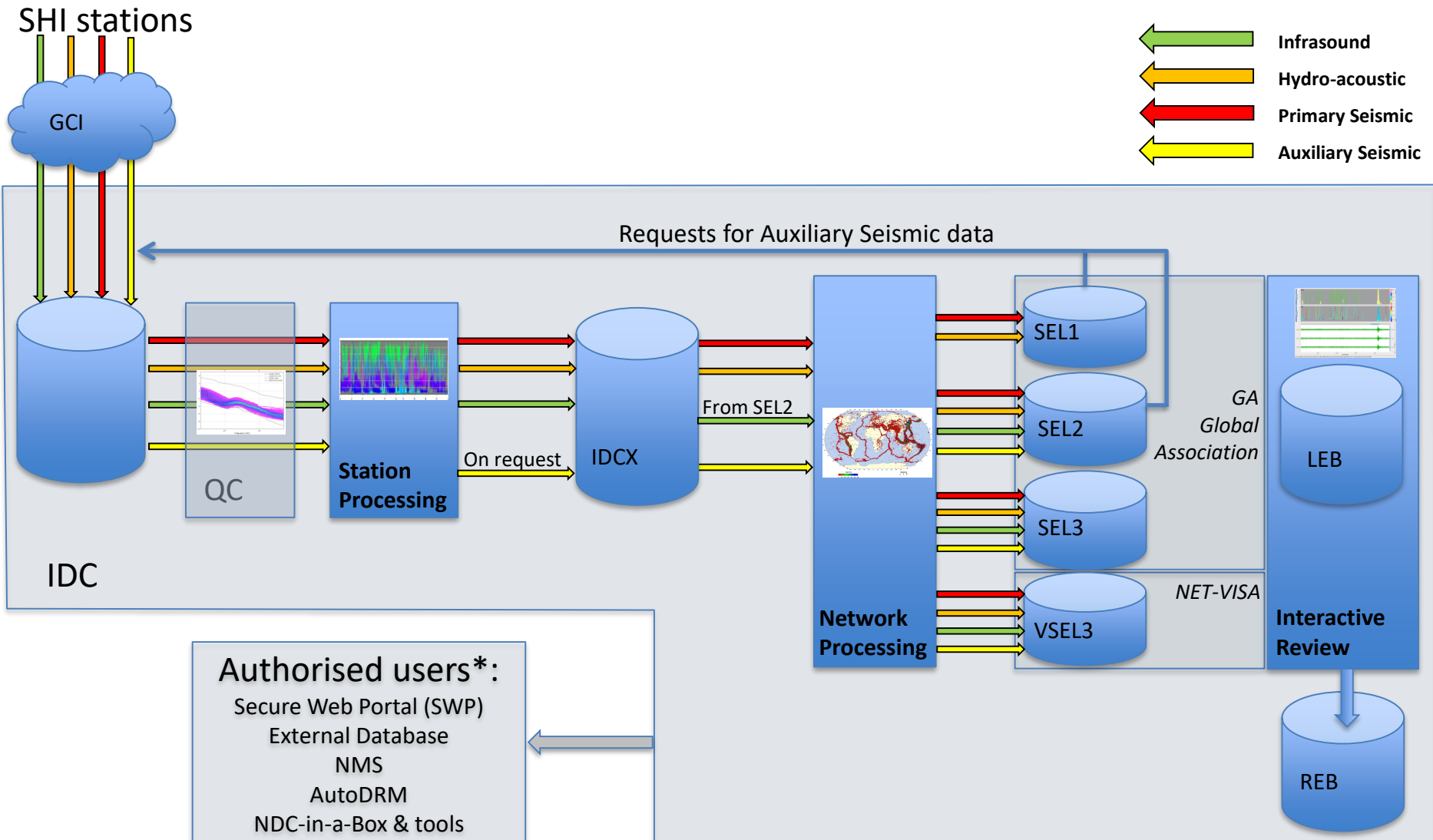
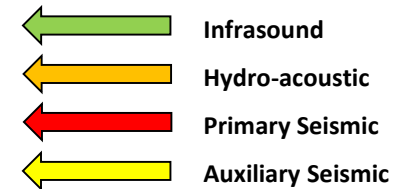


Over 34,000 LEB infrasound events

>9 events/day with infra association

REB and LEB are IDC products.

International Data Center System Overview (simplified)



* Useful resource: *User Guide for NDC* available on SWP under Documentation

Data quality waveform QC software

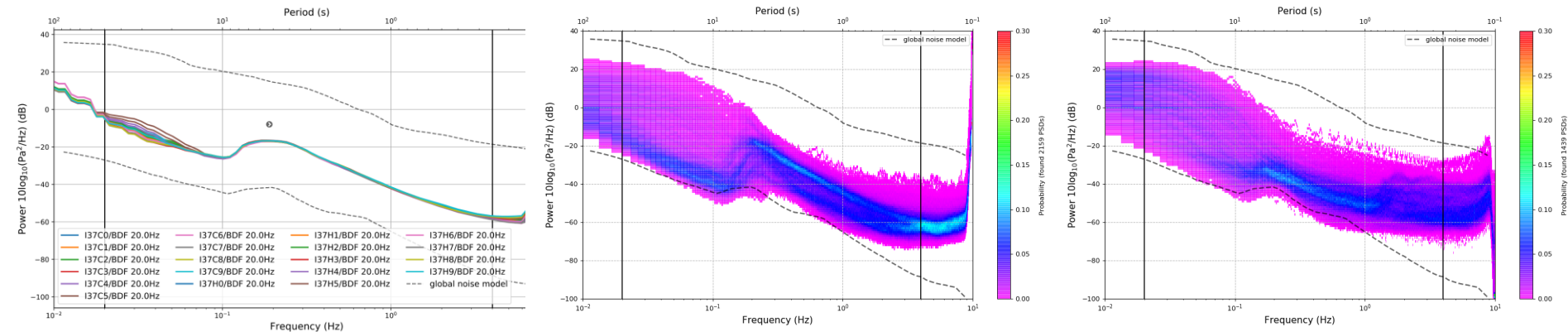
Recent improvements to SHI QC software *libwaveformqc*

- API - power spectral density (PSD) and Probability Density Function (PDF) computation

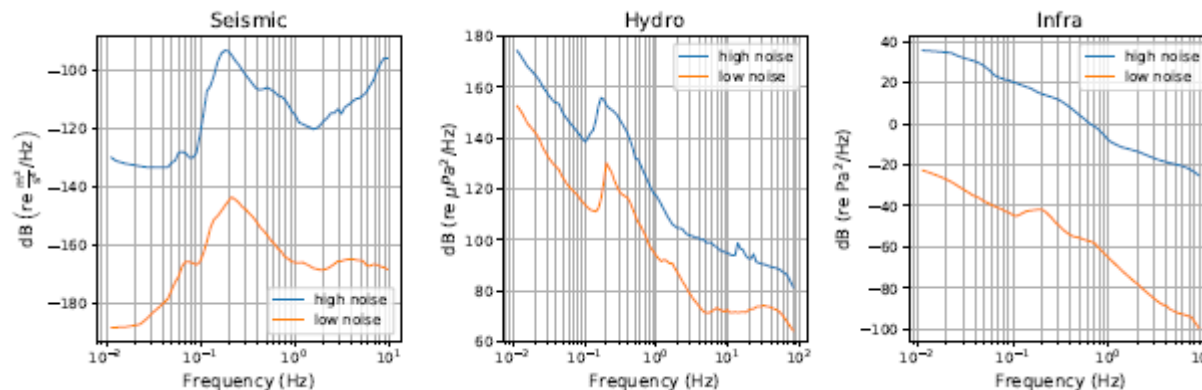
Power spectrum density I37NO
2019/11/07 16:00 - 2019/11/07 17:00

Probability density function of I37NO - I37H4/BDF (20.00Hz)
2019/08/01 02:00 - 2019/10/30 02:00

Probability density function of I10CA - I10H1/BDF (20.00Hz)
2019/08/28 03:00 - 2019/10/27 03:00



- PTS (internal) effort to assess data quality of IMS SHI stations
- Pre-processing at IDC: masking of data with quality issue



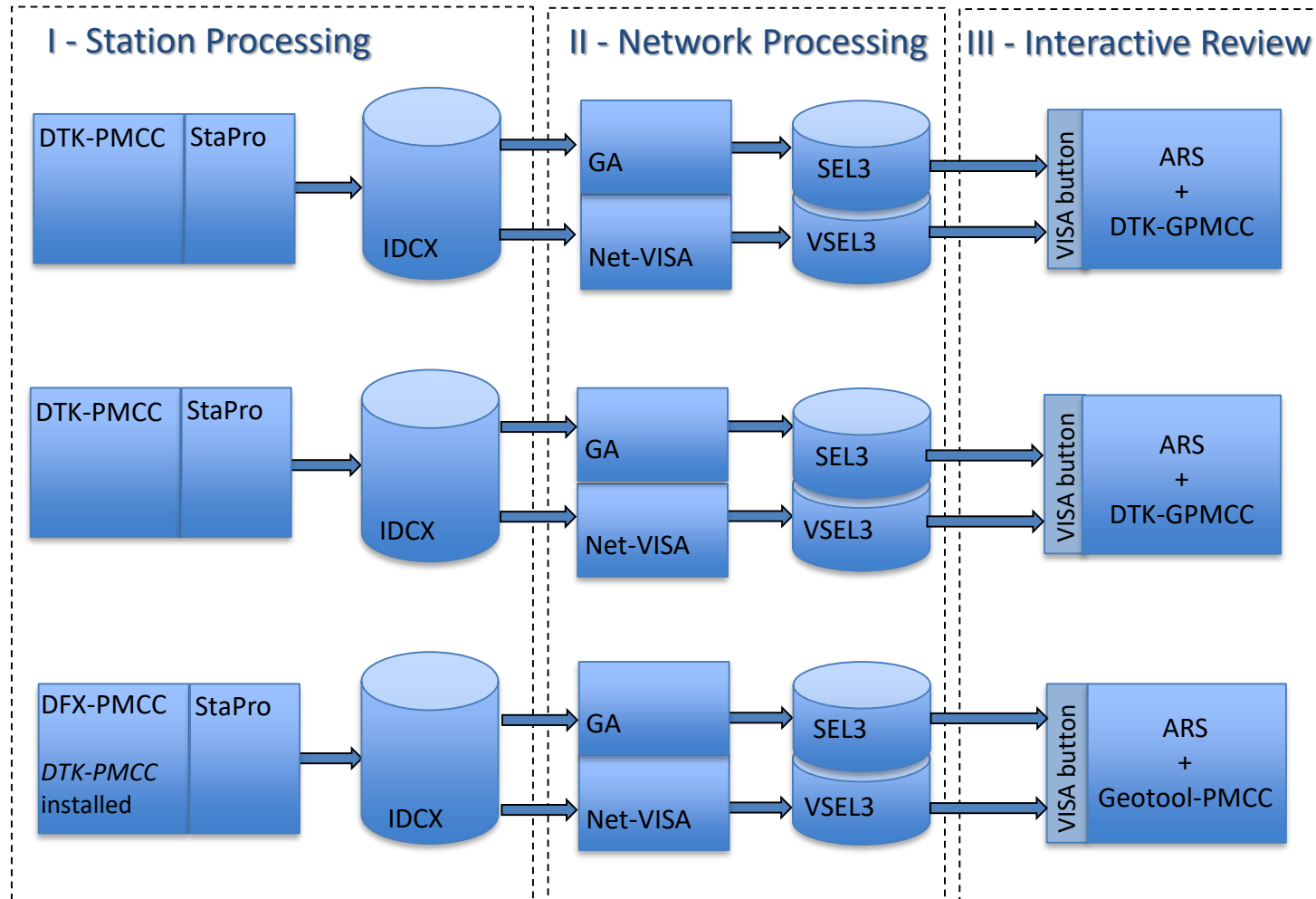
Brown, David, et al. "The IDC seismic, hydroacoustic and infrasound global low and high noise models." (2012)

IDC DEV-OPS

Infrasound overview

Development

Integration of DTK-
(G)PMCC *completed*



Testbed

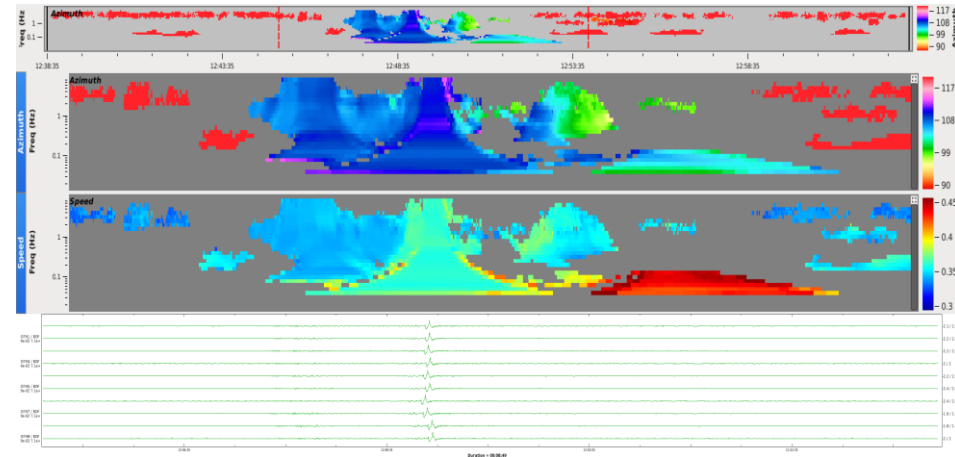
PMCC integration *completed*
 GPMCC integration *ongoing*

Operations – Legacy system still running

Integration *started*
 completion *planned for 2020*

DTK-(G)PMCC into IDC processing:

- DVL: Full pipeline implementation since March 2018, current version 6.4.0 (development version)
- TST: Full pipeline implementation since March 2019, current version 6.3.0
- Integrated in Continuous test and evaluation (CATS): black box testing



Main window and redesigned station manager

Notable changes for IDC system and users:

- SHI array loaded in Site Manager
 - Better handling of station history, of file/db configurations
- Performance improvements
 - Stability improvements
- GPMCC now read & write from/to database
- Evolution for IDC operational system: logging, database interaction...

Site Manager

Database: osdb

Date: Now All -1

Networks/Arrays

Stations

	Net	Array	Sta	Alias	RefSta	dnorth	deast	Latitude	Longitude	Elev (km)	OnDate	OffDate
1	CUR_INF	I18DK	I18H1	I18H1	I18L1	0.0778364	-0.0819...	77.4763...	-69.291...	0.0729	2016245	Now
2	CUR_INF	I18DK	I18H1	I18H1	I18L1	0.0778364	-0.0771...	77.4763...	-69.291...	0.053	2002248	2016244
3	CUR_INF	I18DK	I18H2	I18H2	I18L1	0.044478	0.0771623	77.4760...	-69.284...	0.0741	2016245	Now
4	CUR_INF	I18DK	I18H2	I18H2	I18L1	0.044478	0.0819849	77.4760...	-69.284...	0.071	2002248	2016244
5	CUR_INF	I18DK	I18H3	I18H3	I18L1	-0.100075	0.0651057	77.4747...	-69.285...	0.046	2002248	2016244
6	CUR_INF	I18DK	I18H3	I18H3	I18L1	-0.0889...	0.0626944	77.4748...	-69.285...	0.0626	2016245	Now
7	CUR_INF	I18DK	I18H4	I18H4	I18L1	-0.0778...	-0.0795...	77.4749...	-69.291...	0.05	2002248	2016244
8	CUR_INF	I18DK	I18H4	I18H4	I18L1	-0.066717	-0.0843...	77.4750...	-69.291...	0.0647	2016245	Now

Sensors

	Sta	Chan	Srate (Hz)	Sensitivity	Inst Type	Rsp Type	Rsp File	On Date	Off Date
1	I18H1	BDF	20	10526.3	MB2000	PAZ	/opt/ctbt...	2002248	2016244
2	I18H1	BDF	20	10526.3	MB2000	PAZ	/opt/ctbt...	2016245	Now
3	I18H2	BDF	20	10526.3	MB2000	PAZ	/opt/ctbt...	2002248	2016244
4	I18H2	BDF	20	10526.3	MB2000	PAZ	/opt/ctbt...	2016245	Now
5	I18H3	BDF	20	10526.3	MB2000	PAZ	/opt/ctbt...	2002248	2016244
6	I18H3	BDF	20	10526.3	MB2000	PAZ	/opt/ctbt...	2016245	Now
7	I18H4	BDF	20	10526.3	MB2000	PAZ	/opt/ctbt...	2002248	2016244
8	I18H4	BDF	20	10526.3	MB2000	PAZ	/opt/ctbt...	2016245	Now

IDC *DEV-OPS*

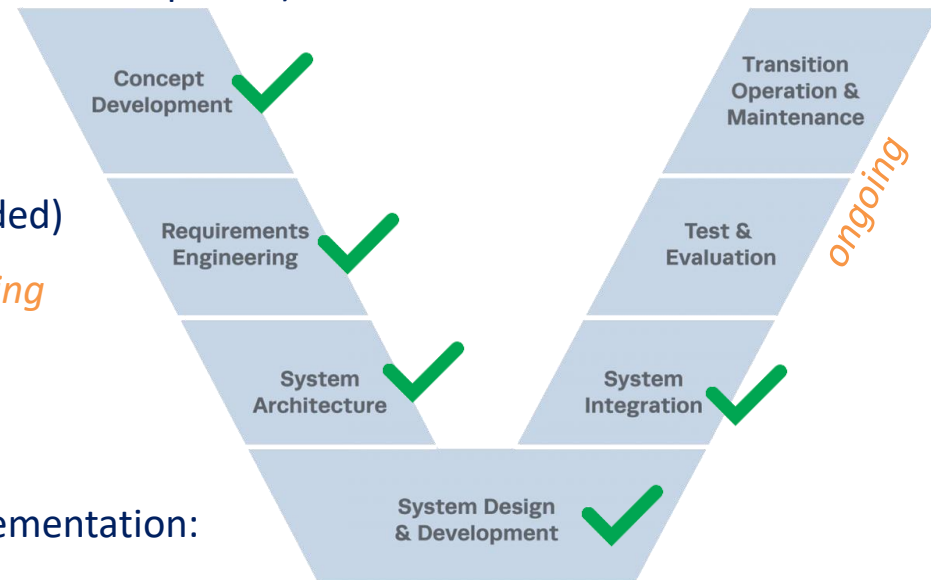
Upgrade in IDC Operations

Station Processing (DTK-PMCC) and interactive analysis (DTK-GPMCC) toolsets towards IDC Operations

- **DVL** pipeline: *completed*
 - Pipeline processing integration – *completed*
 - Interactive review – *partial test* (DVL only used for development)

- **TST** pipeline: *ongoing*
 - Pipeline processing integration – *completed*
 - Interactive review – *completed* (evolutions needed)
 - ARS <=> DTK-GPMCC interaction testing – *ongoing*

- **OPS** pipeline: *started*
 - Installation of software package – *completed*
 - Pipeline processing and interactive review implementation:
 - Depend on successful test and evaluation in TST - *pending*
 - Depend on analyst training in TST - *pending*



the comprehensive nuclear-test-ban treaty
putting an end to nuclear test explosions

Thank you

