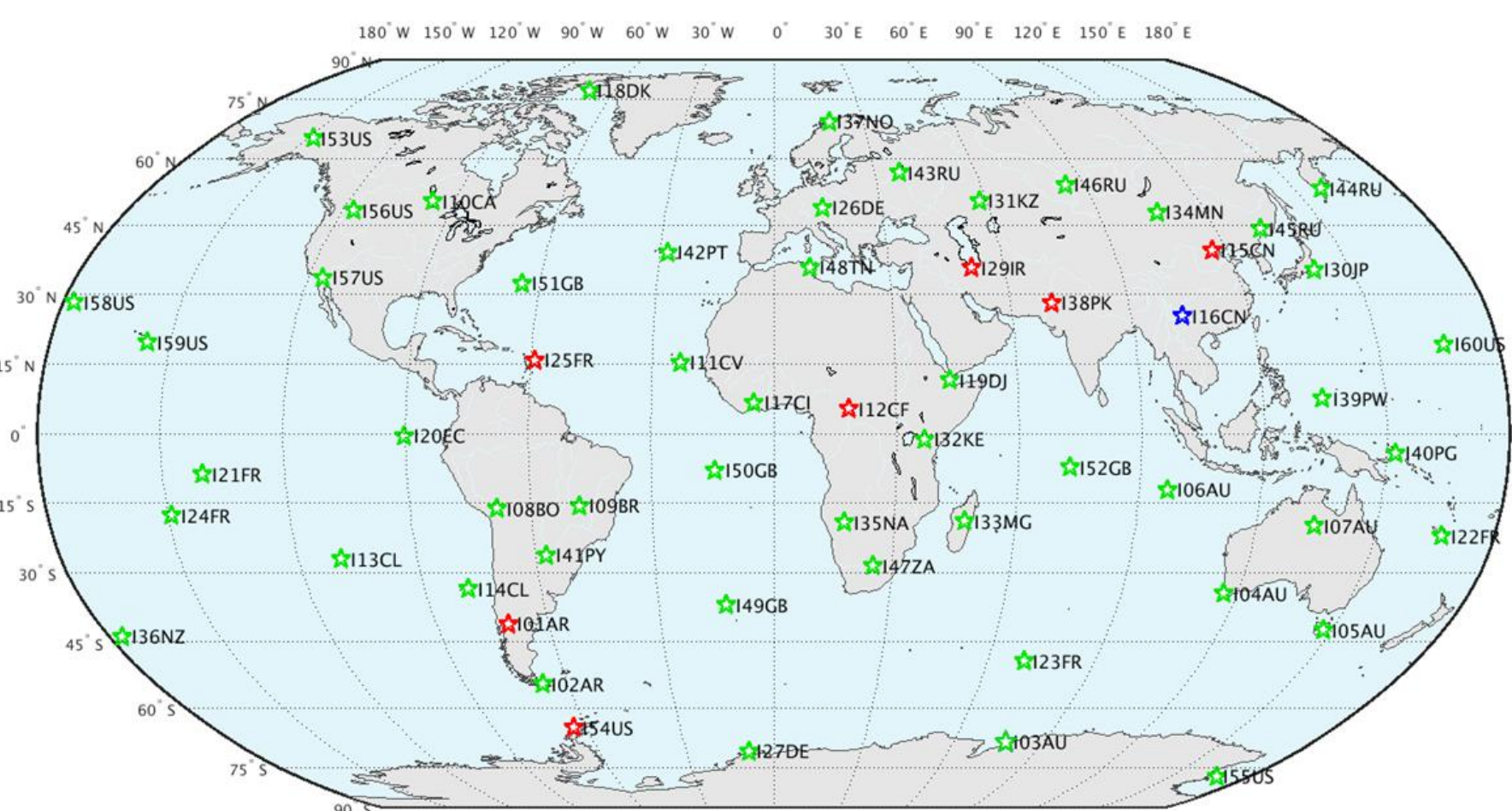
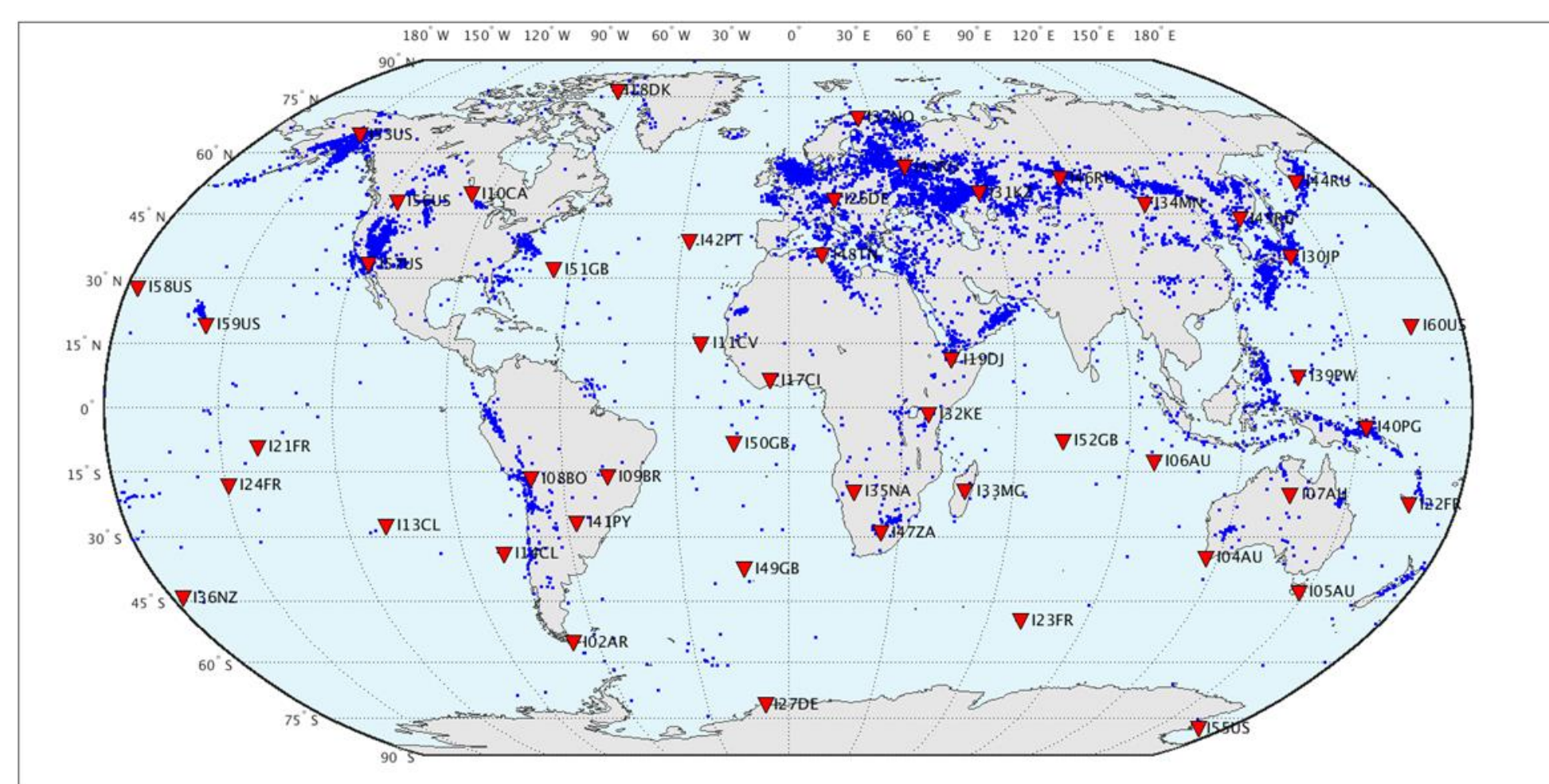


The IDC advances its methods and continuously improves its automatic system for the infrasound technology. The IDC focuses on enhancing the automatic system for the identification of valid signals and the optimization of the network detection threshold by identifying ways to refine signal characterization methodology and association criteria. An objective of this study is to reduce the number of associated infrasound arrivals that are rejected from the automatic bulletins when generating the reviewed event bulletins. A number of ongoing projects at the IDC will be presented, such as: - improving the detection accuracy at the station processing stage by introducing the infrasound signal detection and interactive review software DTK-(G)PMCC (Progressive Multi-Channel Correlation) and by evaluating the performances of detection software; - development of the new generation of automatic waveform network processing software NET-VISA to pursue a lower ratio of false alarms over GA (Global Association) and a path for revisiting the historical IRED. The IDC identified a number of areas for improvement of its infrasound system, those will be shortly introduced..

**Figure 1.** Status of the IMS infrasound network in Nov. 2018  
- Construction 2001 – 2018  
- Sustainment of assets  
- Infrasound component >80% complete (51 of 60 stations certified)



## Nearly 9 years of Infrasound in IDC Operations



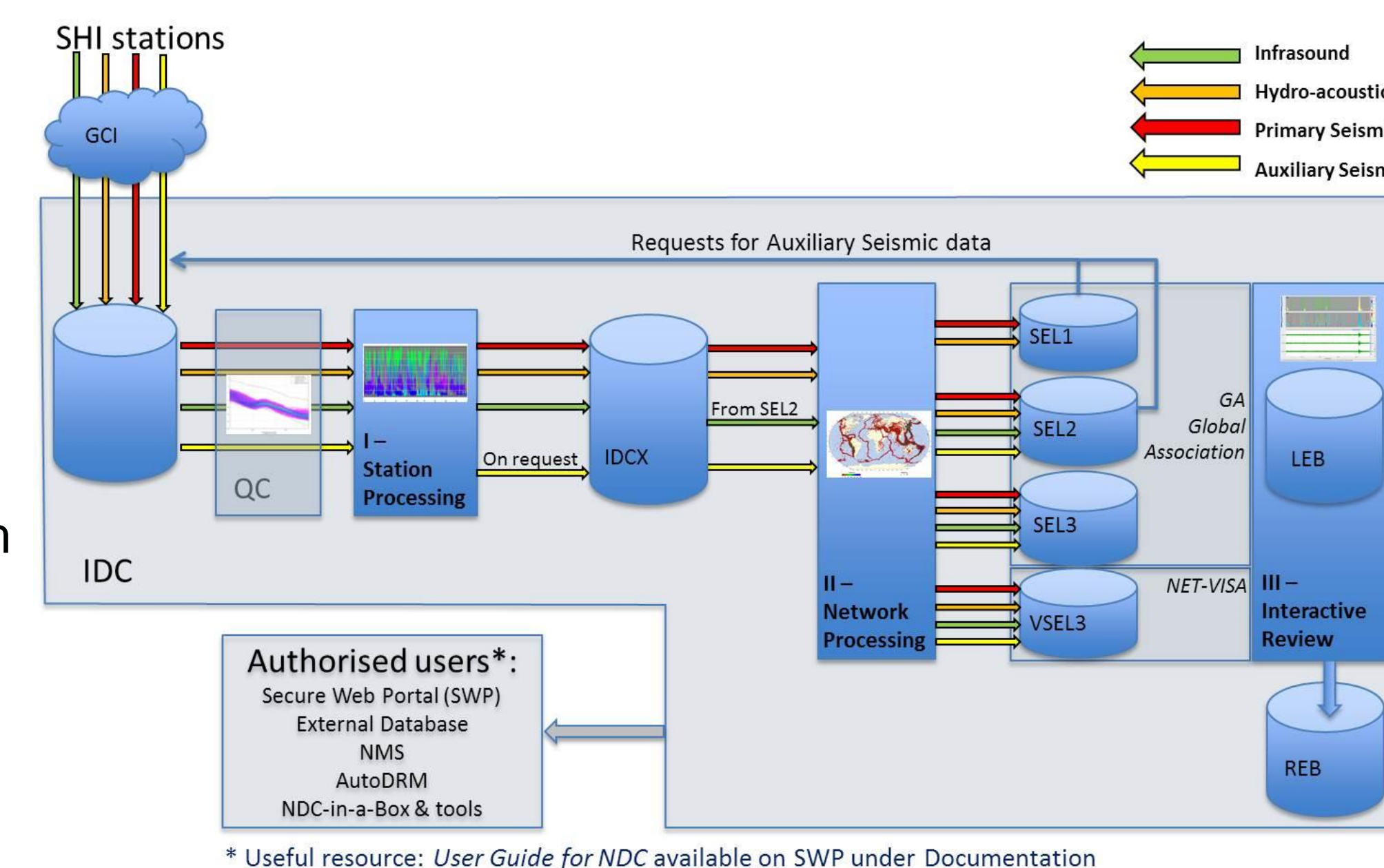
**Figure 2.** Map with over 28.000 infrasound LEB for period February 2010 to November 2018: ~9 events/day

Note: The IDC REB contains over 600.000 events since 2000.

IDC Operations since 02/2010, IDC produces a unique global infrasound bulletin: IDC infrasound system is under operation, extension and maintenance. In 2017, PTS Medium Term Strategy (CTBT/PTS/INF.1395): "Enhancements to automatic processing and interactive review software will focus **on reducing analyst workload**, for example through improvements to network processing resulting in an enhanced automatic event bulletin [...]. For infrasound and hydroacoustic data, possibilities of improving network processing through better models for wave propagation will be explored. This includes the use of infrasound wave propagation models with uncertainty quantification, combined with high resolution atmospheric specifications during infrasound phase association, event formation and in-depth event analysis."

**Disclaimer:** The views expressed on this poster are those of the author and do not necessarily reflect the view of the CTBTO

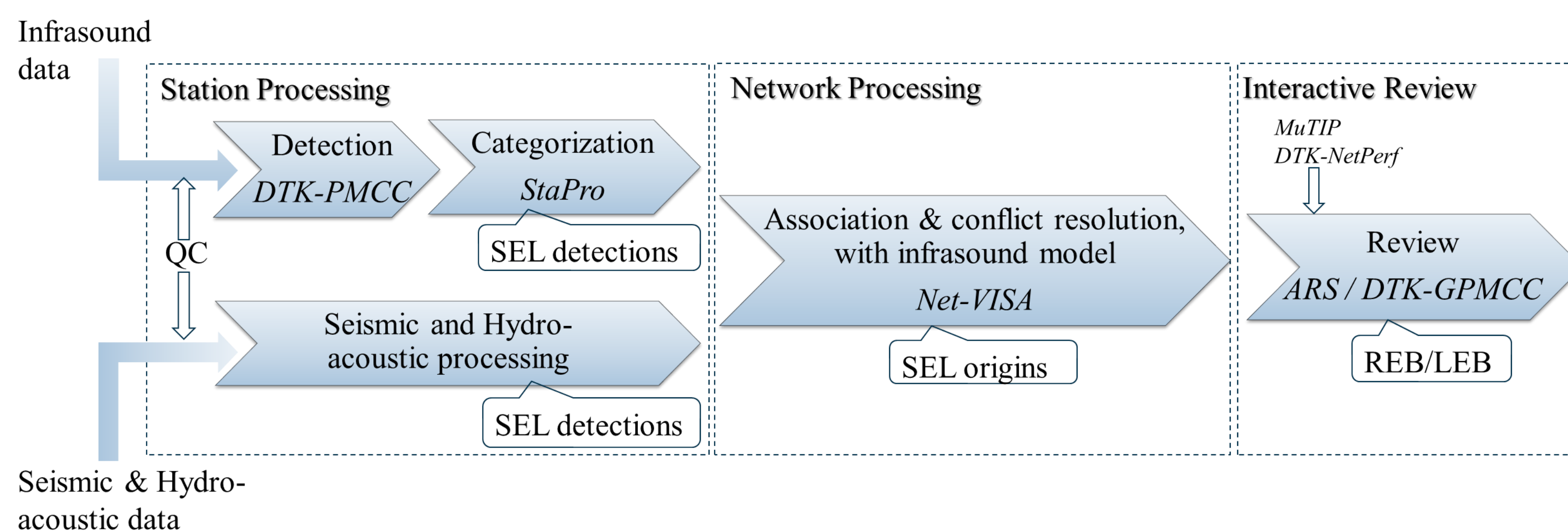
## IDC System Overview



**Figure 3.** IDC processing system

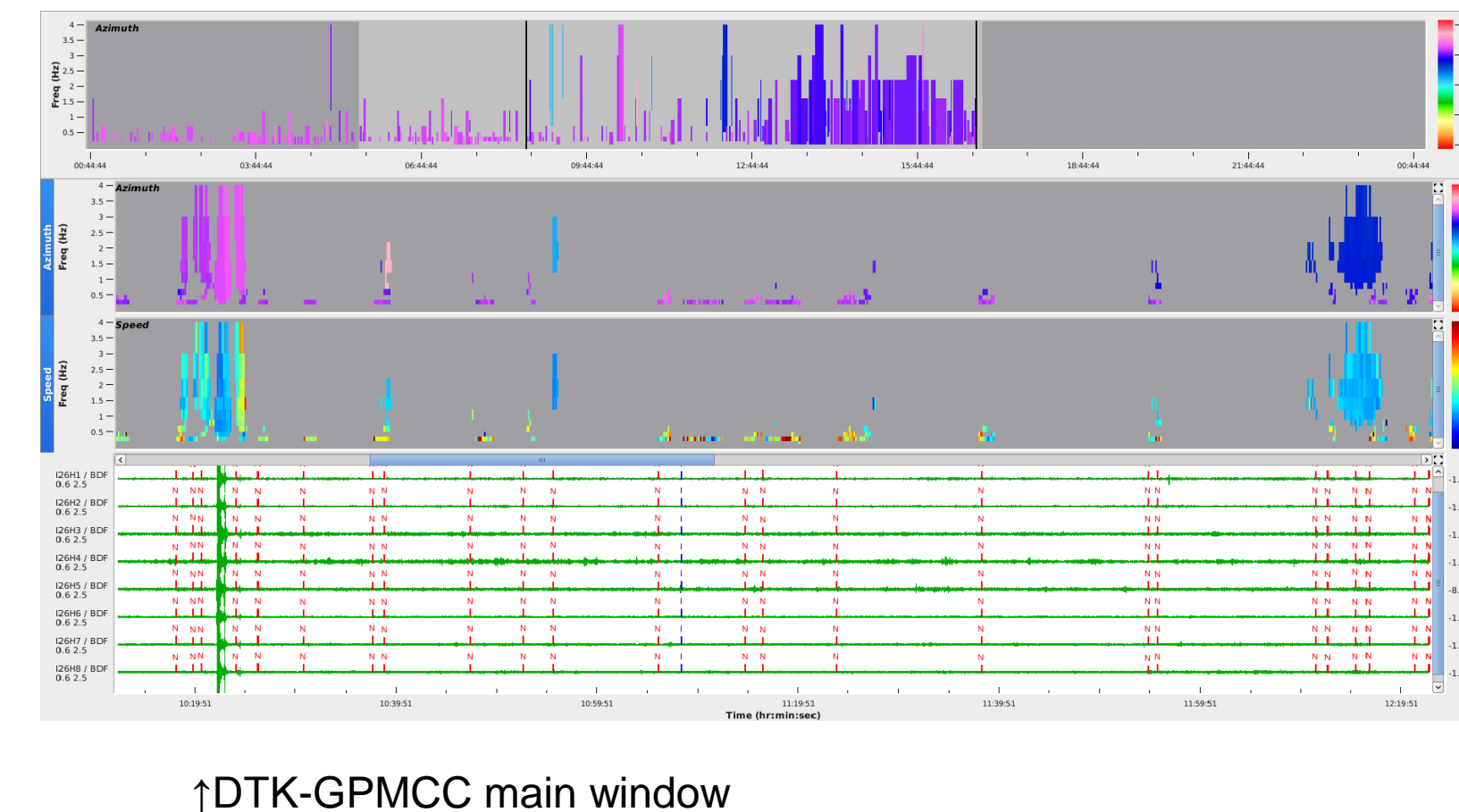
**Figure 4.** Infrasound IDC pipeline

## Infrasound automatic and interactive review system

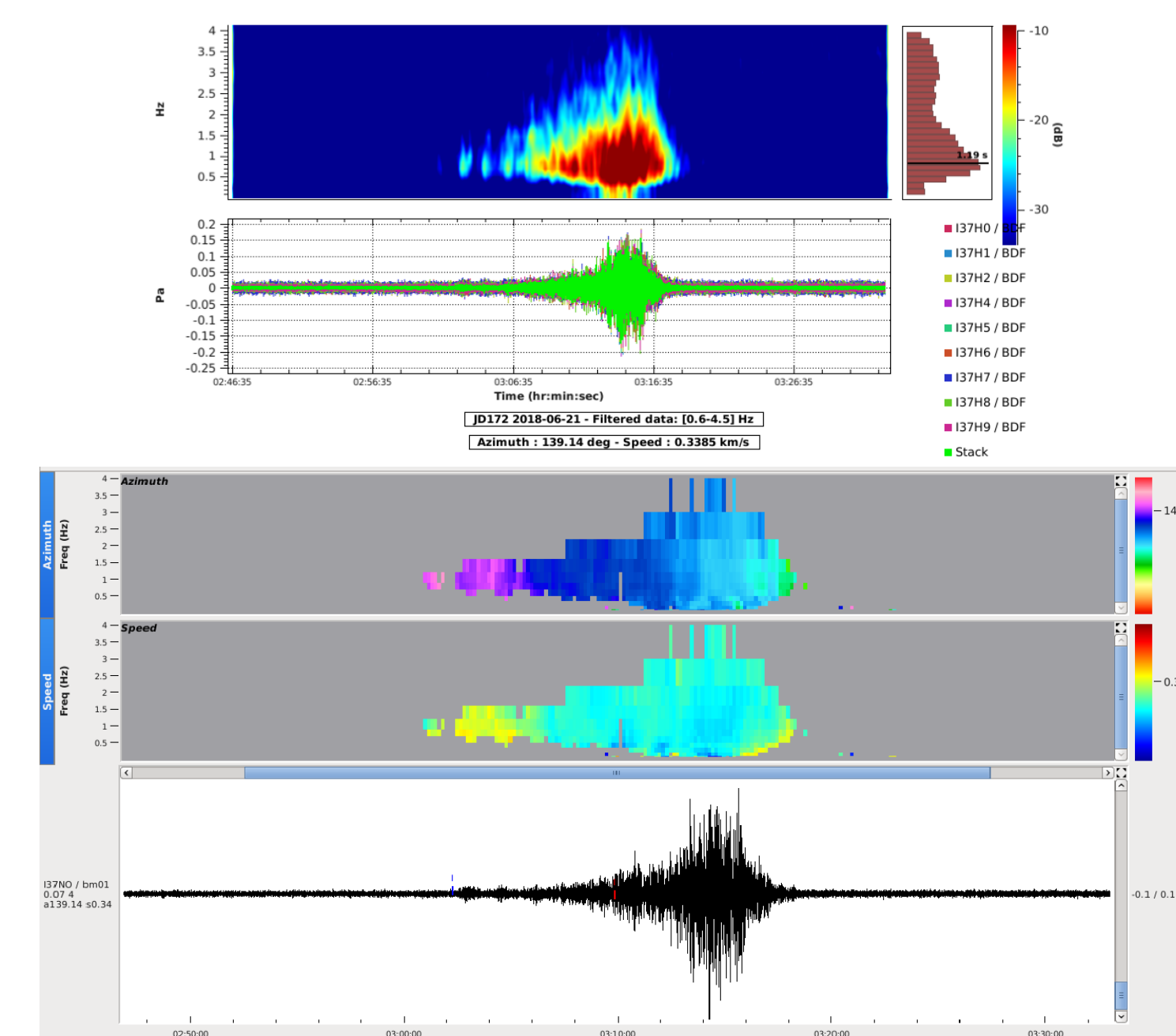
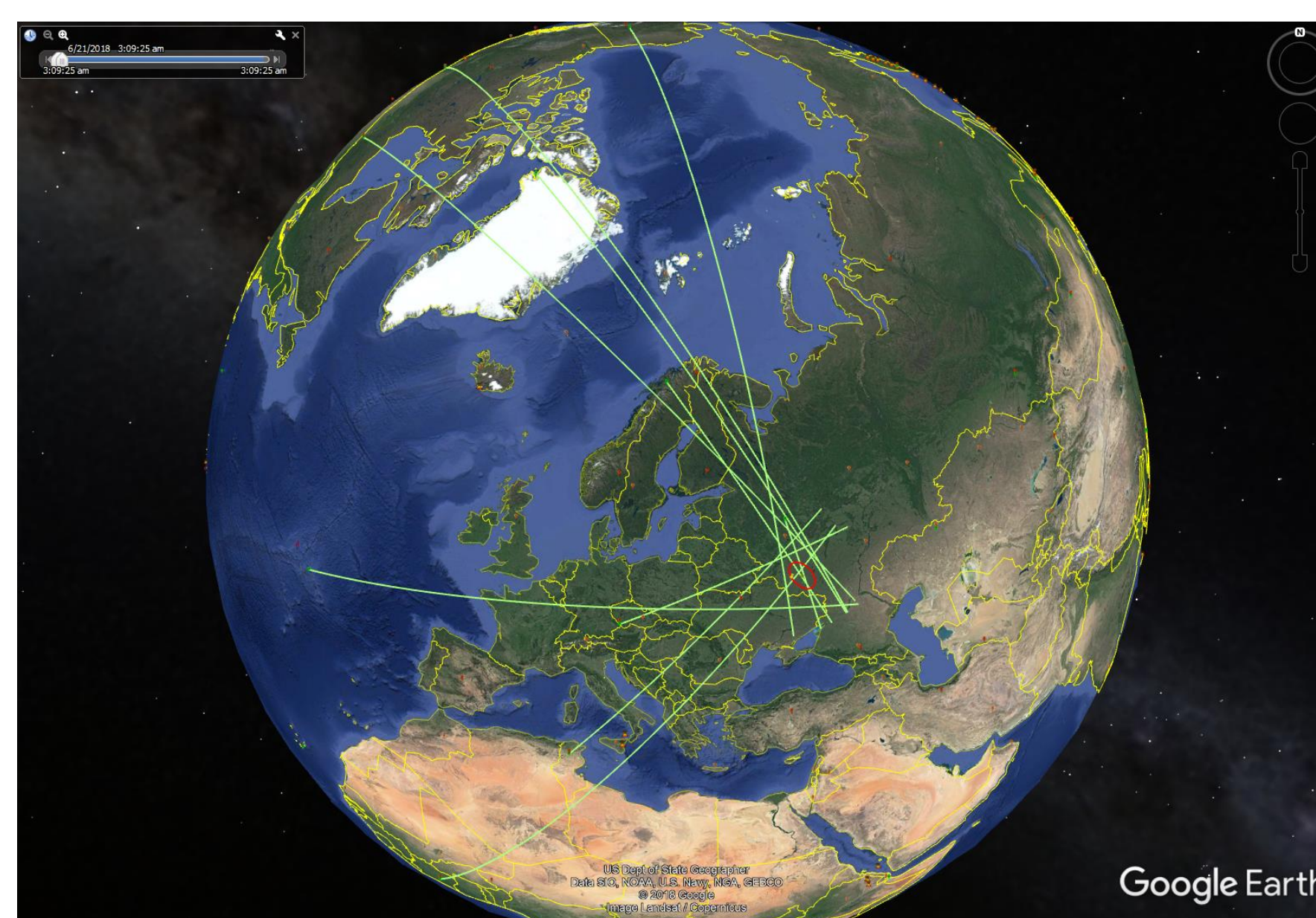


## Infrasound station processing: DTK-(G)PMCC into IDC processing

- Full pipeline implementation in IDC dev area since 03/2018
  - Continuous test and evaluation (CATS)
  - Current version: release candidate for OPS
- Notable efforts on:
- Performance and db improvements
  - I/O efforts for flawless access to waveform and computed results

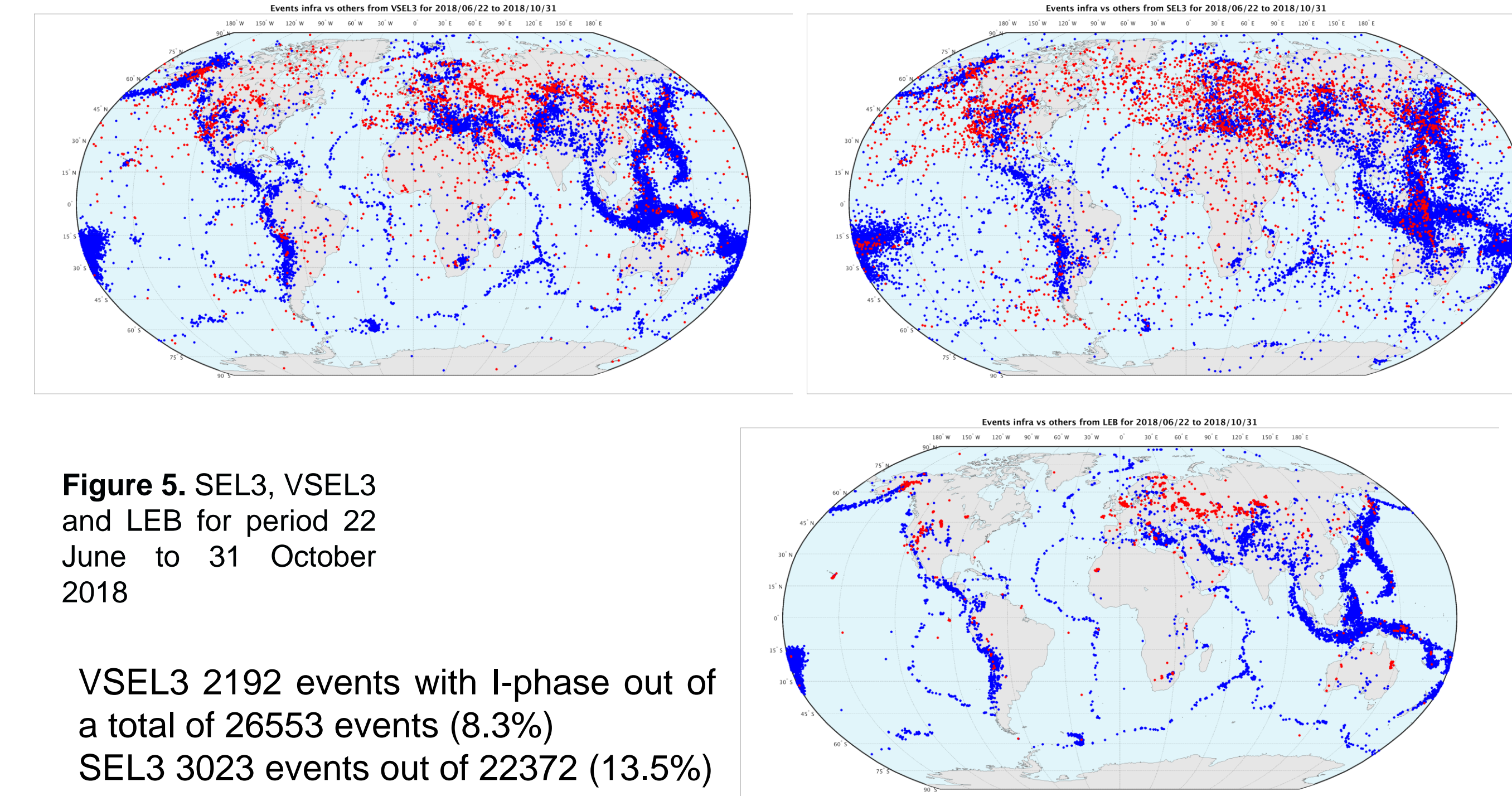


## Example: 21 June 2018 airburst over Western Russia



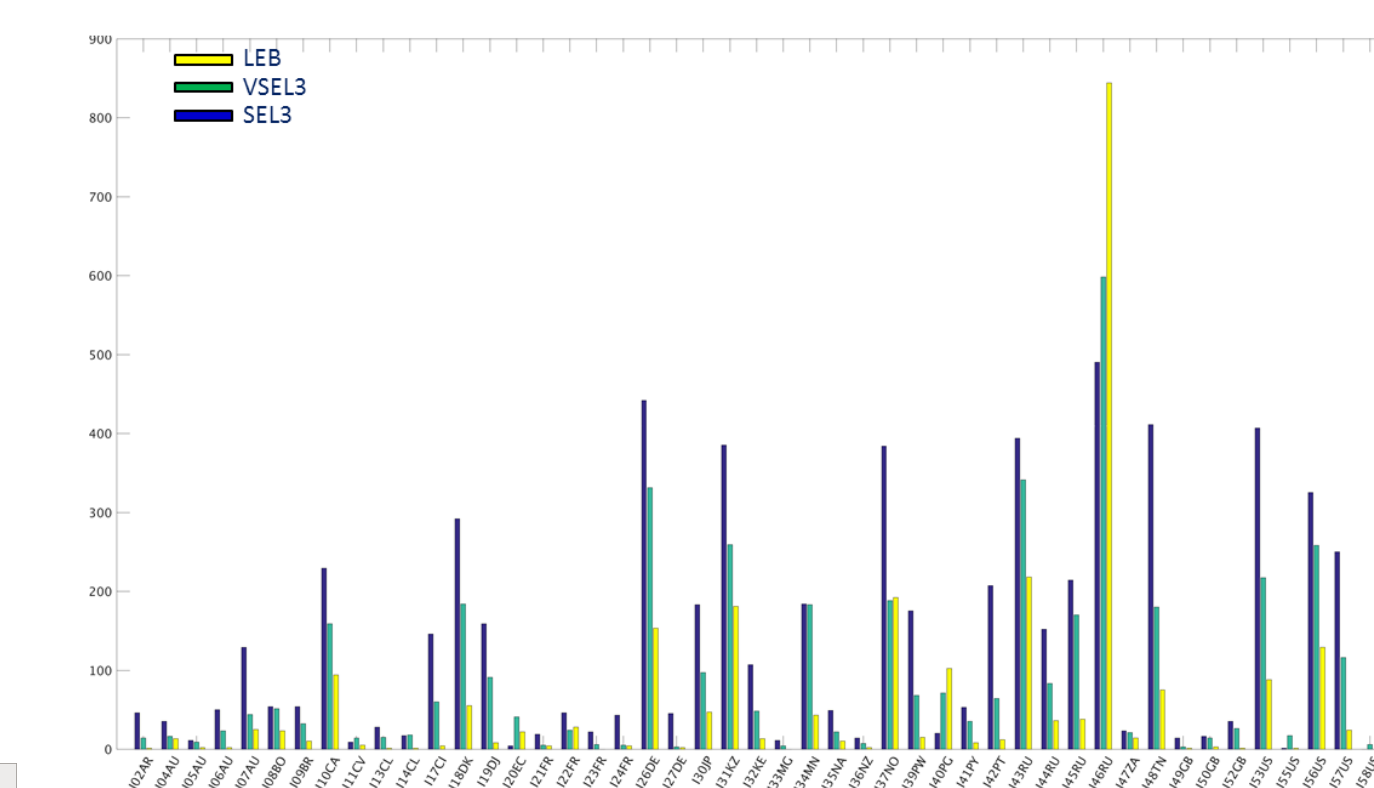
## Net-VISA in IDC Operations: an infrasound perspective

In IDC Operations, deployment of VSEL3 pipeline and NET-VISA 2.2.50 in June 2018. Primary & auxiliary (requested by SEL1&2) seismic, hydroacoustic, and infrasound stations included.



**Figure 5.** SEL3, VSEL3 and LEB for period 22 June to 31 October 2018

VSEL3 2192 events with I-phase out of a total of 26553 events (8.3%)  
SEL3 3023 events out of 22372 (13.5%)



**Figure 6.** Station contribution to IDC bulletins for period 20 June to 31 October 2018

- Overall VSEL3 lower the contribution of I stations
- VSEL3 better match with LEB associations
- Seismo-acoustic activity better captured by Net-VISA, in particular in known mining area (e.g. ZALV & I46RU...)

IDC Operations performances: the pure-infrasound-event overlap is in agreement with offline test for 2013, infrasound inconsistency also. Net-VISA produces more seismic events and less infrasound events, and notably far fewer false events for a stable number of real events.

Bulletin comparison since Net-VISA 2.2.50 in IDC Operations, 22 June 2018:

- Events with at least one associated infrasound station

All infra station events	Number of events	Number of events per day	All infra station events	Number of events	Number of events in LEB	Pure Infra	Number of I seed events	Contribution to LEB
LEB	1756	13.4 /d	SEL3	3023	433 (14.3%)	LEB	708	
SEL3	3023	23.1 /d	VSEL3	2192	515 (23.5%)	SEL3	2347	257 (36.3%)
VSEL3	2192	16.7 /d				VSEL3	1953	308 (43.5%)

Note: Only I phases from infrasound stations in use in VSEL3, while LEB & SEL3 have infra and seismic phases

➔ Reduced number of automatic events with better performances = **expected reduction of analyst workload.**

➔ Preparation for a **full parallel and independent three-pipeline** processing suite.

2018: **Infrasound and middle-atmospheric monitoring: Challenges and new perspectives**, editors Le Pichon A., Blanc E. and Hauchecorne A.

- The IMS Infrasound Network: Status and State-of-the-Art Design, Marty et al.
- Advances in operational processing at the International Data Center, Mialle et al.

