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Coordination Meeting (ICM-11)**

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Session 3

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## Task Team Progress Report for April 2019 – Scheduling

*(Submitted by Tom Gardiner and Fabio Madonna)*

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### **Summary and Purpose of this Document**

Progress report from the task team on Measurement Schedules and Associated Instrument-type Requirements.

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# Measurement Scheduling and Combination Task Team Summary (2018/2019)

Following the review by the Science Coordinators of areas of common research interest across the network in 2016 it was decided to extend the scope of the scheduling task team to cover the issues surrounding measurement combination. The aim of the revised task team is to develop methodologies to optimally combine measurements of ECVs from multiple instruments to meet all GRUAN objectives including climate trend detection, satellite calibration/validation, and studies of local mesoscale processes and events. In addition, it provides a chance to refresh the task team membership and bring together the various measurement scheduling and combination activities across the network. Task team membership: Tom Gardiner (co-chair), Fabio Madonna (co-chair), Dave Whiteman, Rigel Kivi, Lori Berg, Xavier Calbet Alvarez, Jordis Tradowsky, John Dykema, Alessandro Fassò, Tony Reale, Alexander Haefele, Richard Querel, Doug Sisterson and Rob Kursinski. The long term objective for the Task Team is to develop tools to characterise the atmospheric column above each site through the combination of measurements from multiple instruments, taking into account relevant collocation effects, with a view to:

- providing the best available estimate of the vertically resolved atmospheric column above the site;
- ensuring continuous measurements of an atmospheric parameter without temporal gaps;
- understanding and better quantifying the total uncertainty budget;
- optimising the operational costs.

In terms of scientific outputs from the task team, while the activity of the team remains a voluntary one without specific funding, the outputs mainly relate to relevant work within other projects and the main information sources are from peer-reviewed literature, GRUAN documentation, and currently unpublished studies of which the group is aware. Some limited new analyses are being undertaken by team members using existing data sets to start to address areas where critical gaps exist that prohibit scientifically defensible choices.

Recent activities by members of the task team have included:

- Ongoing delivery of the RIVAL campaign:
  - Dual radiosonde soundings (RS92 & RS41 on same balloon) performed at Eastern North Atlantic (ENA), North Slope Alaska (NSA) and Southern Great Plains (SGP) ARM sites weekly for 1-year.
  - Launches occur at JPSS overpass times.

- Second year of measurements planned for ENA and SGP, but not NSA. Awaiting official confirmation of funding for year-2 launches.
- Ongoing work on Copernicus Climate Change Service development for reference and baseline network data covering a range of GRUAN-relevant ECVs. This has included:
  - Revision of the Product Traceability and Uncertainty assessment procedure developed during GAIA-CLIM, to include uncertainty assessment over different timescales for Near Surface temperature, with the plan to apply this also to the GRUAN RS92 products in 2019.
  - Analysis of source uncertainties in the estimation of decadal trends in radiosounding historical time series due to the choice of the linear estimation methods of temperature and relative humidity.
  - Provision of quantitative estimates of the uncertainty introduced by the spatial and temporal subsampling effects on decadal trends estimations of temperature and relative humidity.
- Scientific publication on temperature SASBE for Lauder: Combining data from the distributed GRUAN site Lauder-Invercargill, New Zealand, to provide a site atmospheric state best estimate of temperature; Jordis S. Tradosky, Gregory E. Bodeker, Richard R. Querel, Peter J. H. Builtjes and Jürgen Fischer; *Earth Syst. Sci. Data*, 10, 2195-2211, 2018.
- Development of co-location uncertainty assessment tools, following from GAIA-CLIM project, utilising ECMWF ERA-5 reanalysis data.
- Ongoing programme of multi-payload sonde (RS92/RS41/CFH) launches from Sodankyla and campaign launches from Antarctic in late 2018 / early 2019.