

Agenda of the 5th Management Committee Meeting of COST Action CA15211 “Atmospheric Electricity Network: coupling with the Earth System, climate and biological systems”

Sopron, Hungary, 25th September 2019

1. Welcome to participants and new MC Members and Observers
2. Verification of the presence of two-thirds of the Participating COST Countries (quorum)
3. Adoption of agenda
4. Approval of minutes and matters arising from last meeting

The MC needs to approve:

- The minutes from the 4th MC meeting.
- The financial report for GP3.
- The 1st Progress Report of the Action
- WBP4.
- Current WG and MC meeting dates (see Annex).
- STSM applications and reports (see also 5b below).
- Any other pending matter not mentioned explicitly above.

5. Update from the Action Chair

a) Status of Action: Participating COST countries and NCC institutions

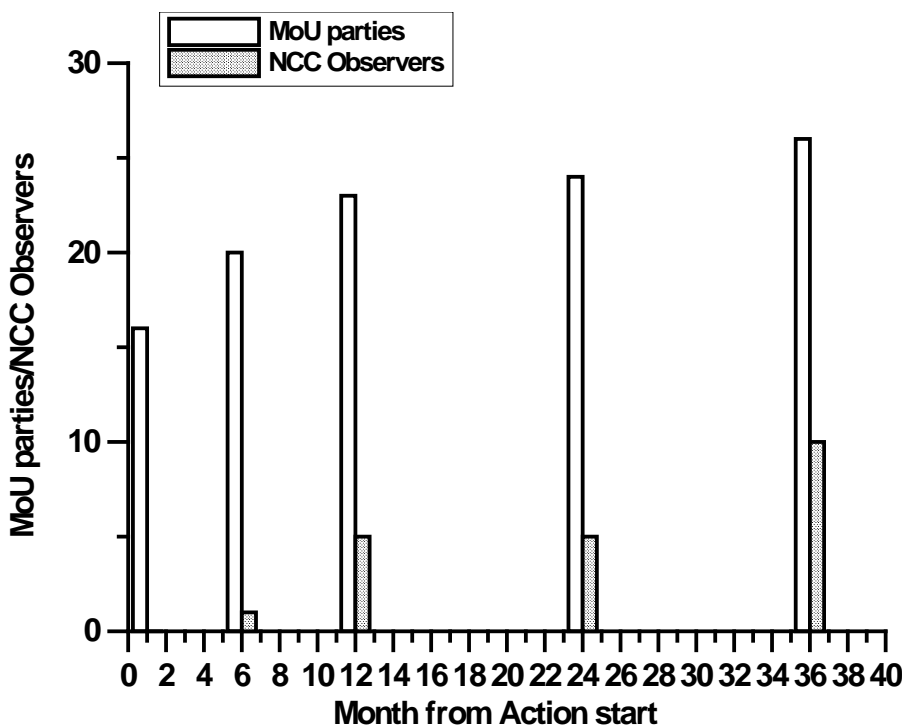


Figure: Evolution of MoU parties and NCC observers from Action start (Nov. 2016) until now.

b) STSMs: Review of completed reports and approval of applications.

GP3 (after the 4th MC) and GP4:

Name From-To	Stsm dates	Grant Period	MC approval	Report submitted	Report on the website	Title
Kseniia Golubenko RU-CH	10-18.11.18	GP3		Y	Y	Adding radon induced ionizations to the Chemistry-Climate Model SOCOL
Ilya Ushoshin FI-CH	17-23.2.19	GP3		Y	Y	Assessment of the effect of a potential 'worst-case scenario' on atmospheric electricity
Maria Kezoudi UK-GR	8-23.9.18	GP3		Y	Y	Dust size distribution profiling with balloon-borne optical particle counters
Kseniia Golubenko RU-CH*	18-30.3.19	GP3		Y	Y	Toward a proper analysis of atmospheric conductivity and its variability in a comprehensive Global Electric Circuit: installation of the convective Rn222 transport to the Chemistry-Climate Model SOCOL v.2
Pavlos Kassomenos GR-ES	15-19.4.19	GP3		Y	Y	Health Cities, Biometeorological Indexes and respiratory diseases
Luis Salcines Suarez ES-FI	23-29.4.19	GP3		Y	Y	Methodology of the comparative study of air ions and nanoparticles measurements in

						different latitudes of the northern hemisphere based on the measurement campaign in the University of Cantabria and work done by the Institute for Atmospheric and Earth Sys
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**Note: As Kseniia Golubenko requested a 2nd STSM within the same grant period, she provided a justification letter and the Chair requested approval from the MC via e-vote with at least 2/3 of votes on 18.2.2019. The Core group approved unanimously.*

The MC is requested to take note of the above and approve ALL the above STSM applications.

The MC is also requested to take note and approve all the submitted reports from the above STSMs. The reports are available at the Action website, at <https://atmospheric-electricity-net.eu/stsm>.

The STSM Committee (Mirela Voiculescu), will brief the MC about the GP4 STSMs and the planning for GP5.

c) ITC conference grants

The MC is requested to note: One conference Grant was awarded in the 3rd GP. ITCCG budget was underspent. One ITCCG is planned 4-8.11.2019 for the 4th GP. It is expected that the ITCCG budget will be underspent for this GP also.

e) Monitoring Progress report due in 3 November 2018, submitted to COST on 21 Nov 2018

The Chair will inform the MC on the submission of **Progress report at m24, Oct. 2018** (See Annex) and the Rapporteur Report received on 6.2.2019 by the Chair.

6. Update from the Grant holder

Grant Period 3 (01/05/2018-30/04/2019):

Action	Approved budget	Actual expenses	Comment
4 STSMs	14,750 €	11,798	-2,952
1MC/WH/WG/ meetings	63,990€	Travel costs for 57 people 57542.59 € & Local organizer support 3.260 € Total: 60,802.59 €	-32.71
ITCCG	6 * 1,950€ = 11,700€	Christina Oikonomou: 1.780€	-9,920
Training school	22,820	(21 participants) 22,890	70
Dissemination	Action website	Action website	-2,455

	maintenance (1000 €) Publications (2455 €) 3,455€	maintenance (1000 €)	
OERSA (bank charges for bank transfers)	1,000€	2,099.70	1,099.70
TOTAL SCIENCE EXPENDITURE	111,300.30 €	97,110.29	14190.01
	15% flat rate of direct costs: 16,695.05	15% flat rate of direct costs 14,566.54	2,128.51
GRAND TOTAL	123998.75 €	111,676.83	-16,318.52

As per 1st MC meeting decision "In case of underspending in 1 activity, the Core Group may decide to use the unspent funds on other activities in the approved Work and Budget Plan as appropriate (minutes of the 1st MC meeting, 4th October 2016)". On 28-1-2019 the MC Chair asked Core Group approval "Hence I would like your approval to use unspent funds in any activity of the current Grant Period to other activities in need". At the time the e-vote closed on 5-2-2019, the Core Group had approved unanimously.

As per 4th MC meeting decision "The MC decided also that if meeting funds from the present meeting are unspent and/or a large part of ITCCG funds are unspent until early 2019, to move them to the TS so as to support more ECI to attend it and possibly hold a 5-day training school".

Financial report for GP3 was submitted to COST and approved. The MC needs to approve the submitted financial report.

Grant Period 4 (01/05/2019-30/04/2020):

Action	Approved budget	Actual expenses	Comment
4 STSMs	16,149	0	
1MC/WH/WG/ meetings	71,940 (of which 3,960 for LOS)	0	
ITCCG	6,300	0	
Training school	0	0	
Dissemination	Action website maintenance 1,000 € Publications 9,000 €	0	
OERSA (bank charges for	1,698€	0	

bank transfers)			
TOTAL SCIENCE EXPENDITURE	106,087 €	0	
	15% flat rate of direct costs: 15,913 €	0	
GRAND TOTAL	122,005 €	0	

The MC is requested to note and approve the budget.

7. Update from COST (only if representative is present)

8. Monitoring of the Action

The MC is asked to note of the changes that have occurred since the 3rd MC meeting to the MC composition and leadership.

9. Implementation of COST policies on:

a) promotion of gender balance and Early Career Investigators (ECI).

10. Follow-up of MoU objectives: progress report of WGs

Matters related to GP3 and GP4 will be handled together with agenda item 11. below.

11. Scientific and action implementation planning for 4th Grant Period (GP), 1.5.19-30.4.2020:

a) Scientific (MoU objectives, GP goals, WG tasks and Deliverables for GP2 and GP3)

Review of status of Grant Agreement Period 3

The MC to be briefed on the GP3 GAPGs:

- GAPG1 Resource Integration (D0.3, Challenge, Secondary objectives 6, 7, WG1): Delivery date between m24 and m29, Oct. 2018-Mar2019 Accomplished.
- GAPG2 Handbook on interdisciplinary lower atmosphere AEF/natural radioactivity/ionosphere/natural hazards (D2.5, Challenge, Secondary objective 5, 7, WG2): Delivery date @m24, Accomplished.
- GAPG3 Research timetable creation for WG4 (D4.2, Secondary objective 8, WG4): Delivery date @m24, Oct. 2018, Accomplished.
- GAPG4 Study of influence of AEF on atmospheric aerosol ionisation and cloud microphysics (D3.2, Secondary objective 1, WG3): Delivery date @m24, Oct. 2018, Accomplished.

Regarding GAPG1 above, this had to do also with the organization of a training school (TS) (see Annex 7), that Reik Donner (DE) organized and hosted in the week 25.2.-1.3.2019. The TS Selection Committee evaluated the applications for the training school and selected the participants. On 1st February 2018 the Action Chair asked for Core group approval of the list of

participants for the training school that the Training School Committee recommended. The Core Group approved unanimously until 8/2/2018 (Y. Yair, K. Kourtidis, A. Odzimek, S. Dragovic, E. Hunting, A. Makela, E. Rosanov approved in writing, P. Arroyabe and K. Nicoll casted no vote until 8/2, hence approved).

Review of status of Grant Agreement Period 4

Review of status of Grant Agreement Period 4

The MC needs to approve the following Grant Agreement Period Goals (MoU Deliverable, MoU Objective(s) it relates to, responsible WG, delivery date) for GP4.

GAPG 1 Integration, networking, improvement of interdisciplinary understanding of processes.(Challenge), WG1

GAPG 2 Satellite product development (D5.5), sensor development (D5.3), Secondary objective 4, WG5, @m36 & m42, respectively.

GAPG 3 New research directions on AEF effects on biological systems (D4.3, D4.4, update of D4.1). Secondary objective 8, WG4, @m36

GAPG 4 AEF influence on atmospheric ionisation and climatic relevance (D3.2). Secondary objective 1, WG3, @m36

GAPG 5 Interdisciplinary studies of AEF, earthquakes, radon etc (D2.4). Secondary objective 7, WG2, @m36

b) Budget: WBP5 preparation

Draft budget outline proposal for discussion and modifications:

WBP5 (1/5/2020-3/10/2020)

Type	Expenditure (€)
MC/WG Meetings travel expenditure	39100
Local Organiser Support	2150
Training school	
STSMs	5000
ITC Conference Grants	4000
Dissemination:	
Action website maintenance	1000
Publications	4000
	0
Other dissemination material	0
OERSA	1000
TOTAL SCIENCE EXPENDITURE	56250
Grant Holder 15%	8437.5
GRAND TOTAL	64687.5

The MC is asked to discuss the draft budget plan, noting that the exact amount of the grant for GP5 is not known.

c) Dissemination strategy/planning (publication and outreach activities, action website).

The Dissemination Committee Chair Annti Mäkelä if present may present an update.

Monitoring the amount of communication: The MC is requested to note the dissemination output of the Action below and add publications where necessary.

CA15211 Dissemination/communication record:

Papers in scientific journals including acknowledgements to COST CA15211

1. Christos Haldoupis, Is there a conclusive evidence on lightning-related effects on sporadic E layers? *Journal of Atmospheric and Solar-Terrestrial Physics* 172 (2018), 117–121.

Acknowledgements: Part of this work developed during discussions made possible by participating in the COST Action Atmospheric Electricity Network: coupling with the Earth System, climate and biological systems, supported by the European Union COST (European Cooperation in Science and Technology) Program.

2. Gallep, Cristiano M, João F Viana, Michal Cifra, Dominic Clarke, and Daniel Robert. “Peter Barlow’s Insights and Contributions to the Study of Tidal Gravity Variations and Ultra-Weak Light Emissions in Plants.” *Annals of Botany*, January 2, 2018. <https://doi.org/10.1093/aob/mcx176>.

3. Havelka, Daniel, Ondrej Krivosudský, Jiří Průša, and Michal Cifra. “Rational Design of Sensor for Broadband Dielectric Spectroscopy of Biomolecules.” *Sensors and Actuators B: Chemical* 273C (May 2018): 62–69. <https://doi.org/10.1016/j.snb.2018.05.124>.

4. Jha, Abhishek K., Zubair Akhter, Nilesh Tiwari, K. T. M. Shafi, H. Samant, M. J. Akhtar, and M. Cifra. “Broadband Wireless Sensing System for Noninvasive Testing of Biological Samples.” *IEEE Journal on 5. Emerging and Selected Topics in Circuits and Systems* 8, no. 2 (2018): 251–59. <https://doi.org/10.1109/JETCAS.2018.2829205>.

6. Salari, V., Sh Barzanjeh, M. Cifra, C. Simon, F. Scholkmann, Z. Alirezaei, and J. A. Tuszynski. “Electromagnetic Fields and Optomechanics in Cancer Diagnostics and Treatment.” *Frontiers In Bioscience, Landmark* 23 (2018): 1391–1406.

7. Tian, Bozhi, Shuai Xu, John A Rogers, Stefano Cestellos-Blanco, Peidong Yang, João L Carvalho-de-Souza, Francisco Bezanilla, et al. “Roadmap on Semiconductor–Cell Biointerfaces.” *Physical Biology* 15, no. 3 (March 9, 2018): 031002. <https://doi.org/10.1088/1478-3975/aa9f34>.

8. Poplová, Michaela, Pavel Sovka, and Michal Cifra. “Poisson Pre-Processing of Nonstationary Photonic Signals: Signals with Equality between Mean and Variance.” Edited by Joseph Najbauer. *PLOS ONE* 12, no. 12 (December 7, 2017): e0188622. <https://doi.org/10.1371/journal.pone.0188622>.

9. Burgos, Rosilene Cristina Rossetto, Johannes Cornelius Schoeman, Lennart Jan van Winden, Kateřina Červinková, Rawi Ramautar, Eduard P. A. Van Wijk, Michal Cifra, Ruud Berger, Thomas Hankemeier, and Jan van der Greef. “Ultra-Weak Photon Emission as a Dynamic Tool for Monitoring Oxidative Stress Metabolism.” *Scientific Reports* 7, no. 1 (December 2017). <https://doi.org/10.1038/s41598-017-01229-x>.

10. Barzanjeh, Sh., V. Salari, J. A. Tuszyński, M. Cifra, and C. Simon. "Optomechanical Proposal for Monitoring Microtubule Mechanical Vibrations." *Physical Review E* 96, no. 1 (July 12, 2017): 012404. <https://doi.org/10.1103/PhysRevE.96.012404>.
11. Bór, J., Zelkó, Z., Hegedüs, T., Jäger, Z., Mlynarczyk, J., Popek, M., & Betz, H. D. (2018). On the Series of +CG Lightning Strokes in Dancing Sprite Events. *Journal of Geophysical Research: Atmospheres*, 123. <https://doi.org/10.1029/2017JD028251> ("The Authors appreciate support of the COST Action CA15211, ELECTRONET, in facilitating scientific communication").
12. Harrison, R.G. and K.A. Nicoll (2018) Fair weather criteria for atmospheric electricity measurements, *J. Atmos. Sol. Terr. Phys.*, in press, <https://doi.org/10.1016/j.jastp.2018.07.008>.
13. Nicoll K.A., Harrison R G., V. Barta, J. Bor, R. Brugge, A. Chillingarian, J. Chum, A. K. Georgoulas, A. Guha, K. Kourtidis, M. Kubicki, E. Mareev, J. Matthews, H. Mkrtchyan, A. Odzimek, J.-P. Raulin, D. Robert, H. Silva, J. Tacza, Y. Yair, R. Yaniv, A global atmospheric electricity monitoring network for climate and geophysical research, *Journal of Atmospheric and Solar-Terrestrial Physics*, 184, 18-29, doi.org/10.1016/j.jastp.2019.01.003, 2019.
14. E. R. Hunting, R. Giles Harrison, Andreas Bruder, Peter M. van Bodegom, Harm G. van der Geest, Andries A. Kampfraath, Michel Vorenhout, Wim Admiraal, Casper Cusell and Mark O. Gessner Atmospheric Electricity Influencing Biogeochemical Processes in Soils and Sediments, *Front. Physiol.*, <https://doi.org/10.3389/fphys.2019.00378>, 2019.
15. I. Mironovaa, G. Bazilevskaya, G. Kovaltsov, A. Artamonov, E. Rozanov, A. Mishev, V. Makhmutov, A. Karagodin, K. Golubenko, Spectra of high energy electron precipitation and atmospheric ionization rates retrieval from balloon measurements, *Science of the Total Environment* 693 (2019) 133242, <https://doi.org/10.1016/j.scitotenv.2019.07.048>
16. Arseniy Karagodin-Doyennel, Eugene Rozanov, Evgeny Mareev, Irina Mironova, Evgeny Volodin, Ksenia Golubenko "The representation of ionospheric potential in the global chemistry-climate model SOCOL" *Science of the Total Environment* (2019) IN PRESS
17. Kseniia Golubenko, Eugene Rozanov, Irina Mironova, Ilya Usoskin "Natural sources of ionization and their impact on atmospheric electricity" *Environmental Research Letters* (ERL) (2019) IN PRESS

Presentations in scientific conferences including acknowledgements to COST CA15211

1. M. Teplan, I. Bajla, O. Štrbák, M. Cifra, Development of experimental platform for monitoring biological response of cells to weak low frequency electromagnetic fields, 11th International Conference on Measurement, 2017, DOI: 10.23919/MEASUREMENT.2017.7983580
2. A. Karagodin, The first outcomes and further plans of incorporating GEC into the chemical climate models, Oral presentation at the 8th International Student's Conference "Science and Progress-2017". "Science and Progress-2017" was held in Russia in Saint-Petersburg State University (Saint-Petersburg, Peterhof, Russia) from 13th to 17th November 2017. A. Karagodin presented the results of his STSM.
3. Attila Buzás, Tamás Horváth, Veronika Barta, and József Bór, Revisiting the decreasing trend of atmospheric electrical potential gradient measured in Central Europe at Nagycenk, Hungary, EGU

General Assembly 2018, Vienna 8-13 April 2018 (poster), Geophysical Research Abstracts Vol. 20, EGU2018-6723, 2018.

4. Konstantinos Kourtidis and the COST Action CA15211 Team, Atmospheric Electricity Network: coupling with the Earth System, climate and biological systems, EGU General Assembly 2018, Vienna 8-13 April 2018 (oral), Geophysical Research Abstracts Vol. 20, EGU2018-4410, 2018.

5. Kourtidis K., Atmospheric Electricity coupling with the Earth System, climate and biological systems: A review, Book of abstracts, 14th International Conference in Meteorology, Climatology and Atmospheric Physics, COMECAP2018, ISBN 978-960-98220-4-6, Alexandroupolis, p. 22, 2018.

Other presentations including acknowledgements to COST CA15211

K. Kourtidis: Invited talk about the Action at the European Researchers Night 2017 at the Research Center ATHENA/Xanthi Dept. (<http://www.renathens.gr/xanthi/>) on 29 Sept. 2017. About 100 people (90% general public, 10% scientists) attended the talk.

Other dissemination/communication

CTRWilson twitter account of Karen Aplin, 1/10/2017, Yoav Yair distributed this information: Open Call for Short Term Scientific Missions within COST Action Electronet. Deadline is November 30th. Information <http://www.atmospheric-electricity-net.eu/>

After STSMs of Roy Yaniv and Veronika Barta at the Swider observatory of IGF PAS Dr. Ann Odzimek wrote on 10/05/2017 a short summary of the STMS (in Polish) on the website of the Polish Institute of Geophysics, Polish Academy of Sciences. It is still informing about STMS of the COST action and has link to the Action website.

<https://www.igf.edu.pl/zespoly-6.php>

<https://www.igf.edu.pl/zespoly-6.php#stsm2017>

In October 2017, in the news section of GSKF institute, the following news about ElectroNet appeared (the news are in Hungarian, below the google translation outcome):

<http://www.ggki.hu/en/news/article/article/a-ggi-reszvetele-az-electronet-akcioban/>

(30.10.2018 13:16

GGI's participation in the ELECTRONET action

September 25-27. the recent workgroup COST ELECTRONET supported by the European Science Foundation was held in Porto, Portugal.

September 25-27. the recent workgroup COST ELECTRONET supported by the European Science Foundation was held in Porto, Portugal. The objective of ELECTRONET is to harmonize internationally the research on static and quasi-static atmospheric electromagnetic fields and to extend the scope of related measurements to environmental monitoring and to the interaction with different biological systems. The research work in Hungary was represented by the delegates of the Hungarian Academy of Sciences: Dr. Gabriella Satori, Dr. Jozsef Bor, Dr. Veronika Barta, Researchers at the Geodetic and Geophysical Institute, and Attila Buzas scholarship student. The delegates reported on the latest measurements of Atmospheric Potentiometer (PG) measurements, reviewed the main domestic results of Schumann resonance research and

presented the proposed concept for extending the Paks environmental monitoring system to establish a PG metering network around the nuclear power plant. The possibility of setting up a measuring network and proposals for related scientific programs was welcomed and supported by the international research community).

<http://www.ggki.hu/en/news/article/article/roevit-tanulmanyut-tamogatasa/>

(30. 10. 2017. 13:25

Supporting a short study tour

The ELECTRONET Action offers researchers, PhD students and university students the opportunity to take part in a Short Time Scientific Mission (STSM) for the purpose of implementing their scientific project to the subject of the action.

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Travel subsidy must be applied. In the current cycle, the application deadline is 2017. 30th. The applied study trip must be completed between 1 January 2018 and 30 April 2018. Detailed information on STSM can be found in Chapter 7 of the COST Vademecum.

The ELECTRONET STSM call for proposals can be found on the action website).

<http://www.ggki.hu/en/news/article/article/reszvetel-tamogatasa-nemzetkoezi-konferencian/>

(30. 10. 2017. 13:35

Supporting Participation at an International Conference

The ELECTRONET action offers support to PhD students and young researchers for international conferencing. It is a young researcher (Early Career / Stage Researcher, ECR / ESR or Early Career Investigator, ECI) who has completed less than 8 years of PhD graduation and COST program / action.

The ELECTRONET action offers support to PhD students and young researchers for international conferencing. It is a young researcher (Early Career / Stage Researcher, ECR / ESR or Early Career Investigator, ECI) who has completed less than 8 years of PhD graduation and COST program / action.

The ITC conference grant must be applied, Hungary is among the supported countries. Aid can be applied if the candidate presents a fit for the ELECTRONET program at the conference. Application is ongoing until the available budget is exhausted.

The call for applications can be found on the ELECTRONET website.)

In the site of the University of Cantabria, Spain, on 24 January 2018, the following News appeared about the meeting of WG4 of CA15211 that took place there.

https://web.unican.es/noticias/Paginas/2018/enero_2018/La-ETS-de-Nautica-acoge-la-reunion-de-expertos-del-Grupo-IV-de-la-Accion-COST.aspx



12. Rules of procedure for the MC of the COST Action, WG Leaders, STSM composition, DC composition, update of WG participation.

Replacement of WG5 Vice Chair Alec Bennett due to termination of his participation.

The MC is asked to note that through e-vote it decided for the replacement of WG3 co-leader Jens Olaf Pedersen with Mirela Voiculescu on 8-2-2019.

13. Any Other Business (AOB)

Reduced accommodation rate for the Sopron meeting. On 30-5-2019 the Chair initiated an MC e-vote for the approval of reduced accommodation rates (100 Euro) for the Sopron meeting. The vote closed on 7-6-2019 and the reduced accommodation rate was unanimously approved (ETS, PT, PL, CY, ESP, NL, FI, NO, BG, RS, HU, UK, IL, CH, FR YES, the rest no answer hence also YES). The MC is requested to take note and approve.

14. Location and date of next meeting.

The Chair tables the following proposal for discussion by the MC.

On 14/3/2019 the Chair received the following proposal from Luis Mir and Francesca Apollonio: "Far in advance, Francesca Apollonio and I would like to inform you that URSI General Assembly and Scientific Symposium in 2020 will be in Rome from August 29 until Friday 4 of September. As you know, in URSI, there are several commissions with subjects of real interest for the members of the COST action, that is for many of the COST WGs.

We suggest that you could consider proposing to the COST steering group the possibility to have the COST MCM in Rome on September 5 (Saturday). On the one hand, the COST scientific discussions will be enriched by the contact of the COST participants with the very large community at the URSI meeting. On the other hand, this proximity in the dates could facilitate the attendance

of the COST participants to this URSI meeting (in particular those from ITC countries), because at least the trip (and two or three nights – not the registration fees) could be covered by the COST; This is why we are suggesting you that we could have the COST MCM at the end of the URSI meeting (allowing those that would not be interested to attend the URSI meeting, not to do it and just attend the MCM meeting in a beautiful city, Rome).”

15. Summary of decisions

16. Closing

Prepared by:

Action Chair: Prof. Konstantinos Kourtidis

List of Annexes

Annex 1: MC approval for the meeting dates

Annex 2: Replacement of WG3 co-leader Jens Olaf Pedersen with Mirela Voiculescu

Annex 3: Monitoring progress report 1

Annex 4: Training school

Annex 5: List of acronyms/abbreviations

ANNEX 1: MC approval for meeting dates

The Chair initiated an e-vote procedure on 1st February 2019 9:15:

Dear MC members,

I created a doodle poll for the dates of our next WG and MC meeting in Sopron, Hungary. Please go to

<https://doodle.com/poll/a8qe29suefnafv8c>

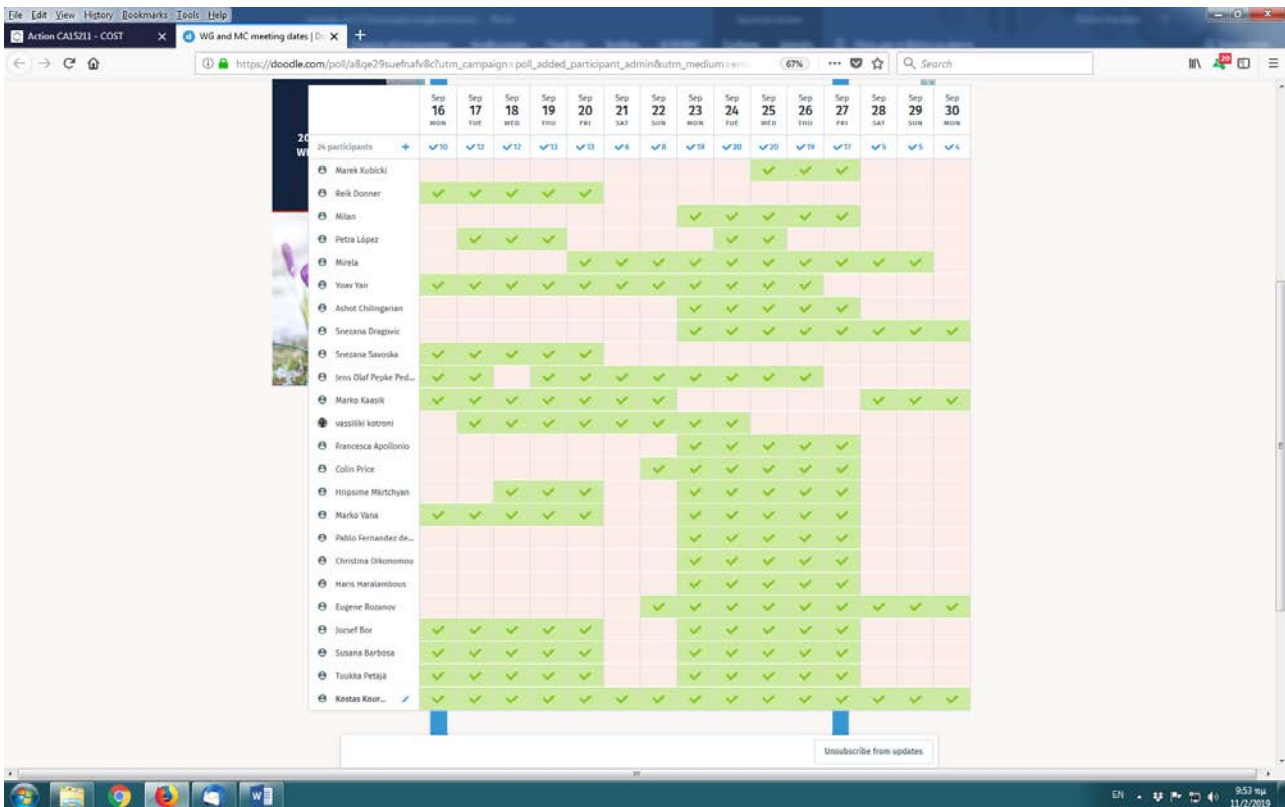
and indicate your preferences. I remind you that, in our last MC meeting in Limassol, "It was decided unanimously to hold the next WG/MC meeting at the 2nd half of September 2019 in Sopron, HU. It was decided, that for fixing the exact dates the same procedure as last year will be followed, i.e. the Chair will at some point early 2019 initiate a doodle poll and the meeting will be held at the dates that are convenient to the majority" (Note: to the majority of MC members). The doodle will close on 10 February 2019.

The doodle will close on 10 February 2019.

Best regards,

Kostas

The vote closed on 10.2.2019 9:15.



The votes of A. Chilingarian (ARM) and H. Mkrtychyan (ARM) were not counted, as they have observer status in the MC. Also, the vote of the Chair was not counted as he does not represent EL in the MC. The outcome is as follows (please note that in case a MC member AND a MC substitute from the same country had voted, only the MC member vote is counted. In case two MC members from the same country had voted, only the common dates were counted):

Day of Sept.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Votes	7	10	9	10	9	3	6	14	16	16	14	11	3	3	2



Hence it was decided that the meeting will be held Monday 23 to Wednesday 25 September 2019.

Annex 2: Replacement of WG3 co-leader Jens Olaf Pedersen with Mirela Voiculescu

On 29-1-2019 MC Chair started an MC e-vote after a request from WG3 leader for the replacement of WG3 co-leader Jens Olaf Pedersen with Mirela Voiculescu. The vote closed on 8-2-2019 and the MC decided unanimously in favour of the replacement. CY, EST, DK, FI, FR, DE, NO, PT, RO, RS, SPAIN, UK approved in writing while BG, CZ, FYROM, HU, IL, IT, NL, PL, SLO and CH casted no vote (hence approved).

Annex 3: Progress report 1 (see separate attachment)

Annex 4: Training School

Location: Potsdam, Germany

Dates: The 5-day training school took place on 25.2.-1.3.2019 (decision of MC)

21 participants attended (5 HU, 3 RS, 3 EL, 2 ES, 2 ARM, 2IL, 2 RU, 1 CY, 1 RO)

Annex 5: List of acronyms/abbreviations

DC Dissemination Committee

ECI Early Career Investigator

GH Grant Holder

GP Grant Period

GAPG Grant Agreement Period Goal

ITC Inclusiveness Target Countries (Bosnia-Herzegovina, Bulgaria, Cyprus, Czech Republic, Estonia, Croatia, Hungary, Lithuania, Latvia, Luxembourg, Malta, Montenegro, Poland, Portugal, Romania, Slovenia, Slovakia, the former Yugoslav Republic of Macedonia, Republic of Serbia and Turkey)

ITCCG ITC Conference Grants

LOS Local Organiser Support

MC Management Committee

NNC Near Neighbor Countries (Albania, Algeria, Armenia, Azerbaijan, Belarus, Egypt, Georgia, Jordan, Lebanon, Libya, Moldova, Morocco, the Palestinian Authority, Russia, Syria, Tunisia and Ukraine)

STSM Short Term Scientific Mission

STSMC Short Term Scientific Mission Committee

SO Science Officer

SC Science Committee

TS Training School

TSSCom Training School Selection Committee

WBP Work and Budget Plan

WG Working Group

COST Action Progress Report at 24 months

CA15211: Atmospheric Electricity Network: coupling with the Earth System, climate and biological systems (04/10/2016 to 04/10/2018)

The Action was approved by the Committee of Senior Officials (CSO) on 26-2-2016 and has the MoU reference COST 012/16.

This report shows the data entered into e-COST to enable the Action Chair to verify the completeness and accuracy of the report with the MC prior to submitting the report via e-COST in fulfilment of the rules for COST Action Management, Monitoring and Final Assessment.

Action leadership and participants

Leadership positions

Position	Name	Contact details	Country of work affiliation
Chair	Prof Konstantinos Kourtidis	kourtidi@env.duth.gr 0030-25410-79383	Greece

Position	Name	Contact details	Country of Nomination
Vice Chair	Dr Anna Odzimek	aodzimek@igf.edu.pl +48226915821	Poland

Working groups

#	WG Title	# of participants	WG Leader	Country of nomination
1	Atmospheric electricity network	16	Prof Konstantinos Kourtidis kourtidi@env.duth.gr	n/a
2	Natural radionuclides / ionosphere and connections with natural hazards	19	Dr Snezana Dragovic sdragovic@vin.bg.ac.rs	Serbia
3	Climatic relevance	20	Dr Eugene Rozanov eugene.rozanov@pmodwrc.ch	Switzerland
4	Biological aspects	7	Dr Pablo Fernandez de Arroyabe fernandhp@unican.es	Spain
5	Instrumentation development	10	Dr Keri Nicoll k.a.nicoll@reading.ac.uk	United Kingdom

Other key leadership positions

Position	Name	Contact details	Country of work affiliation
STSM Coordinator	Prof Yoav Yair	yoav.yair@jdc.ac.il	Israel

Participants

COST members having accepted the MoU

BA	19/09/2016	BG	08/09/2016	CY	16/03/2016	CZ	20/01/2017	DK	17/05/2016
EE	18/11/2016	FI	21/03/2016	FR	06/06/2017	DE	15/05/2017	EL	09/03/2016
HU	16/03/2016	IL	10/03/2016	IT	19/11/2016	NL	30/03/2016	NO	14/06/2018
PL	13/06/2016	PT	02/05/2016	RO	29/03/2016	RS	08/07/2016	SI	29/08/2017
ES	03/05/2016	CH	30/06/2016	UK	08/04/2016	MK	08/11/2016		

Other participants

Institution Name	Country
ST. Petersburg State University	Russian Federation
Yerevan Physics Institute	Armenia
Institute of Applied Physics, Rus. Acad. Sci.	Russian Federation

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Summary

Main aim/ objective

integrate resources in the field of atmospheric electricity, create a network, introduce new techniques, improve the understanding of a number of processes that lie at the interface of solid earth, environmental, biological, climatic and solar/terrestrial sciences

During its first two years the Action progressed the achievement of this as described below

We have achieved a good level of integration of European resources, both in terms of human resources and facility resources in the field of atmospheric electricity. An active network was created, as evidenced from the number of participants in the Action WG meetings, the number of countries that have joined the MoU (24 + 3 NCC Institutions) and the number of STSMs (15) completed so far in the first 24 months of the Action.

Introduction of new techniques, is progressing according to the MoU. Sensor needs of the atmospheric electricity community have been identified and a number of sensor developments is underway, expected to be delivered (according to MoU) at m42 of the project.

Improvement of the understanding of a number of processes that lie at the interface of solid earth, environmental, biological, climatic and solar/terrestrial sciences is also well progressing, with joint earthquake precursor studies underway (reported extensively in the last WG meeting of the Action in September 2018), joint biological studies also underway (also reported extensively in the last WG meeting of the Action in September 2018).

The Action will implement the following measures in the coming two years to overcome any issues identified in this report as potentially endangering the achievement of the objectives of the Action

No such issues have been identified hence no measures foreseen.

Action website

<http://www.atmospheric-electricity-net.eu>

Achievement of MoU objectives, deliverables and additional outputs/ achievements

MoU objectives

Please self-assess and describe the level of achievement of each MoU objective. For any MoU objective that is 25% or less achieved, please add an explanation.

Mou objective	Study of the climatic relevance of AEF, in particular through its influence on atmospheric aerosol ionization and cloud microphysics.
Type of objective	1.b Coordination of information seeking, identification, collection and/or data curation 2.a Building a community around a topic of scientific and/or socio-economic relevance, allowing for knowledge exchange and the development of a joint research agenda
Level of progress	26 - 50%
Description of progress with achieving the MoU objective	A relevant research timetable was created (D3.1 of MoU) and a WG3 meeting took place in 13 and 14 feb 2018 in Bucharest to progress toward the objective. The following possible topics were identified during the meeting: ionization from thunderstorms, lightning and thunderstorms, extension of the balloon measurement coverage, reasons for Coronal Mass Ejections (CME) influence on atmospheric electrical currents, response of Carnegie curves to solar variability, Potential Gradient-Ionospheric Potential (IP) connection, IP plot for separate months with better coverage, IP in various models as SOCOL and INM, Mansurov effects in new reanalysis in correlation with other solar proxies, Mansurov effect seen in clouds properties at polar altitudes, difference between current and ionization effects, aerosol to lightning parameterization, lightning according to different models, solar term inclusion in IP calculations.

Mou objective	Standardization of procedures, data collection and archiving to allow for the study of large-scale features and impacts.
Type of objective	1.b Coordination of information seeking, identification, collection and/or data curation
Level of progress	76 - 100%
Description of progress with achieving the MoU objective	GAPG5 of GAP1, part of Deliverables 1.2 and 1.3 of the MoU has been delivered and laid down the archiving procedures. The database cataloguing allows for easy search of the data: Spatial search, search per variable, per time period, combined search. The data in the dataspace may come from very different data sources distributed over various places, and these data may update periodically. Therefore, it is important whenever a participant of dataspace updates, the changes to be reflected in the database. The dataspace of the project (GAPG2 of GAP2) is created at https://dataspace.atmospheric-electricity-net.eu/ .

Mou objective	Creation of a Handbook where available literature on AEF effects on humans and other biological systems (e.g. bees) is reviewed.
Type of objective	1.a Development of a common understanding/definition of the subject matter 2.b Building a community around a new or emerging field of research 2.c Bridging separate fields of science/disciplines to achieve breakthroughs that require an interdisciplinary approach
Level of progress	76 - 100%
Description of progress with achieving the MoU objective	A Handbook was created (GAPG5 of GAP2) which includes the conceptual frame and all the relevant terms and references of available literature on AEF effects on humans and other biological systems. One of the first limitations for the development that was

	realised during the Action was the lack of normalized terms to confront a complex and interdisciplinary research such as the one proposed. Hence, with the delivery of GAPG5 of GAP2 this limitation was overcome. At the current stage, the Action participants develop further this handbook with the aim of publishing it in a scientific journal.
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Mou objective	Development of new generation instrumentation for the needs of the AEF research community. Pursue the development of a new satellite product for the remote sensing of PG.
Type of objective	1.h Input for future market applications (including cooperation with private enterprises)
Level of progress	26 - 50%
Description of progress with achieving the MoU objective	D53. to D5.5 of MoU have delivery dates after m36 of the project. Some entities of the ElectroNet consortium are already developing prototypes.

Mou objective	Literature Handbook production on interdisciplinary studies of lower-atmosphere AEF, natural radioactivity, ionosphere and natural/man-made hazards (in particular earthquake precursor phenomena study, lightning, air pollution, dust events, solar events impacts on the lower atmosphere).
Type of objective	2.b Building a community around a new or emerging field of research 2.c Bridging separate fields of science/disciplines to achieve breakthroughs that require an interdisciplinary approach
Level of progress	26 - 50%
Description of progress with achieving the MoU objective	Although progress has been achieved in bridging separate disciplines, the overall objective of producing a Handbook involving that large number of fields (AEF, natural radioactivity, ionosphere, lightning, air pollution, dust events, solar events) has been overambitious to achieve at m24. We expect however to achieve the objective in the course of the Action, although with delay with regard to the originally set m24 timeframe.

Mou objective	Create a Network for European-scale monitoring and studying of atmospheric electricity that will network existing resources for atmospheric electricity monitoring, couple them to ionosphere/magnetosphere monitoring, natural radionuclides (e.g. Radon) monitoring networks and advance their synergistic study.
Type of objective	1.b Coordination of information seeking, identification, collection and/or data curation 2.a Building a community around a topic of scientific and/or socio-economic relevance, allowing for knowledge exchange and the development of a joint research agenda 2.b Building a community around a new or emerging field of research
Level of progress	76 - 100%
Description of progress with achieving the MoU objective	This has been almost fully achieved already and it is expected that the Network will further strengthen during the course of the Action. A Network for European-scale monitoring and studying of atmospheric electricity that networks existing resources for atmospheric electricity monitoring and couples them to ionosphere/magnetosphere monitoring, natural radionuclides (e.g. Radon) monitoring networks and advances their synergistic study has been created. The Action dataspace (https://dataspace.atmospheric-electricity-net.eu/) continues to add resources.

Mou objective	Establishment of the connections and interdisciplinary studies of lower-atmosphere AEF, natural radioactivity, ionosphere and natural/man-made hazards (in particular earthquake precursor phenomena study, lightning, air pollution, dust events, solar events impacts on the lower atmosphere).
Type of objective	1.a Development of a common understanding/definition of the subject matter

	<p>1.e Development of knowledge needing international coordination, pertaining to a new or improved theory, model, methodology, technology or technique</p> <p>2.c Bridging separate fields of science/disciplines to achieve breakthroughs that require an interdisciplinary approach</p>
Level of progress	76 - 100%
Description of progress with achieving the MoU objective	<p>Connections and interdisciplinary studies of lower-atmosphere AEF, natural radioactivity, ionosphere and natural/man-made hazards (in particular earthquake precursor phenomena study, lightning, air pollution, dust events, solar events impacts on the lower atmosphere) have already been established. The ElectroNet participants already perform common studies of 1. earthquake precursor phenomena, 2. AEF and nuclear disasters (Tchernobyl and Fukushima), 3. AEF, ionisation and climate. These studies will deliver concrete results and common publications in the near future.</p>

Mou objective	Identification of gaps and establishment of new research directions by exploring the network potential on AEF effects on humans and other biological systems.
Type of objective	<p>1.e Development of knowledge needing international coordination, pertaining to a new or improved theory, model, methodology, technology or technique</p> <p>2.b Building a community around a new or emerging field of research</p> <p>2.c Bridging separate fields of science/disciplines to achieve breakthroughs that require an interdisciplinary approach</p>
Level of progress	26 - 50%
Description of progress with achieving the MoU objective	<p>One STSM (https://atmospheric-electricity-net.eu/sites/default/files/2018-07/STSM_CA15211_Vorenhout_to_DUTH_Greece_0.pdf) has been concerned on the effects of AEF on soil redox. One ECI (MC member Ellard Hunting, NL) works with D. Roberts (UK) on effects of pesticides on the electric field of flowers and resulting effects on bee visits to flowers. Other Action participants explore nanoparticle charge and effects on their deposition to lungs.</p>

Deliverables

This section covers only deliverables that were foreseen for the Action, not additional outputs that were generated during the Action (these additional outputs will be added in the following section). Please select and comment on the progress with achieving each deliverable.

For deliverables that are:

- Delivered, please provide proof to enable the Action Rapporteur to confirm the delivery
- Not delivered but delivery is foreseen within 2 years please explain how the delivery will be achieved
- Not foreseen to be delivered please explain why not

Deliverable	Action progress report to COST, according to the required reporting standards for the Action.		
Progress with achieving deliverable	Delivered	Month deliverable due	18
Proof of progress with achieving the deliverable	https://e-services.cost.eu/action/CA15211/MFA/manage		

Deliverable	Action progress report to COST, according to the required reporting standards for the Action.		
Progress with achieving deliverable	Not delivered, but expected before end of Action	Month deliverable due	36
Explanation	Delivery is foreseen in September 2019. The Report will be delivered next year in the foreseen time.		

Deliverable	Action final report to COST, according to the required reporting standards for the Action.		
Progress with achieving deliverable	Not delivered, but expected before end of Action	Month deliverable due	48
Explanation	Month of delivery foreseen is September 2020, which is two years from now. Final report will be delivered in the foreseen delivery time.		

Deliverable	Establishment of a fully functional Action website that will also include data, a bibliographic database, news and updates.		
Progress with achieving deliverable	Delivered	Month deliverable due	12
Proof of progress with achieving the deliverable	https://atmospheric-electricity-net.eu/		

Deliverable	Network creation. Standardisation of measurement and archiving procedures, Network database. Establishment of priorities in research gaps to be addressed by the network, relevant timetable.		
Progress with achieving deliverable	Delivered	Month deliverable due	12
Proof of progress with achieving the deliverable	https://dataspace.atmospheric-electricity-net.eu/		

Deliverable	Establishment of connections to other relevant networks (e.g. radionuclide networks, lightning networks, ionospheric networks, climatic networks) and international AEF monitoring efforts.		
Progress with achieving deliverable	Delivered	Month deliverable due	18
Proof of progress with achieving the deliverable	https://dataspace.atmospheric-electricity-net.eu/node/98		

Deliverable	Cross-discipline exchange and integration of the fields AEF, natural radioactivity, ionosphere, earthquake precursor phenomena, lightning, air pollution, dust events, solar events impacts on the lower atmosphere. Integration with WG1.		
Progress with achieving deliverable	Delivered	Month deliverable due	12
Proof of progress with achieving the deliverable	https://atmospheric-electricity-net.eu/node/115		

Deliverable	Literature handbook on interdisciplinary studies of lower-atmosphere AEF, natural radioactivity, ionosphere and natural/man-made hazards (in particular earthquake precursor phenomena study, lightning, air pollution, dust events, solar events impacts on the lower atmosphere, etc).		
Progress with achieving deliverable	Not delivered, but expected before end of Action	Month deliverable due	24
Explanation	This deliverable was overall more ambitious than it appeared due to the sheer amount of different phenomena and atmospheric compartments involved. Work is progressing and it is expected to be delivered within the next months. In particular the earthquake precursor phenomena study is quite progressed and in the last WG meeting of the Action a dedicated session was devoted to these ongoing studies. Presentations are in the restricted DOCUMENTS->PRESENTATIONS area of the Action website (https://atmospheric-electricity-net.eu/mc4-meeting , requires login, only accessible to Action participants). Action participants are now in the process of progressing to the publication of these studies in scientific journals.		

Deliverable	Establishing research needs and gaps of the climatic relevance of AEF through its influence on atmospheric aerosol ionization and cloud microphysics and studies timetable creation.		
Progress with achieving deliverable	Delivered	Month deliverable due	12
Proof of progress with achieving the deliverable	https://www.atmospheric-electricity-net.eu/sites/default/files/2018-11/WG3_research_plan_Rosanov.pdf		

Deliverable	Report on studies on AEF, aerosol ionization and cloud microphysics performed during the Action.		
Progress with achieving deliverable	Not delivered, but expected before end of Action	Month deliverable due	48
Explanation	Foreseen delivery is two years from now. Is expected to be delivered in the foreseen delivery time.		

Deliverable	Creation of a Handbook where all available literature on AEF effects on humans and other biological systems (e.g. bees) is reviewed.		
Progress with achieving deliverable	Delivered	Month deliverable due	18
Proof of progress with achieving the deliverable	https://www.atmospheric-electricity-net.eu/node/108		

Deliverable	Establishment of a solid biometeorological basis for future research on AEF effects on humans and AEF biometeorology Handbook.		
Progress with achieving deliverable	Not delivered, but expected before end of Action	Month deliverable due	36
Explanation	Month of delivery foreseen is September 2019, which is one year from now. Will be delivered in the foreseen delivery time.		

Deliverable	Identification of sensor needs of the AEF research and monitoring community and recommendation report on future sensor needs.		
Progress with achieving deliverable	Delivered	Month deliverable due	18
Proof of progress with achieving the deliverable	https://www.atmospheric-electricity-net.eu/gapg1		

Deliverable	Sensor development. Smaller and cheaper sensors, miniaturization of sensors, development of instrumentation that will allow the hi-res (on a ~m scale) spatial mapping of AEF, etc. Prototype development for miniaturized low-cost sensors.		
Progress with achieving deliverable	Not delivered, but expected before end of Action	Month deliverable due	42
Explanation	Month of delivery foreseen is March 2020, which is one and a half years from now. Will be delivered in the foreseen delivery time.		

Deliverable	Development of a new satellite product for the remote sensing of PG from space.		
Progress with achieving deliverable	Not delivered, but expected before end of Action	Month deliverable due	36
Explanation	Month of delivery foreseen is September 2019, which is one year from now. Will be delivered in the foreseen delivery time.		

Deliverable	Updated report on studies on AEF, aerosol ionization and cloud microphysics performed during the Action.		
Progress with achieving deliverable	Not delivered, but expected before end of Action	Month deliverable due	36
Explanation	Month of delivery foreseen is September 2019, which is next year. Will be delivered in the foreseen delivery time.		

Deliverable	Report on studies on AEF, aerosol ionization and cloud microphysics performed during the Action.		
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Progress with achieving deliverable	Delivered	Month deliverable due	24
Proof of progress with achieving the deliverable	https://www.atmospheric-electricity-net.eu/sites/default/files/2018-11/Discussion_ionisation_cloud_Mironova%2BKaragodin.pdf		

Deliverable	Standarisation of the archiving procedures and sunsequent Action network data base creation.		
Progress with achieving deliverable	Delivered	Month deliverable due	12
Proof of progress with achieving the deliverable	https://dataspace.atmospheric-electricity-net.eu/		

Deliverable	Establishing a timetable for possibilities of joint studies of atmospheric electricity effects on humans and other biological systems.		
Progress with achieving deliverable	Not delivered, but expected before end of Action	Month deliverable due	24
Explanation	Joint studies of atmospheric electricity effects on humans and other biological systems are performed within the Action and are evolving without the need of a strictly defined timetable. Timetable was foreseen in the MoU (D4.2) but as the studies have evolved the last 12 months, in the last WG4 meeting Action participants opted for publication of joint studies in a special issue of the Journal of Biometeorology within the next months.		

Deliverable	Joint workshop on all aspects of atmospheric electricity tackled by the Action.		
Progress with achieving deliverable	Delivered	Month deliverable due	6
Proof of progress with achieving the deliverable	https://e-services.cost.eu/action/CA15211/instruments		

Deliverable	Training school on all aspects of atmospheric electricity tackled by the Action.		
Progress with achieving deliverable	Not delivered, but expected before end of Action	Month deliverable due	42
Explanation	Month of delivery foreseen was March 2020. Training school is foreseen in the current WBP and will take place in Potsdam end of February 2019, which is ahead of the foreseen delivery time.		

Deliverable	MC and WG meeting. Although we mention here only the month of the first joint meeting (m6), these meetings will be organised as required several times during the Action course.		
Progress with achieving deliverable	Delivered	Month deliverable due	6
Proof of progress with achieving the deliverable	https://e-services.cost.eu/action/CA15211/instruments		

Additional outputs / achievements

Co-authored Action publications

Please enter below ONLY publications (including publications that are submitted but not yet accepted):

- that are on the topic of the Action, and
- that are co-authored by at least two Action participants from two countries participating in the Action, and
- for which the Action networking was necessary.

Please pay special attention to representatives of Inclusiveness Target Countries (ITCs) in each publication. If there are more than 20 publications you *may* choose to enter only the most 20 significant (in terms of Inclusiveness, Excellence and the MoU Objectives).

	Bibliographic data	Countries participating in the Action among authors	Open Access	COST cited?	COST funds?	Relevance to H2020 Societal challenge	Peer Reviewed?
1	doi:10.1093/aob/mcx176 Gallego, Cristiano M, João F Viana, Michal Cifra, Dominic Clarke, and Daniel Robert, Peter Barlow's Insights and Contributions to the Study of Tidal Gravity Variations and Ultra-Weak Light Emissions in Plants. <i>Annals of Botany</i> , January 2, 2018, DOI:10.1093/aob/mcx176.	CZ, UK	Y	Y	N	Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the Bioeconomy	Y
2	Konstantinos Kourtidis and the COST Action CA15211 Team, Atmospheric Electricity Network: coupling with the Earth System, climate and biological systems, EGU General Assembly 2018, Vienna 8-13 April 2018 (oral), <i>Geophysical Research Abstracts Vol. 20, EGU2018-4410</i> , 2018.	AM, BG, CY, CZ, DK, EE, FI, EL, HU, IL, NL, PL, PT, RO, RS, ES, CH, UK	Y	Y	N	Not Applicable	N

Projects resulting from Action activities

Please enter below all the projects on the topic of the Action resulting from Action activities, involving at least one Action participant, and for which the Action networking was necessary.

The Action reported 0 project(s) and 0 proposal(s) resulting from the Action networking.

#	Title	Countries participating in the Action among proposers	Main proposer name	Funder	Amount	Call identifier	Relevance to H2020 Societal Challenge

Other outputs / achievements

Please enter below any additional outputs/ achievements on the topic of the Action that contribute to the COST mission: “COST enables break-through scientific developments leading to new concepts and products and thereby contributes to strengthen Europe’s research and innovation capacities”, and for which the Action networking was necessary (e.g. a patent, standards, white paper).

Output / achievement description	Dependence of achievement on the Action networking
<p>The following publications also acknowledge the Action:</p> <p>Christos Haldoupis, Is there a conclusive evidence on lightning-related effects on sporadic E layers? Journal of Atmospheric and Solar-Terrestrial Physics 172 (2018), 117–121.</p> <p>Harrison, R.G. and K.A. Nicoll (2018) Fair weather criteria for atmospheric electricity measurements, J. Atmos. Sol. Terr. Phys., in press, https://doi.org/10.1016/j.jastp.2018.07.008</p> <p>Attila Buzás, Tamás Horváth, Veronika Barta, and József Bór, Revisiting the decreasing trend of atmospheric electrical potential gradient measured in Central Europe at Nagycenk, Hungary, EGU General Assembly 2018, Vienna 8-13 April 2018 (poster), Geophysical Research Abstracts Vol. 20, EGU2018-6723, 2018.</p> <p>Bór, J., Zelkó, Z., Hegedüs, T., Jäger, Z., Mlynarczyk, J., Popek, M., & Betz, H. D. (2018). On the Series of +CG Lightning Strokes in Dancing Sprite Events. Journal of Geophysical Research: Atmospheres, 123. https://doi.org/10.1029/2017JD028251</p> <p>Teplan M., I. Bajla, O. Štrbák, M. Cifra, Development of experimental platform for monitoring biological response of cells to weak low frequency electromagnetic fields, 11th International Conference on Measurement, Smolenice Castle, Slovakia, 29 - 31 May 2017, DOI: 10.23919/MEASUREMENT.2017.7983580</p> <p>Havelka, Daniel, Ondrej Krivosudský, Jiří Průša, and Michal Cifra, Rational Design of Sensor for Broadband Dielectric Spectroscopy of Biomolecules. Sensors and Actuators B: Chemical 273C (May 2018): 62–69. https://doi.org/10.1016/j.snb.2018.05.124.</p>	<p>High</p>

Jha, Abhishek K., Zubair Akhter, Nilesh Tiwari, K. T. M. Shafi, H. Samant, M. J. Akhtar, and M. Cifra, Broadband Wireless Sensing System for Noninvasive Testing of Biological Samples. IEEE Journal on Emerging and Selected Topics in Circuits and Systems 8, no. 2 (2018): 251–59. <https://doi.org/10.1109/JETCAS.2018.2829205>.

Salari, V., Sh Barzanjeh, M. Cifra, C. Simon, F. Scholkmann, Z. Alirezaei, and J. A. Tuszynski, Electromagnetic Fields and Optomechanics in Cancer Diagnostics and Treatment. Frontiers In Bioscience, Landmark 23 (2018): 1391–1406.

Tian, Bozhi, Shuai Xu, John A Rogers, Stefano Cestellos-Blanco, Peidong Yang, João L Carvalho-de-Souza, Francisco Bezanilla, et al., Roadmap on Semiconductor–Cell Biointerfaces. Physical Biology 15, no. 3 (March 9, 2018): 031002. <https://doi.org/10.1088/1478-3975/aa9f34>.

Poplová, Michaela, Pavel Sovka, and Michal Cifra, Poisson Pre-Processing of Nonstationary Photonic Signals: Signals with Equality between Mean and Variance. Edited by Joseph Najbauer. PLOS ONE 12, no. 12 (December 7, 2017): e0188622. <https://doi.org/10.1371/journal.pone.0188622>.

Burgos, Rosilene Cristina Rossetto, Johannes Cornelius Schoeman, Lennart Jan van Winden, Kateřina Červinková, Rawi Ramautar, Eduard P. A. Van Wijk, Michal Cifra, Ruud Berger, Thomas Hankemeier, and Jan van der Greef, Ultra-Weak Photon Emission as a Dynamic Tool for Monitoring Oxidative Stress Metabolism. Scientific Reports 7, no. 1 (December 2017). <https://doi.org/10.1038/s41598-017-01229-x>.

Barzanjeh, Sh., V. Salari, J. A. Tuszynski, M. Cifra, and C. Simon, Optomechanical Proposal for Monitoring Microtubule Mechanical Vibrations. Physical Review E 96, no. 1 (July 12, 2017): 012404. <https://doi.org/10.1103/PhysRevE.96.012404>.

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Impacts

Please describe the impacts (the short- to long-term scientific, technological, and / or socioeconomic changes produced by a COST Action, directly or indirectly, intended or unintended) that have resulted, or might result, from the Action in the following table (one impact per line).

Description of the impact, i.e. what will change, and for whom, as a result of what the Action achieved	Type of impact	Timing of impact
A diverse multidisciplinary community dealing with atmospheric electricity aspects (atmospheric, climatic, biological) has been established.	<ul style="list-style-type: none"> Scientific / Technological 	Achieved

Please describe how the Action is advancing the careers, skills and network of researchers, including ECIs (for example: joint supervision of graduate and PhD students, research exchanges not funded by the Action, collaborations, Training Schools with ECTS accreditation, joint projects and jobs prospects).

Some ECIs participating in the project, have through contacts developed within the Action found jobs in Institutions of project members.

The career benefits are mainly to researchers with the following amount of experience after their PhD: ≤ 8 years.

Which of the stakeholders described in the “Plan for involving the most relevant stakeholders” in the Action’s MoU have been engaged and how? What additional stakeholders have been, or will be, engaged and how?

The plan in the MoU foresees the following: -Active collaboration in exchange of experimental data and results obtained in different but overlapping fields of study: Achieved -Organizing interdisciplinary conferences, workshops and training schools with well-defined agendas: A training school is foreseen in the current WBP. -Transfer and dissemination of best practices and know-how between the institutions involved in Action: Partly achieved, ongoing. -Short term visits of researchers or PhD. students for training, transfer of knowledge and implementation of newly developed techniques: 15 STSMs completed up to now.

Dissemination and exploitation of Action results (other than co-authored Action publications listed previously)

Please describe the Action's dissemination and exploitation approach as well as all activities undertaken to ensure dissemination and exploitation of the Action results and the effectiveness of these activities.

Dissemination and exploitation approach of the Action

Action website established at <https://atmospheric-electricity-net.eu/> and Action dataspace established at <https://dataspace.atmospheric-electricity-net.eu/> . Report on instrumentation needs of the atmospheric electricity community published and distributed at Action participants and non-Action participants at scientific conferences. Scientific dissemination was done through publications and presentations at conferences.

Dissemination

Dissemination meetings funded by the Action

Title of Dissemination meeting	Meeting date	Meeting country	Action participant	Event name and hyperlink to the website	Title of presentation	Description of added value to the Action
N/A						

Other dissemination activities

E.g. participation to non-Action meetings, e.g. EU Parliament, meetings with policy makers, experts in the field, regional authorities.

Item/activity	Target audience	Outcome	Hyperlink
Invited talk of K. Kourtidis about the COST CA15211 Action at the European Researchers Night 2017 at the Research Center ATHENA/Xanthi Dept.	The target audience was the general public. As many children also attend the European Researchers Night, these were also in the target audience.	About 100 people (90% general public, of which around 20% primary and secondary education students, 10% scientists) attended the talk. People were informed about the awe, thrill and potential practical applications of atmospheric electricity research.	http://www.renathens.gr/xanthi/
In the site of the University of Cantabria, Spain, on 24 January 2018, in the News section the meeting of WG4 of CA15211	The target audience was the general public, faculty members, university students, and the press.	Action CA15211 dissemination to the target audience that is listed above. As we have not access to web statistics of the site	https://web.unican.es/noticias/Paginas/2018/enero_2018/La-ETS-de-Nautica-acoge-la-reunion-de-expertos-del-Grupo-IV-de-la-

<p>that took place there was highlighted, along with the COST CA15211 Action.</p>		<p>we cannot access how many people have visited.</p>	<p>Accion-COST.aspx</p>
<p>Through the CTR Wilson Center twitter account of CA15211 participant Dr. Karen Aplin, on 1/10/2017, CA15211 STSM Committee Chair Yoav Yair distributed this information: "Open Call for Short Term Scientific Missions within COST Action Electronet. Deadline is November 30th. Information http://www.atmospheric-electricity-net.eu/"</p>	<p>Early career researchers interested in atmospheric electricity that might wish to apply for an STSM.</p>	<p>Wide dissemination of STSM possibilities in COST Action CA15211 to ECIs.</p>	<p>https://twitter.com/thewilsoncenter?lang=en</p>
<p>After STSMs of Roy Yaniv and Veronika Barta at the Swider observatory of IGF PAS Dr. Anna Odzimek (MC member, PL, CA15211 Vice-Chair) wrote on 10/05/2017 a short summary of the STMS (in Polish) on the website of the Polish Institute of Geophysics, Polish Academy of Sciences. It is still informing about STMS of the COST action. https://www.igf.edu.pl/zespoly-6.php https://www.igf.edu.pl/zespoly-6.php#stsm2017</p>	<p>Students, ECIs and faculty. Students and ECIs especially, as they might be interested in STSMs within the Action.</p>	<p>Students, ECIs and faculty of the Polish Institute of Geophysics, Polish Academy of Sciences got informed about the performed STSMs, the possibilities the Action offers for STSMs and the Action itself, as the summary also contains link to the Action webpage.</p>	<p>https://www.igf.edu.pl/zespoly-6.php</p>
<p>In October 2017, in the news section of GSKF institute, the following news about ElectroNet appeared (in Hungarian, below the google translation): GGI's participation in the ELECTRONET action September 25-27. the recent workgroup COST ELECTRONET supported by the ESF was held in Porto, Portugal. The objective of ELECTRONET is to harmonize internationally the research on static and quasi-static atmospheric electromagnetic fields and to extend the scope of related measurements to environmental monitoring and to the interaction with different biological systems. The research work in Hungary was represented by the delegates of the Hungarian Academy of Sciences: Dr. Gabriella Satori, Dr. József</p>	<p>GSFK students, ECIs and faculty, other site visitors from Hungary.</p>	<p>GSFK students, ECIs and faculty got informed about the Action.</p>	<p>http://www.ggki.hu/en/news/article/article/aggi-reszvetele-az-electronet-akcioban/</p>

<p>Bór, Dr. Veronika Barta, Researchers at the Geodetic and Geophysical Institute, and Attila Buzás scholarship student. The delegates reported on the latest measurements of Atmospheric Potentiometer (PG) measurements, reviewed the main domestic results of Schumann resonance research and presented the proposed concept for extending the Paks environmental monitoring system to establish a PG metering network around the nuclear power plant. The possibility of setting up a measuring network and proposals for related scientific programs was welcomed and supported by the international research community).</p>			
<p>In October 2017, in the news section of GSKF institute, the following news about ElectroNet appeared (in Hungarian, below the google translation: The ELECTRONET Action offers researchers, PhD students and university students the opportunity to take part in a Short Time Scientific Mission (STSM) for the purpose of implementing their scientific project to the subject of the action. Travel subsidy must be applied. In the current cycle, the application deadline is 2017. 30th. The applied study trip must be completed between 1 January 2018 and 30 April 2018. Detailed information on STSM can be found in Chapter 7 of the COST Vademecum. The ELECTRONET STSM call for proposals can be found on the action website).</p>	<p>Students, ECIs and faculty. Students and ECIs especially, as they might be interested in STSMs within the Action.</p>	<p>Students and ECIs got informed about the Action and the STSMs possibilities within the Action.</p>	<p>http://www.ggki.hu/en/news/article/article/oevid-tanulmanyut-tamogatasa/</p>

Exploitation activities

Please describe below any activities undertaken to ensure exploitation (use, in particular in a commercial context) of the Action's achievements.

Item/activity	Target audience	Outcome
N/A		

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Other matters

This section is confidential to the Management Committee, the Action Rapporteur and the COST Association, and is not included in the version of the report that is published on the COST website.

COST Members with pending intention to accept the MoU

The following COST Members have the status "intention to accept the MoU": BA, BG, CY, CZ, DK, EE, FI, FR, DE, EL, HU, IL, IT, NL, NO, PL, PT, RO, RS, SI, ES, CH, UK, MK. Please comment.

Difficulties in implementing the Action

If any difficulties are experienced in the implementation of the Action (e.g. imbalances of participation across the Working Groups, inactive country representatives) please describe these below. Please also describe the efforts made by the MC to address these.

The representatives of Bosnia/Herzegovina and Slovenia in the MC have not participated in any WG or MC of the Action. The Chair has contacted them multiple times per e-mail and they have been invited in all meetings but in vain. All other Action members and country representatives have been contributing to the Action and participate in the meetings.

We would like to note here that in the Deliverables section of this report for deliverables that are already delivered, the "URL of proof of delivery" some times contains links to the restricted area of the Action website which is assessible by the MC but not by the COST Association or the Action Rapporteur. If the COST Association/Action Rapporteur requires login credentials the Action Chair can provide those upon request.

Suggestions for improvements to COST framework/ procedures

The mandate of the Scientific Committee includes providing advice to the COST Committee of Senior Officials on possible improvements to the COST framework. Please describe below any improvements that you believe should be made to the COST framework.

Less bureaucracy in decision making processes through MC decisions to mandate them to e.g. the Core Group or the Action Chair/Vice-Chair.

Sustaining the network beyond the Action

Are there any plans to sustain the network beyond the end of the Action?

YES

Please describe how the network will be sustained beyond the end of the Action.

As very close collaborations in a range of topics addressed by the Action (e.g. currently ongoing joint investigations on a) earthquake precursor signals in the global ecelctric circuit b) nuclear accident monitoring through atmospheric electric parameters, c) biometeorological aspects of atmospheric electricity) have developed within the project, it is foreseeable that also after project end these collaborations and the networking that has brought them to life will continue.

Emerging topics/ developments in the field of the Action

Please describe any emerging topics or potentially important future developments identified during the Action and that could potentially be addressed by future COST activities such as Actions S&T Conferences or Exploratory Workshops.

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Annex 1: Types of objectives

1 - Coordination of scientific and technological activities at a European level

- 1.a - Development of a common understanding/definition of the subject matter
- 1.b - Coordination of information seeking, identification, collection and/or data curation
- 1.c - Coordination of experimentation or testing
- 1.d - Comparison and/or performance assessment of a theory, model, methodology, technology or technique
- 1.e - Development of knowledge needing international coordination, pertaining to a new or improved theory, model, methodology, technology or technique
- 1.f - Achievement of a specific tangible output that cannot be achieved without international coordination (e.g. due to practical issues such as database availability, language barriers, availability of infrastructure or know-how, etc.)
- 1.g - Input to stakeholders (e.g. standardization body, policy-makers, regulators, users), excluding commercial applications
- 1.h - Input for future market applications (including cooperation with private enterprises)
- 1.i - Dissemination of research results to the general public
- 1.j - Dissemination of research results to stakeholders (excluding specific input in view of knowledge application)

2 - Community building

- 2.a - Building a community around a topic of scientific and/or socio-economic relevance, allowing for knowledge exchange and the development of a joint research agenda
- 2.b - Building a community around a new or emerging field of research
- 2.c - Bridging separate fields of science/disciplines to achieve breakthroughs that require an interdisciplinary approach
- 2.d - Acting as a stakeholder platform or trans-national practice community, pertaining to a certain area of socio-economical or societal application, or to a certain market sector
- 2.e - Building capacity in the demographic inclusiveness of networks in science and technology, including representation of newly established research groups, Early-Career Investigators, the under-represented gender and teams from countries/regions with less capacity in the field of the Action

Annex 2: Dimensions of successes

1 - Breakthroughs

- 1.a - Scientific breakthrough
- 1.b - Technological breakthrough
- 1.c - Breakthrough in socio-economic or societal applications

2 - Policy contribution

- 2.a - Contribution to regulatory policy
- 2.b - Contribution to environmental, infrastructural or agricultural policy
- 2.c - Contribution to economic or socio-economic policy
- 2.d - Contribution to social, cultural or legal policy

3 - Capacity building

- 3.a - Building capacity in an existing field of science and technology
- 3.b - Building capacity in bridging separate fields of science and technology
- 3.c - Building capacity in a new or emerging field of science and technology
- 3.d - Building capacity in valorising and implementing advances and applications in science and technology
- 3.e - Building capacity in the demographic inclusiveness of networks in science and technology, including representation of newly established research groups, Early-Career Investigators, the under-represented gender and teams from countries/regions with less capacity in the field of the Action

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