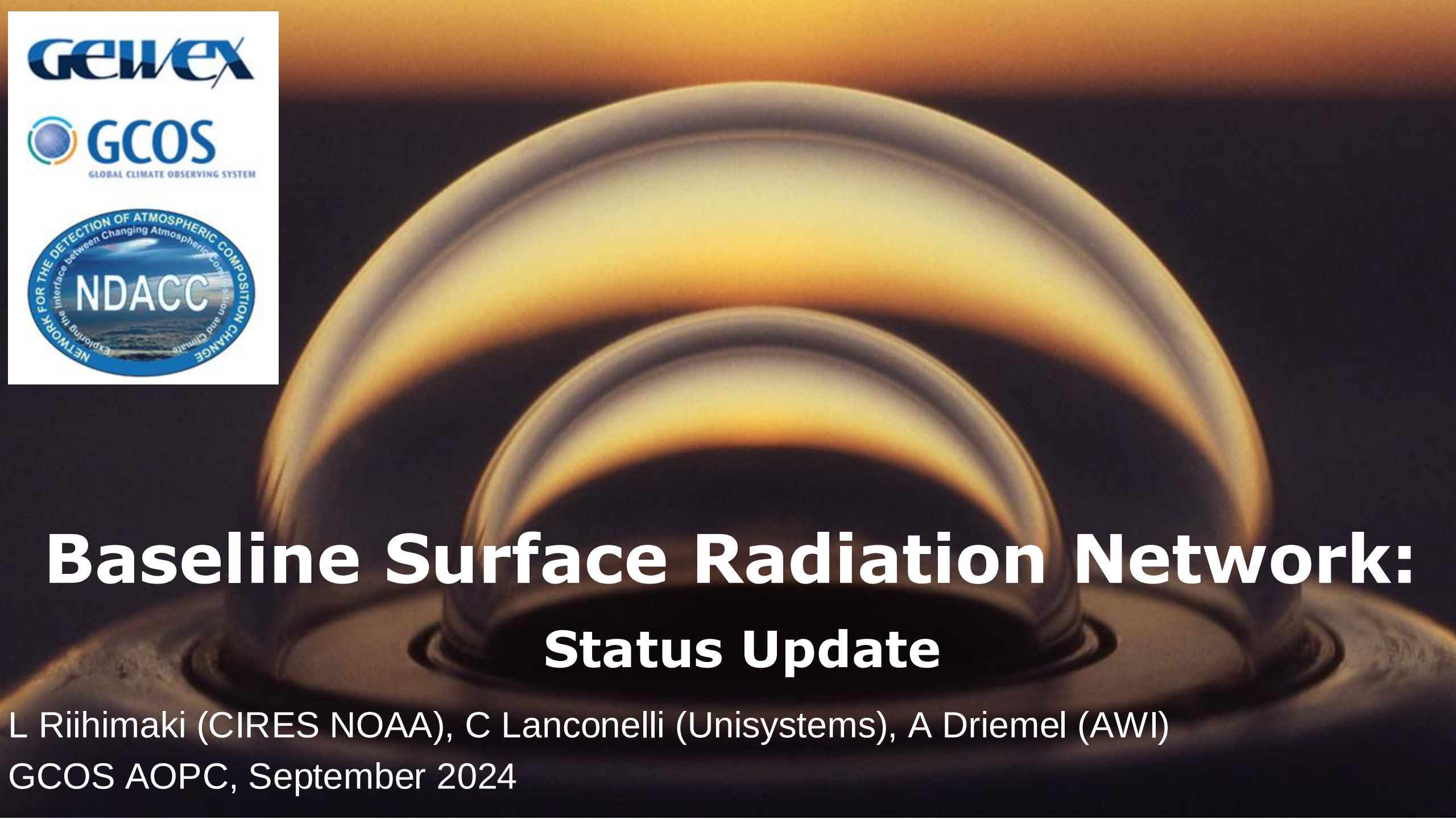


Baseline Surface Radiation Network:

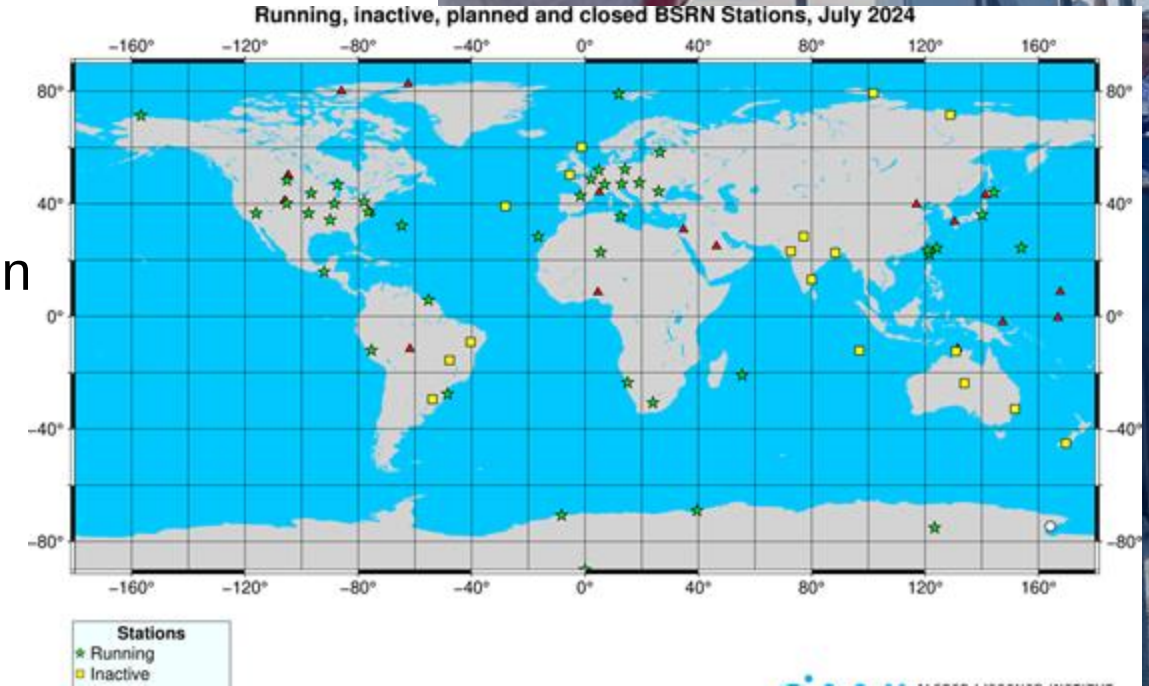
Status Update

L Riihimaki (CIRES NOAA), C Lanconelli (Unisystems), A Driemel (AWI)

GCOS AOPC, September 2024

About BSRN

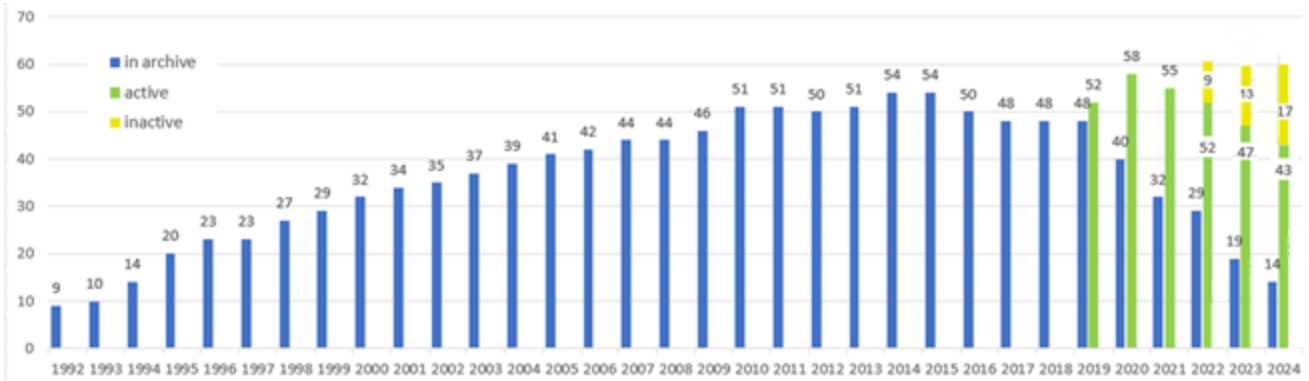
- More than **30 years** of collecting broadband SW and LW radiation since 1992 (9 stations) over a total of 77 stations worldwide
- **Currently 43 stations are operational, 17 inactive, 17 closed**
- Principles:
  - Traceable to standards
  - Instrument Redundancy
  - High temporal resolution (1hz->1min
  - high-quality instruments
  - QC & systematic correction
  - Accessible data
  - Site representativeness
  - Long-term commitment



Geographical distribution

2024: of the 77 stations: 43 active, 17 ‚inactive', 17 closed stations

- **2024: Qiqihar Station, China, and Cape Verde have been accepted as pending stations**
- **Lampedusa is now an official station**
- Inactive stations increased despite efforts aimed to support data analysis, primarily related to issues during the pandemic & station scientist turnover
- **Pending:** Indonesia, Thailand, Korea (Antarctica), Cyprus, Ireland, Chile
- Expressions of interest: Egypt, Cameroon, China (Antarctica)



ALFRED-WEGENER-INSTITUT
HELMHOLTZ-ZENTRUM FÜR POLAR- UND MEERESFORSCHUNG

18th BSRN Scientific Review and Workshop

- **When: 1-5 July 2024**
- **Where: Japan Meteorological Agency HQ, Tokyo, Japan**
- Hybrid (MS Teams)
- Station Operations, Status of pending stations, Applications Climate and RS/RE, QC training, WG reports (40+ presentations)

https://bsrn.awi.de/meetings/2024/

BSRN / WRMC update

- Data distribution PANGAEA (doi indexed and snapshots) and FTP
  - recently added secure-FTP **protocol**

Amelie Driemel
(Data Curator/Director)
~10% for BSRN

Data overview, status 07-2024

1	LR 0100: **Global, Diffuse, Direct, Long-wave down**	77 stations
2	LR 0300: **Reflex, Long-wave up**	19 Stations
3	LR 0500: **UV**	13 Stations
4	LR 1000: **Synops**	16 Stations
5	LR 1100: **Upper air soundings**	33 Stations
6	LR 1200: **Total ozone**	9 Stations
7	LR 1300: **Ceilometer data**	3 Stations
8	LR 30x0: **Radiation measurements from tower**	13 stations
9	LR4000: **Pyrgeometer raw data**	18 stations

Status July 2024 **~13400 monthly datasets** (~1116 years)

Interactions with supporting organizations & other networks

- **Reported to**
  - GEWEX Data Analysis Panel (GDAP)
  - International Radiation Commission (IRC)
  - Network for the Detection of Atmospheric Composition Change (NDACC)

- **Collaborate with ocean community** to develop measurement best practices through OBPS (www.oceanbestpractices.org/)
  - Riihimaki, Laura D., et al. (2024): Ocean surface radiation measurement best practices, *Frontiers in Marine Science,* 11, https://doi.org/10.3389/fmars.2024.1359149
- **Discuss cross-network interactions**
  - GBOV continue to ingest BSRN data
  - ARRN (Antarctic Regional Radiation Network metadata, coordinated by ISP/CNR V Vitale)

Main achievements

1. **New Reporting of LW components for calibration**
   - "Raw" pyrgeometer signals submitted by ~20 stations operationally; LR4000 consistency check between pyrgeometer signals and physical quantities released
   - Calibration certificates stored in centralized way, still collecting and summarizing (in support of Traceability)
2. **Developing New Data Quality Processing to Support Stations**
   - Pilot data processing system developed: Raw system further developed to support station operations and Timeliness, and integration with the bsrn-qc.net tool (KNMI). In support of new stations mainly.
3. **Value Added Products Under Development**
   - ECMWF/CDS Temporal aggregation software under internal review (CNR)
   - Determination of SW Clear-sky baseline is operational (every 10-days), based on Long and Ackerman (2000). Internally stored, todo: release it as a BSRN official product.
   - Urraca et al. (2024), Impact of the spatio-temporal mismatch between satellite and in situ measurements on validations of surface solar radiation, JGR

Activities and plans

- Implement and validate full uncertainty budget following GUM approach
- Make new data quality tools operational
- Define quantitative indicators to determine when data submission can be ingested into BSRN archive
- Establish Albedo WG/expand albedo measurements (tower/drones?)
- BSRN Manual Update underway
- Release Time Aggregated data through the Copernicus CDS (in progress, <2024)

Upcoming leadership change

Christian Lanconelli finishes his term as Project Manager this fall