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LUAMI CAMPAIGN – FALL 2008

SUMMARY

Reference: CIMO-XIV/Doc. 5.2

CONTENT OF DOCUMENT:

Proposal on a *Lindenberg campaign* regarding an *Upper-Air Methods Intercomparison (LUAMI)*, 10 November – 01 December 2008

LUAMI Campaign – Winter 2008

Draft proposal on a *Lindenberg campaign* regarding an *Upper-Air Methods Intercomparison (LUAMI)* from 10 November to 01 December 2008

In agreement with the CIMO/OPAG-UPPER-AIR/ET-UASI report (Geneva, Switzerland, 3-7 November 2003) the Richard-Aßmann Observatory at Lindenberg, Germany, is prepared to organize a highly sophisticated upper-air sensor and techniques campaign.

I. OBJECTIVES:

The main goal of the LUAMI campaign is to make an essential contribution to the improvement and correction of water-vapour soundings from surface up to the middle stratosphere (5 hPa level).

Besides this main goal, the campaign should help in the following three major issues:

- (1) To assess and inter-compare both up-to-date active and passive ground-based remote-sensing systems for meteorological parameters in view of their potential for supply in operational networks as well as for high-quality reference or ground-truth e.g. to satellite sensors;
- (2) To demonstrate the capabilities of passive microwave profiler systems for their use in operational meteorological networks by means of a test network of profilers supplying quality-proven data in real-time to a network hub at Lindenberg.
- (3) To improve the quality of worldwide standard radio-soundings for further reduction of systematic measuring errors (bias), and to check existing correction methods for known systematic errors, primarily for the parameter water vapour/humidity, but also for aerological temperature measurements, being always needed as an input parameter for water-vapour corrections;
- (4) To provide a 3 week reference data set of the Central-European atmosphere in late fall by preparation of a compilation of measurements at the WMO-GUAN site Lindenberg (52° N, 14° E), 65 km southeast to the centre of Berlin. The data set will offer vertical reference data of humidity and temperature profiles in six-hour intervals for comparisons with ground-based and space-borne remote-sensing techniques as well as air-borne in-situ sensors.

The proposed LUAMI campaign:

- Supplies quality assurance and control (QA/QC) based on the DWD routine radiosondes;
- Supplies reference data from active and passive ground-based remote-sensing techniques like wind profiler/RASS, water vapour, temperature and wind lidar, microwave profiling, and FTIR spectroscopy;
- May help to validate and optimize different ground-based remote-sensing techniques for measuring water vapour, temperature, and wind (DWD-systems plus invited guest systems);
- Delivers a reference data set for GCOS and for calibration of satellite data (EUMETSAT CM-SAF, WMO/GEWEX-GVaP);

- Is a contribution to fix still-existing deficits being under consideration from results of recent campaigns like *LAUTLOS* in Sodankylä/Finland (EU-supported) or in Vacoas/Mauritius (radiosonde inter-comparison, supported by WMO);
- Creates a reference data set for AMDAR-data in the Central European region around Berlin.

II. MAIN ITEMS (and related focal points)

1. “Remote-sensing part” / “Air-borne part”

1.1 “Ground-based systems” (*proposed guest systems underlined*)

MWP	Microwave-profiler	RAO Lindenberg
MWR	2-channel-microwave-radiometer	RAO Lindenberg
RLI	Water-vapour Raman-Lidar RAMSES	RAO Lindenberg
<u>LEO</u>	<u>PBL Doppler-Wind Lidar</u>	<u>Leosphere, France</u>
<u>LEO</u>	<u>PBL Aerosol-Lidar</u>	<u>Leosphere, France</u>
CLR	36 Ghz Cloud radar	RAO Lindenberg
<u>MTK</u>	<u>HALO cloud radar</u> (ground-based)	<u>METEK, Germany</u>
CEI	4 ceilometers (different types)	RAO Lindenberg
WPR	2 wind profiler-/RASS-systems	RAO Lindenberg
EIS	EISAR FT-Infrared spectrometer	RAO Lindenberg
GPS	GPS-receiving system	RAO Lindenberg
OP	Optical near-infrared system (Sun- and starphotometer)	RAO Lindenberg
<u>DLR</u>	<u>FALCON WV-Lidar system</u>	<u>DLR-IPA, Oberpfaffenhofen</u>

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2.1. “in-situ part”:

a) 5 Reference- / Research radiosonde systems

Abbreviation	Type / Method	Organization / Company	confirmed
FN	FN Reference method	DWD, RA Observatory Lindenberg, Germany	✓
SW	SRS C34-Frostpoint mirror	Meteolabor AG Wetzikon, Switzerland	✓
FL	FLASH Lyman-Alpha-Hygrometer	CAO Moscow, Russia	✓
CF	CFH Frost-point mirror	University Colorado, Boulder/USA	✓
AT	ATM	NASA, USA	

b) 7 – 8 types of radiosondes from the global operational aerological network

Abbreviation	Type / method	Organization / Company	confirmed
92	RS92	Vaisala Oyj, Finland	✓
MA	MARK IIA	SIPPICAN Inc., USA	
MO	MSKS	MODEM, France	
ME	RS-01G	MEISEI Electric Co. Ltd, Japan	
GR	DIM 97	GRAW Radiosondes GmbH, Germany	✓
IM	IMS4010	Int. Met. Systems, USA	

- Additional radiosonde types and participants will be welcome;
- It is planned to launch up to 8 sondes simultaneously (with a maximum payload of 3000g), using TOTEX 3000g balloons. If the number of radiosondes or the maximum payload exceeds 3000g, 2 or 3 TOTEX balloons will be launched with a time delay of 5–10 s (parallel ascents):
 - Comparisons for parallel ascents will be performed by a method within predefined pressure layers, as described and applied by the Richard-Aßmann-Observatory, Lindenberg¹;
 - Comparisons for synchronous flights using one balloon will be done by the WMO-RSKOMP-Software;
- Intended launch times will be 12:00 UT (day time ascent) and 18:00 UT (night-time ascent) with a launch window of 50 minutes because of air-traffic regulations. For night-time ascents, a sun elevation of less than -8 deg is necessary because of light sensitivity of some hygrometer systems;
- Electric power supply (220 V) will be available;
- The bandwidth for the radiofrequency of the radiosondes has to be frequency stabilized and smaller than 200 kHz, in the range between 401-406 MHz. The use of the broadband radiosondes (~1 MHz bandwidth) could be accepted merely for selected exceptions; a decision on these exceptions will be made as soon as the total number of participating radiosondes types has been fixed.

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2.2 “Space-borne systems” (proposed satellite systems)

Champ-system	Occultation measurements	GFZ Potsdam
NOAA 16, 17-systems (AMSU)	Microwave radiometer	UNI Bremen
EUMETSAT-systems (Metop)	IR spectrometer	EUMETSAT
IASI and/or AQUA/TERRA AIRS-profiles)		

Coordinator: Dr F. H. Berger

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1) Ref.: Leiterer et al, J. Atmos. Oceanic Technol. 22, Jan 2005, Correction Method RS80-A Humicap Profiles and Their Validation by Lidar Backscattering Profiles in Tropical Cirrus Clouds

3. General remarks and terms of participation

- Institutions and/or manufacturers interested in a participation at the campaign are requested to announce their participation before **11 Sept 2007**;
 - All participants will be responsible for their own measuring systems and the required staff for operation;
 - All data of the campaign will be stored in a local data base for the campaign;
 - The ascent data of radiosondes/hygrometers are to be stored in a structure similar to the LAUTLOS-data base (Hygrometer Comparison Jan./Feb. 2004, Sodankylä, Finland (see: fmiarc.fmi.fi; User: "lautlos"; Password: "inseus");
 - The DWD staff at Lindenberg Observatory will supply a WLAN in a special building to all participants for easy access to Internet and Email for the duration of the campaign. A radio-controlled timeserver will supply reference time marks and will be the base for time synchronization;
 - Potential participants are asked to support the proposed campaign with a sponsorship, because there will be no specific budget for the campaign provided by DWD or the Richard-Aßmann-Observatory: This sponsors' budget will be used for campaign-related costs like:
 - Purchase of *Kurnosenko-Validation-Software* (approx. 8 T€);
 - Working contract for the *data-base manager* (invited expert), (approx. 15 T€).
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Annex

Annex: 1 Proposed time schedule for the campaign (draft)

a) Microwave profiling network:

Nov 03 – 23, 2008

b) Schedule for radio sounding activities

			Daytime 12:00 UT	Nighttime ¹ 18:00 UT
Monday	03.11.2008	Arrival		
Tuesday	04.11.2008	Opening meeting		
Wednesday	05.11.2008	1. comparison	X	X
Thursday	06.11.2008	2.	X	X
Friday	07.11.2008	3.	X	X
Saturday	08.11.2008	4.	X	X
Sunday	09.11.2008	leisure/spare time		X
Monday	10.11.2008	5.	X	X
Tuesday	11.11.2008	6.	X	X
Wednesday	12.11.2008	7	X	X
Thursday	13.11.2008	8.	X	X
Friday	14.11.2008	9.	X	X
Saturday	15.11.2008	10.	X	X
Sunday	16.11.2008	leisure/spare time		
Monday	17.11.2008	11.	X	X
Tuesday	18.11.2008	12.	X	X
Wednesday	19.11.2008	13.	X	X
Thursday	20.11.2008	14.	X	X
Friday	21.11.2008	15.	X	X
Saturday	22.11.2008	closure meeting		
Sunday	23.11.2008	leisure/spare time		
Monday	24.11.2008	End of campaign (departure)		

Detailed information:

Monday, 03.11.2008, morning: arrival until 12:00 UT at RAO Lindenberg (DWD)
 03.11.2008, afternoon:
 a) positioning of participants' RCVs and 220 V electric power connections

Tuesday, 04.11.08, morning: Opening meeting (payload configuration and frequency control)
 04.11.08, afternoon 12:00 or 18:00 UT: test flights

Daily from 04 Nov 2008 until Friday, 21 Nov 2008: 10:30 – 11:00: Campaign briefing

¹ On 3.11.2008 the solar zenith angle at 18:00 UT (19:00 MEZ) is 113°, i.e. 23° below horizon