D8.5 Progress Report

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Progress report – ITN

June 2017

1. General progress of the action

- *Please provide information on scientific progress and trainings occurred during the period covered by this report (including deliverables and milestones as described in the Grant Agreement).*

- *Describe and justify any deviation to the original Work Plan in this section.*

ESR3, Tai Wada, has developer particle tracking tool using tri-linear interpolation and forth order Runge-Kutta (RK4) method in order to investigate Lagrangian fluid element dynamics near the Turbulent Non-Turbulent (TNT) interface. Time-resolved field data of Direct Numerical Simulation (DNS) of a planar jet is provided for investigation. Tracer particles are seeded equally in upstream of the jet, both inside and outside the TNT interface, and he obtained preliminary result for particle crossing statistics across the interface. As a result, significant number of particles are found to cross the interface from inside to outside (detrainment) as well as from outside to inside (entrainment). Rate of crossing (entrainment and detrainment) particles depends on threshold value, which determine the interface, and has a peak inside Turbulent Sublayer (TSL) region. He anticipates this peak has significant effect on condensational growth of droplets.

ESR4, Vishnu Nair, developed a numerical case to study the dynamics of descending shells formed at the edges of actively growing shallow cumulus clouds. DNS was used to conduct a temporal study on the cloud-environment mixing and study the properties of the turbulent flow generated by evaporative cooling. A forcing is applied on the cloud layer to maintain the cloud up draught velocity and thermodynamics at pre-defined values to simulate an actively growing cloud. A bulk approach was used to describe cloud thermodynamics. Scaling laws were derived to predict the length, velocity and buoyancy scales within the shell and a relation for the entrainment coefficient has also been derived.

During his first half of year at our institute, ESR5, Augustinus Bertens, designed a new laser beam expander for the Zugspitze experiment, and two tools that help aligning the laser beam. For this he also characterized the laser beam that our laser produces. Furthermore, he is in the process of developing a cooling system for the camera box, and he is deliberating a droplet sizing method, both to be included in our experimental setup. Finally, in June Guus joined us on the first 2017 Zugspitze campaign. On the theory side he put some work in preparing a kinematic simulation, which is to be used to test our particle tracking codes.

The main goal of the ESR6, Johannes Guettler, in the first 6 months was to come up with a mechanical design for a droplet generator that would generate liquid droplets of chosen size and velocity. High precision was needed to generate droplets in the size of 10-100 microns. At the end of June 2017, the mechanical design of the droplet generator will be completed by Johannes and first parts of the device are in manufacturing process. Johannes carried out first test prints with the 2-Photon-Polymerization 3D-printer at our institute. The design allows for the creation of highly precise nozzles (200 nm resolution), which Johannes deployed in collaboration with a research group leader at the MPI in Martinsried. From the beginning, Johannes conducted a literature research.

Most of the deliverables up to now will concern the structure of the training network and its related requirements: D6.1 Network website, D6.2 1st Summer School lecture notes, D7.1 ESRs Recruitment report, D7.2 Code of conduct and quality criteria for the supervision of ESRs, D7.3 ESR's Career

Development Plans, D8.1 Consortium Agreement, D8.2 Ethics, D8.3 Exploitation Plan, D8.4 Supervisory Board, D9.1 NEC – Requirement No.1.

Network events: The Coordinator organised the first Kick-Off meeting in Turin on 22nd June 2016 and the second Kick-Off meeting and training school is going to be held from 19 – 22 June 2017, to which all the recruited ESRs by this time will participate. This training school is going to be focused on cloud microphysics and entrepreneurship. The first Supervisory Board meeting was organised in March 2016 via a teleconference and the second Supervisory Board will take place in Turin, during the Kick-Off meeting and training school, from 19th to 22nd of June 2017.

Training organisation: All the ESRs are enrolled to PhD programmes and are attending courses related to their research fields.

Important aspect on the dissemination and publicity is the preparation and construction of **COMPLETE website** (https://www.complete-h2020network.eu/) and the decision to open a **Wiki space** associated to the website with reserved access, for the collaboration and exchange of material between ESRs and researchers of the network.

The milestones that are accomplished:

- MS1 Kick-Off Meeting: First Supervisory Board meeting carried out.
- MS2 Recruitment assessment: Recruitment started and there are 4 ESR positions left.

The milestones accomplished are few because the recruitment is not complete yet as 4 ESRs still need to be recruited and the majority of recruited ESRs have just arrived, as seen from the table on page 4 (see 2. Recruitment). This process was complex and long for all the beneficiaries where candidates from non-EU countries were involved, due to the issuing of VISAs.

Work package 4 has been slightly changed as Pentalum, Grimm Aerosol and Aerosol Akademie have left the COMPLETE network. Therefore, some of the deliverables have been changed, that is, D4.1 to be done by ICL is now *Laboratory experiments of interfaces in turbulent shear flow* instead of *Laboratory experiments of aerosol/droplets particles in shearless flows*.

2. Recruitment

All researcher's declarations must be submitted for each recruited researcher.

Fellow ID	Last Name	First Name	Last Country of residence of researcher prior to MSCA	Name of recruiting participant	Country of recruiting participant	Academic / Non-academic	Recruitment Start date	Recruitment End date	Contract Type [1]	Family charges	Working time commitment (100%)	Duration within reporting period FTE	PhD enrolment
3	Satheesh Kumar Nair	Vishnu	The Netherlands	Imperial College of London	England	Academic	03/01/2017	02/01/2020	A	Yes	Full time	5 months	Yes
4	Wada	Tai	France	Imperial College of London	England	Academic	20/10/2016	19/10/2019	A	No	Full time	7,5 months	Yes
6	Boetti	Marco	Italy	Tel Aviv University	Israel	Academic	01/02/2017	31/01/2020	A	No	Full time	4 months	Yes
8	Akinlabi	Emmanuel	Senegal	Uniwerszytet Warszawski	Poland	Academic	01/03/2017	29/02/2020	A	No	Full time	3 months	Yes
7	Mohammadi	Moein	Iran	Uniwerszytet Warszawski	Poland	Academic	01/03/2017	29/02/2020	A	No	Full time	3 months	Yes
9	Shamekh	Sara	Italy	Laboratoire de Météorologie Dynamique	France	Academic	01/03/2017	29/02/2020	A	No	Full time	3 months	Yes
5	Basso	Tessa Chiara	England	Politecnico di Torino	Italy	Academic	01/02/2017	31/01/2020	A	No	Full time	4 months	Yes
11	Guettler	Johannes	Sweden	Max Planck - Göttingen	Germany	Academic	16/01/2017	15/01/2020	A	No	Full time	4,5 months	Yes
12	Bertens	Augustinus	The Netherlands	Max Planck - Göttingen	Germany	Academic	09/01/2017	08/01/2020	A	No	Full time	5 months	Yes
13	Bhowmick	Taraprasad	India	Politecnico di Torino	Italy	Academic	16/05/2017	15/05/2020	A	Yes	Full time	0,5 months	Yes

[1] A: "employment contract" or B: "Fixed amount fellowship"

3. Recruitment strategy

- *Organization of recruitment process (advertisement for open positions, central selection or by each beneficiary; number of applications, country distribution, gender etc.)*
- *Selected candidates (visa issued etc.)*
- *Any delays in recruitment, deviations from the original plan and corrective measures implemented.*

The criteria for the selection of candidates suitable for the 14 positions of Early Stage Researchers were first addressed and elaborated in the proposal of the COMPLETE project, confirmed during the "Kick-Off meeting", where it was decided to advertise all ESR positions in online magazines and websites of high academic renown in addition to the Euraxess portal, in order to reach as many candidates as possible. Each beneficiary carried through their own selection.

The advertisements were published from June 2016 onwards.

The search and selection of appropriate candidates was to continue until all the positions were filled. The above mentioned online magazines and websites are:

1. **Euraxess** (http://ec.europa.eu/euraxess/index.cfm/jobs/jobDetails/34099915)
2. **Physics Today (**http://jobs.physicstoday.org/jobs/8307526)
3. **Nature Jobs (**http://www.nature.com/naturejobs/science/jobs/587441-14-phd-positions-on-cloud-microphysics-and-telemetry-marie-sklodowska-curie-esrs-fellowships)
4. **ResearchGate (**https://www.researchgate.net/job/876806_14_PhD_positions-Cloud-MicroPhysics-Turbulence-Telemetry)
5. **Science Careers** (http://jobs.sciencecareers.org/job/417450/phd-fellowships/?LinkSource=PremiumListing)
6. **Academic Positions** (https://academicpositions.eu/ad/politecnico-di-torino/2016/2-phd-positions-cloud-microphysics-turbulence-telemetry/92754)
7. **Met Jobs** (https://www.lists.rdg.ac.uk/archives/met-jobs/2016-09/msg00088.html)
8. **SCUDO, Doctoral School of Politecnico di Torino** (http://dottorato.polito.it/en/call_for_admission).

The last ESRs that were recruited were the ESR-8 Antonio Ibanez Landeta, recruited by Max Planck, and ESR-14 Tung Bui Duc that was recruited by Sitael.

By the eligibility criteria in **the Marie Skłodowska-Curie Actions,** researchers are required to undertake transnational mobility when taking up the appointment, see H2020 Guide for Applicants and http://ec.europa.eu/research/participants/data/ref/h2020/other/guides_for_applicants/h2020-guide-appl16-msca-rise_en.pdf.

The results of the aforementioned advertisements were fruitful for, in total, there were 147 applicants for the 14 positions of Early Stage Researchers in the COMPLETE Network. It must be noted that there were only a few applicants who applied to more than one position offered by different partners of the COMPLETE project.

Applicants came from 40 countries, of which 78,2% are male candidates and only 21,8% are female candidates. It is interesting to observe that very few candidates from Eastern Europe have applied to the project and the number of European applicants is much lower than the number of applicants coming from the rest of the world. The majority of applicants are from India (24%) and Iran (22%), followed by Italy with 7%, Nigeria with 5% and Germany, Greece and Pakistan with 3% each. The

participation of all the European candidates was lower than 15% whereas all other countries, apart from India and Iran, have less than 5% of applicants representing them.

Out of 10 positions for the COMPLETE project until now, 8 (80%) have been assigned to male and 2 (20%) to female candidates.

The recruitment followed the rules of Marie Sklodowska Curie Actions that treats all the applicants without regard to race, color, sex, gender identity, religion and nationality. The recruitment process, after the collection of all the necessary documentation, was done through skype conferences with candidates, verification of their CVs and reference letters. The candidates' referees were contacted to verify their academic preparation. All the beneficiary partners of the network followed the same criteria. Information on all the ESRs are available on the internet page of COMPLETE: https://www.complete-h2020network.eu/.

The deadline by the MSCA rules for the recruitment of all the ESRs was 31st May 2017 but due to problems related to the difficulties of recruitment met by Tel Aviv University, Pentalum's default and position renouncements by candidates that were already chosen, the recruitment was finalized in the beginning of October 2017. Sitael and EnviSens are still searching for their ESR candidates and MPG and POLITO are searching for a suitable candidate for their third ESR position. For the first two delay reasons, an Amendment to the Grant Agreement was submitted to the Research Executive Agency to reallocate ESR-13 to POLITO and ESR-8 to MPG, following a collective decision by the Supervisory Board summoned on March 10th, 2017. The Amendment was accepted by REA on May 29th, 2017.

Table of the recruited candidates to the COMPLETE project

Name	**Surname**	**E-mail address**	**Nationality**	**Gender**
Taraprasad	Bhowmick	taraprasad2207@gmail.com	India	M
Tessa Chiara	Basso	tessa.basso@polito.it	Australia - Italy	F
Tai	Wada	t.wada@imperial.ac.uk	Japan	M
Vishnu	Nair	v.satheesh-kumar-nair16@imperial.ac.uk	India	M
Guus	Bertens	guus.bertens@ds.mpg.de	Netherlands	M
Johannes	Guettler	johannes.guettler@ds.mpg.de	Germany	M
Marco	Boetti	marcoboetti@mail.tau.ac.il	Italy	M
Moein	Mohammadi	moein.mohammadi@fuw.edu.pl	Iran	M
Emmanuel	Akinlabi	emmanuel.akinlabi@fuw.edu.pl	Nigeria	M
Sara	Shamekh	shamekh@lmd.ens.fr	Iran	F

4. Career development plan for each recruited researcher

- *Have supervision arrangement and career development plan been agreed for each recruited researcher? Please provide a short summary.*

During the Kick-Off Meeting organised on 22nd June 2016, all present agreed on preparing Career Development Plans. This will also be described in the deliverable *D7.3 ESR's Career Development Plans* but unfortunately, due to the problems previously explained, not all of the ESRs have been recruited until now. The ESRs that are recruited do have their Career Development Plans set out and Taraprasad Bhwmick's (ESR1) Career Development Plan is in the making as he has only been at POLITO for 2 weeks.

5. For EID and EJD

- *Describe and justify any deviations from enrolment of the fellow in a Phd Programme.*

- *Please confirm that all administrative arrangements towards the industrial doctorate or the agreement to establish a joint/double/multiple doctoral degree have been finalized among the institutions involved.*

We confirm that all the beneficiary partners have taken to enrol their ESRs to a PhD programme and all administrative arrangements are set for the enrolment of Marie Curie fellows to PhD programmes.

6. Management of the action

- *Please report on management, kick-off and management meetings, involvement of researchers etc.*

- *Please also report on risks (already identified in the GA or new ones), ethics issues (if applicable) etc.*

- *Would you please also report on any difficulties, issues concerning the implementation of the Workplan due to specific rules related to the beneficiary's administration/ country legislation.*

The Kick-Off meeting involving only the beneficiary partners of the project was organised on 22nd June 2016 where decisions have been taken on the advancement of the project, recruitment, announcements for the recruitment and further collaboration between partners. In the following months, close collaboration, especially via e-mail was ongoing regarding the recruitment of Marie Curie fellows. Since Pentalum exited the consortium, an Amendment has been made and all the partners were notified about this as well, as previously explained. The next Kick-Off meeting, to which also ESRs will participate is planned for June 2017 (from 19th to 22nd June 2017).

The main risks involved are late recruitment and consequences for the consortium and the scientific progress of the project. Since one of the beneficiary partners is Israel, several ESRs might expect problems if entering Israel, the secondment and training plan was modified to avoid potential conflicts and ethical issues related.

There are no beneficiary's administrative problems regarding the workplan. It has been slightly modified due to the exit of Pentalum as they are no longer part of the consortium. The secondment and training plan was modified due to problems some fellows might have if entering Israel.

7. Communication Activities

- *Please provide information on dissemination and public engagement activities if any has been organised so far.*

Kick-Off meeting and ESRs workshop is going to be held on 19th – 22nd June 2017, to which supervisors with the recruited ESRs will participate. The event is open, so it will provide an opportunity for the wider audience to participate to the lectures on cloud microphysics. COMPLETE website is active and all the news and progress regarding the project are regularly updated. A

8. Impact of the Action

- *Please describe the impact of the action on the recruited researchers and on the institutions involved or on the completion of the European Research Area.*

COMPLETE closely addresses the prime objectives of an ETN network since it combines the interaction of different scientific disciplines, cooperation between industry and academia and training in complementary and transferable skills and a strong entrepreneurial spirit. At the same time, it pays special attention to gender balance and generates a strong link between the scientific and technical work and possible societal impact. The stimulation of a variety of skills will shape a wide selection of valuable potential professional profiles – from researchers in academia at large, to technologists in high tech industries active in R&D in the field of conception/design of new measurement and environmental monitoring systems, to climatic/meteorological risk assessment – able to enrich the European job market. This ETN will create a unique working environment for cross sector and multidisciplinary research training to deliver high-calibre researchers with the scientific, technical and transferable
skills to improve their career prospects. Through local and network wide training the ESRs will develop a broad knowledge of cutting edge techniques that form the core tools of high level cloud related research and will understand the research and innovation pathways and the perspectives of industry. Furthermore, they will act as ambassadors for the European ideal of integration.
All ESRs will receive a wide range of mentorship and training, including scientific, technological, business and generic aspects, such as *language skills*, *leadership and mentoring*, *team-working*, *grant writing*, *communication*, *public engagement*, *project management*, *research leadership*, *creativity*, *research methods*, *teaching, enterprise, research ethics, promotion of research results towards policy-making, problem solving* and *IP management*. They will also learn skills in Public Engagement so that they are able to disseminate their results to a much wider audience than just their peers and be well informed of the importance of gender issues and scientific misconduct in line with the Horizon 2020 Rules for participation.
The supervisors are already leaders in their fields and their research groups will transfer excellent research practice to ESRs**.** Along with formal scientific training, ESRs will be required to make multiple presentations, organize workshops and conference style events, train students and work within 2-3 collaborating research teams. This training will produce confident, well rounded researchers, highly competent in all aspects of the research process, including its commercial exploitation. These future leaders will be able to spearhead challenging multidisciplinary projects with any mix of academic or industrial involvement.
ESRs work across disciplines and sectors, bringing excellent understanding of science and technology needs, as well as product development to their future research and development groups, broadening their knowledge and career pathways. Through close adhesion to the European Charter for Researchers, the ESRs will take on good working practices which they will be inspired to use throughout their careers. The immediate impact will be to ensure the fellows are well qualified with a broad portfolio of skills and practical experience of cross sector working; this will make them strong

candidates for future employers and underpin their career progression. Importantly taking responsibility for their own development as the project progresses will instil in them at an early stage the importance of continuous professional development. This balanced skill set will make the ESRs highly employable and offer diverse career pathways not only in research centres on atmospheric ocean physics and dynamics, university departments active in these fields, but also in the private sector like weather forecast centres, industrial R&D departments active in the fields of measurement technology, energy, combustion, chemistry and, in general, in any field of application where fluid transport phenomena are of concern (e.g. aerospace and automotive industries, chemical industry).