

**WMO WWRP Nowcasting and Mesoscale Research Working Group Meeting
Hong Kong Observatory
30-31 July 2016**

Summary by Rita Roberts (incoming Co-chair)

Attendees

WMO: Alexander Baklanov, Estelle de Coning

Committee Members: Jeanette Onvlee (co-chair), Peter Steinle (in-coming co-chair), Rita Roberts (in-coming co-chair), Ping Wah (Peter) Li, Jian Jie Wang, Yong Wang, Tabito Hara, Jimmy Dudhia, and Yu Hui

Invited participants: C.M. Cheng, Steve Goodman, Barbara Brown, Cynthia Matsudo, Wang-Chun Woo, Wai-kin Wong

Not-present: Paul Joe (co-chair) and Alan Seed

Day 1

During the morning of the first day, the meeting followed the agenda, with updates provided on WWRP, and the WWRP strategic plan, the TOR for the new merged group, and brief introductions by each participant at the meeting. During the afternoon, presentations¹ were given on current RDP/FDP projects. Highlights from discussion and action items specific to WGNMR are listed below.

1 Opening and Welcome

Dr. C.M. Cheng welcomed the participants to the meeting. Co-chairs were introduced.

2 Reports from the secretariat

2.1 WWRP Update (Alexander)

The importance of the four WWRP Social Challenges (Urbanization, Extremes, Water and New Technology) and how they form part of the overall 2016-19 WMO Strategy was emphasized, and that to meet these challenges it was essential for working groups to be involved in actual, tangible activities as identified in the WWRP Implementation Plan.

The importance of the Urban Cross Cutting Focus was further discussed, highlighting that this involves both WWRP and Global Atmosphere Watch (GAW). The Working Group needs to be linked in with the GAW/WWRP/WCRP Coupled Chemistry – Meteorology Modeling (CCMM) activities. There will also be the UN New Urban Agenda for 2016-2036 to be decided at Habitat III in October. This will include the development & approval for Guidelines for Integrated Urban Services in the next 3 years.

There was brief discussion of Year of Polar Prediction (YOPP) upcoming planning meeting on Arctic Observations (5-9 September 2016 in Reading UK).

¹ All presentations have been stored on the google drive at <https://goo.gl/9KKpMk>

Noted that Intensive Observing Period will be from mid-2017 to mid-2019. Modeling studies and other analyses will continue from mid-2019 to mid-2022.

Action 1: Jeanette is planning to attend and Paul has taken the lead to connect with them on research questions for the polar region.

Action 2: WGNMR to nominate a contact with GURME (This will probably be a new person as after the merging we no longer have significant expertise in urban meteorology and modeling)

A new web site is being prepared for the public on the WWRP web page.

The WMO training centers need to be involved in any training activities being proposed. It is also recommended that RDPs need to engage regional centers to participate and take on responsibilities for training.

Action 3: Alexander has contacted Silvina Carou (WMO) to inform her of proposed training activities for RELAMPAGO RDP/FDP. Rita to follow up with specific details on dates for proposed RELAMPAGO training activities.

2.2 WWRP strategic plan for 2016-2023 (Estelle)

Estelle, Jeanette, Paul and Peter provided input and edits to the WWRP strategic plan. The WG needs to determine and prioritize the activities that the group can contribute to during the next two years, citing specific goals and plans for achieving these goals. Care needs to be given on activities listed for the next two years, as resources may be needed to achieve some of the goals which may not be available. The WG needs to identify what we want to do over the next 8 years. The new TOR for WGNMR will be fixed (final) in the implementation plan.

Action 5: WG to provide a prioritized list of activities for the next two years that will be included in the Progress Report and presented to the SSC during the 24-27 October 2016 meeting. Co-chairs will present the prioritized list. Progress report to focus on what the WG is currently doing.

3 Merged group – WGNMR

Each participant introduced themselves and provided a summary of their background and expertise.

4 Brief status reports of current projects/RDP/FDP

4.1 ICE-POP (Pete Steinle)

Server is up for distributing data from the most recent IOP earlier this year. Another IOP is planned for 2017. A very extensive array of observing systems is planned for the FDP. Plans for forecast involvement, verification metrics and societal impacts have not been discussed. It is expected that the project will need assistance/advice on conducting societal impact studies. Several NWP models will be run; Yong Wang will provide INCA products. Questions were raised on the RDP and what scientific contribution it will provide, and on the FDP on what improvement to forecasting it will provide and how will model forecasts be displayed. In addition, there were questions on how much can be achieved during the preliminary FDP in 2017, in advance of the Olympics in 2018. Will products be available for forecasters to use, and are plans in place to train forecasters in using new products and NWP models for producing forecasts? Yong mentioned that some training of KMA forecasters will be done in Austria in

the coming year. Concern was raised that there was no plan or timeline for when the other participants in ICE-POP will run their NWP models.

Action 5: ICE-POP needs a scientific implementation plan. They need to address what science questions they will answer and what operational needs will they be advancing. Pete has contacted the Korean lead, Sangwon Joo of S. Korea asking that they have each of the NWP groups draft up a timeline of their plans, along the lines of Table 9 in the ICE-POP Science Plan, but in 3 monthly rather than 6 monthly blocks. This would have the additional benefit of confirming their participation in the FDP. Pete will attend their November planning meeting.

4.2 AvRDP (Peter Li)

As part of Phase I, the Implementation plan was presented at the 2nd AvRDP SSC meeting held on 23-24 July 2016. Several IOPs have been conducted in mid-2015 till mid-2016. Efforts are underway on nowcasting research and establishing the research on verification in collaboration with the Verification WG. From May 2015 to July 2016, a few airports, both the northern and southern hemisphere airports, focused on connective weather. From Nov 2015 to Mar 2016, a few airports focused on winter weather and low visibility. A capacity building aviation nowcasting workshop was held on 20-22 July, followed by the AvRDP SSC meeting. During the capacity building workshop, many lectures were provided to around 30 aviation meteorological personnel from 12 countries/regions. Apart from the progress of Phase I, the SSC also discussed about the possibilities of adding more airports in the Project. Some preliminary results obtained in Phase I over various airports were also presented at the WSN16 Symposium.

Phase II of the Project, which focuses on MET-ATM impact translation and validation, has already started at the Hong Kong International Airport, Shanghai Hongqiao Airport and Paris Charles de Gaulle Airport with Meteo-France working on SESAR. Johannesburg Airport has also begun contacting with local Air Traffic Management and relevant sectors to start Phase II. Apart from meteorological observations, nowcast and mesoscale modelling data, Hong Kong has started the 2nd IOP this summer to collecting airport capacity and traffic data. Investigation on the correlation between convection and its impact on Airport Arrival rate and Airport Departure Rare have been begun. In short the progress of the 1st IOP up to September is:

- Hong Kong Observatory have collected MET and ATM data and uploaded them on AvRDP Server for sharing
- MeteoFrance and EnvironmentCanada are preparing to upload their data to the server
- Most participants should have the meta data and impact information available soon, though internal data policies issue for Shanghai needs to be resolved
- Aiming to get scheduled/actual arrival and departure times to allow for impact evaluation
- Other Air Traffic Management variables being considered for collection and sharing include
 - o Airport capacity
 - o Airspace capacity
 - o Arrival/Departure delay information
 - o Fuel consumption (although this is airline and aircraft dependent)
 - o Lightning strikes (to assess impact on airport management of ground operations)
- Data policy on how to use the data shared has been made available. Procedures for uploading and sharing data over the data serves are ready for use.

Next steps would include verification (including observation deficiencies, quality and reliability) and minimum forecast accuracy requirements. Collaboration with JWGFVR has been initiated. Based on the progress and its possible connection with the upcoming inter-commission Aviation Research Project, the Science Plan including the Implementation Plan would be fine-tuned. Another Capacity Building workshop focusing on MET-ATM impact translation might be held around mid-July 2017 back-to-back with the large scale Scientific Conference in association with the Inter-commission Aviation Research Project.

There are some prospects of extension to the program:

- New Delhi indicated interest in participating in the Project and is considering submitting a plan for AvRDP SSC's considerations
- Moscow is considering participation. There have also been tentative discussions with Chile and Argentina as potential participating airports in the Southern Hemisphere.

Action 6: WMO is exploring whether to expand the AvRDP into an Intercommission Aviation Research Project (CAS/CAEM/CBS). Need to come up with a coordinated road map for the project in support of future operational solutions.

4.3 LVB (Estelle de Coning)

WMO is leading a proposal submission to UK's DFID Request for Proposals to Weather and climate Information SERVICES for Africa (WISER) that are due at the end of September. This proposal is called HIGHWAY (HIGH impact Weather LAke sYstem). The proposal must address the following: operational infrastructure, innovation, regional coordination, social economic impacts. The proposal needs to deliver fully functional and sustainable systems to cover nowcasting to 5 day forecasts. The plan learns from/ builds on the AMMA project

In broad terms HIGHWAY will focus on operational systems, mostly using existing infrastructure, and be driven by user needs. There is limited scope for some innovation such as

- an *ad hoc* field campaign (mainly consisting of more sonde launches)
- some modeling development around coupled lake modeling and enhanced use of radar and satellite data

During a meeting in East Africa, heads of the EAC Meteorological Services met and signed an agreement (MOU) to collaborate. Groups involved in the proposal submission include WGNMR, CBS, and WMO Resource Mobilization group. The proposal is to cover 3 years (2017-2019) with maximum monetary award of £3.5 million.

4.4 RELAMPAGO (Cynthia Matsudo, Argentina Meteorological Service (SMN))

- Prior to the RELAMPAGO-CACTI field campaign, the SMN proposes to conduct a 2 week nowcast training workshop in March 2018.
 - 2018 preferred as GOES-R should be available.
- During the field campaign which will run from Nov-Dec 2018 (45 days), 2-3 forecasters will be located at the Operational Centre to participate in the experiment briefing and forecasts.

Nowcasting tools available in the operations center and an FTP site will be created to share data and forecasts. Teleconferences will be held with forecasters from other countries to discuss short term forecasting and nowcasting.

- Post RELAMPAGO-CACTI in September 2019, an intercomparison experiment will be held using RELAMPAGO/CACTI data.
- Expected partners for international testbed participation include SMN, Universidad de Buenos Aires, NCAR, and others TBD.
- Preliminary ideas for funding resources: 1) funding for international traveling (WMO), 2) funding for ftp maintenance and tools implementation (NWS local – international).
- Concept seen as important due to lack of nowcasting in South America, despite MCS's being exceptionally prevalent in La Plata basin.

Action 7: SMN needs split up the proposed RDP and FDP efforts and make clearer in their proposal. They need to make the plan for international cooperation for RDP clear and the plan for international FDP clear. They will need to identify international countries who will participate in these efforts. They need to list their specific financial requests. WMO training branch should be considered for help with training needs. WMO will work with SMN to identify funding sources for international forecaster involvement and for travel to participate in training workshops. Alexander has contacted Silvina Carou (WMO) to explore availability of support from WMO. Jeanette document specific information still needed from SMN. Rita will contact SMN to get further clarifications made on their proposed RDP and FDP activities.

4.5 SURF (Jian Jie Wang)

SURF is an international research program being led by CMA/IUM and is designed to improve understanding of urban weather systems and high impact weather in the urban area, focusing on the interaction between the urban environment, terrain, convection and aerosols. Miao Shiguang is the new director of IUM and is now taking leadership of SURF. The project is driven by floods and haze causing more disasters in the Beijing urban area.

There are three broad areas within this project

1. Improving the understanding of urban weather – including workshops and field campaign
2. Evaluating and improving urban (order 1km) weather models
3. Enhance applications of urban weather

International collaborators from the U.S. and Austria are involved. Four workshops have been held. Several ground-based observational platforms for surface measurements and atmospheric profiles, along with aircraft collections. Modelling systems include RMAPS (Rapid-refresh Multi-scale Analysis and Prediction System), WRF, VDRAS, and INCA – spanning short range forecasting to nowcasting and data integration. Two years of preliminary studies have been done, one in the summer and one in the winter. A 2016 study is ongoing. A fifth workshop planned for spring 2017. Data sharing is confined within the project participants, but will be released to other groups at the end of the project (2018-19).

There is consideration of SURF as and RDP for WWRP. During the December meeting (see minutes) WGNMR encouraged SURF to make an application to GURME and WWRP to be a pilot program. An

application was sent to GURME under the High Impact Weather initiative, but WGNMR has not seen this application.

Action 8: Jian Jie or Alexander will forward the application to WGNMR so that the group can evaluate for the scientific questions that will be applicable to WWRP (Urban), funding and sustainability concerns. Need to engage and confirm additional international partners. WGNMR should make a recommendation on whether SURF should move forward as an RDP or FDP.

4.6 SCMREX (Yu Hui)

A 2016 field campaign was conducted with significant progress on research and NWP developments. Program will continue to 2018 with emphasis on cloud precipitation measurements. A workshop is being planned. A second phase is being proposed; will need to submit a new application to WGNMR and to WWRP (SSC).

Action 9: Yu Hui to contact Dr. Luo and ask if WMO approval for an RDP is desired. If so, an official application will need to be submitted to the SSC. WG on Tropical Meteorology Research is taking the lead on this program so there may already be some approval of a second phase. Yu Hui to find out.

4.7 UPDRAFT (Yu Hui)

UPDRAFT research is focused on understanding and prediction of rainfall from tropical cyclones. A second international workshop is being planned for UPDRAFT in October 2016 in Shanghai. UPDRAFT has been approved and the WG on Tropical Meteorology Research is taking the lead.

No action is required by WGNMR.

4.8 LVB Climatology (Steve Goodman)

Case studies were shown that were initially prepared for the WMO SWFDP East African training workshop in Ethiopia (Nov. 2015) for two days over Lake Victoria Basin. Updated analyses and forecasts shown from NU(NASA/USAID)-WRF 3 km NWP model runs, MSG SEVERI (imagery, SST, etc.) and lightning data sets. Datasets are also being analyzed for understanding the performance of the different lightning networks in the region and the predictability of intense thunderstorms by the NWP models. In addition to meeting the needs for training materials specific to the EA region, these studies have been important to the crafting of activities in the HIGHWAY proposal to be submitted to DFID.

Using the one year of NWP runs to enable a reasonable number of satellite-based lightning and NWP case studies has provided some interesting results:

- Using the model lightning diagnostic was better than diagnostics based on CAPE, Lifted Index etc. – the latter tending to light up the entire domain. (Noting that the Lightning Forecast Algorithm has a maximum value of 4 flashes/km²/5min)
- ATDNET was the worst for detection – unfortunate as this *was* to be used to calibrate MeteoSAT Third Generation.
- World Wide Lightning Network seemed to have a low numbers of flashes but the pattern is OK

Other systems used included ENTLN (EarthNet) which is currently free but unvalidated, and Vaisala's GLD360.

There was also discussion about the possible importance of lake bathymetry to mesoscale modeling results. The lake surface temperature could be initialized from VIIRS. There is also the question regarding a coupled wave model such as WW3. The lake modeling community is very interested – Jeanette will discuss with Dimitry Kitkev.

Action 10: WGNMR to explore options for trials of coupled atmospheric and lake meso-scale NWP models over LVB.

5 Open discussion about all projects

Other potential RDP and FDP's were discussed as follows.

- A GURME (VICE) project for S. Korea; potentially an FDP. KMA has not sent a formal application.
- Expansion of SURF-type urban projects to other regions in China (Hong Kong, Shanghai) in addition to Beijing.

Any new proposals for consideration for an RDP/FDP needs to be submitted to WGNMR and SSC. Cross-divisional proposals should be submitted to the SSC. Some additional discussion took place on the role of the WG for RDPs/FDPs. It was suggested that the RDP/FDP guidelines be revised to reflect the WWRP Implementation Plan (e.g. including minimum or critical decision criteria and user Impact for FDPs). FDP's should include information on

- a. Minimum forecast standards required by users (if applicable)
- b. Critical Decision Criteria (if applicable)
- c. Plans for user impact measurement
- d. Data Policy – which should in turn include information on the sustainability of the data collections and funding
- e. International participation
- f. Scientific questions being addressed, and any potential or planned future phase
- g. Funding

This is to be discussed at the SSC.

Action 11: WGNMR to review and suggest revisions to RDP/FDP guidelines and to clarify the submission process.

Alexander to work with WMO Secretariat to resolve who would be the appropriate lead for new FDPs and RDPs. The issue is that if it is a genuine cross-cutting demonstration project then should it be managed by the Science Committee of the relevant Project (HIW, PPP, S2S)

Peter Li will assist in drawing a roadmap for the Inter-commission Aviation Research Project, taking into account Phase II of AvRDP. This will also include exploring funding options with WMO (e.g. trust funds or other). Similar to Phase I, Phase II is not core funded. He will also need to seek collaboration with more research community including other WGs; he has already contacted the JWGFVR.

A Lake Victoria project is viewed as important; funds need to be identified.

RELAMPAGO has strong scientific goals that are aligned with WMO objectives.

Resource Mobilization Department can be used to assist in obtaining funding support and for training; requests should be formulated and submitted to the secretariat.

Day 2

6 Workshops/symposia/other events

6.1 High Impact Weather (Estelle, Pete)

For now, the expectation is that HIW will rely on existing and planned RDPs and FDPs for achieving their goals. HIW task teams have been set up to define the activities over the next 8 years and to avoid overlap with activities already ongoing or planned. Jenny Sun, a former WGNMR member is leading one of the task teams. Yong Wang is leading a SE European project called Aristotle that will provide prediction of severe weather to prediction centers, for the protection of refugees and their migration. HIW has an open trust fund that international countries can donate to. The trust fund supports meetings and publications but not active research.

Action 12: WGNMR members to communicate with other Working Groups to convey needs and avoid areas of overlap. WGNMR members need to convey to groups running RDPs or FDPs to align their science questions with HIW concern, when possible. Also they need to ensure that projects solicit end-users needs. It is the responsibility of the SWFDP to disseminate and provide operational products to forecasters and end-users.

6.2 WSN16 and plans for WSN19/20 (Peter Li; WGNMR)

Peter Li provided summary statistics on the symposium attendance, breakdown by country, scientific themes covered. All presentations will be uploaded in one week following the symposium. He also summarized the AvRDP Capacity Building Training Workshop, the aviation lectures given, and the evening training courses (lectures).

Action 13: Peter Li will write up a summary about WSN16 and to include recommendations regarding next WSN for the SSC .

The list of WMO-sponsored Nowcasting Symposiums are as follows:

- 2005 Toulouse
- 2009 Whistler
- 2012 Rio de Janeiro
- 2016 Hong Kong

The next symposium can likely be held in 2019/2020. Locations proposed for the next symposium included Exeter UK, Casablanca Morocco, Sri Lanka, Mexico. It was suggested to advertise the next symposium as a Nowcasting and Mesoscale symposium, to reflect the combined nature of WGNMR.

Action 14: WGNMR to continue discussions on the next symposium regarding location, date, thematic content, local organizers, etc.

6.3 Task Team on Guidelines for Nowcasting (Yong Wang)

Yong updated WGNMR on the development of nowcasting guidelines being written by the Task Team - Development Guidelines for nowcasting Techniques (TT-DGNT) at the request of CBS. A first draft was to be completed by 31 July 2016. Members of WGNMR are part of the TT-DGNT. No action required.

7 WWRP strategic implementation (Pete, Jeannette, Alexander, Estelle)

WGNMR provided input to the implementation plan, identifying activities in which WGNMR would lead, be actively involved, or could provide guidance on the specific scientific activities itemized in the plan. Activities currently ongoing, or planned for the next two years, were especially noted, and will compose our top priority activities for the next two years.

Action 15: Pete will distribute the WGNMR edited implementation plan to the committee members for any final comments or edits.

8 Membership (All)

Four committee members are either aging off the committee or have moved into a different position within the WMO will need to be replaced: Paul Joe, Jeanette Onvlee, Jimmy Dudia, and Estelle de Coning. In addition, Jian Jie Wang, mentioned the possibility that she may step down in 2017. Factors to consider in nominating new committee members for considering and approval by the SSC, include: scientific expertise, country, gender, and ability to actively participate in nowcasting/NWP activities and projects. During the remaining few minutes of the meeting, the WG discussed gaps in scientific expertise in the current committee membership but did not have time to propose potential candidates. Identified gaps include:

- Urban scale meteorology and modeling (was Stephane Belair)
- Satellite nowcasting, including remotely sensed lightning (was Steve Goodman)
- High resolution polar forecasting (was Paul and Jeanette)
- Emerging observing technologies (was Volker Wulfmeyer)

Action 16: A table will be prepared by Rita and distributed to the committee showing existing committee members and their expertise, and gaps in expertise. This document will also include a starting list of potential candidates that have been forwarded to Rita, and a solicitation for additional candidate names from the WG members.

16 New actions/projects

Wind Turbines: It is well known that wind turbines cause interference in radar data collection. A turbine document has been provided to the WMO by Paul Joe and others. WG members were asked to review this document and provide input on how to modify guidelines. Wi-Fi interference also a big issue in radar data collection and quality. A commission exists on wavelength (frequency) protection advocating protection of radar wavelengths (frequencies). WGNMR noted that these problems exist, and shares concerns with other groups, but currently has no technological fix.

Action 17: Wind Turbine interference document to be distributed for members to review.

Iran Training Workshop: WMO was contacted and asked to provide two experts to give lectures and training during a conference in Iran in May 2016 that was sponsored by the Iranian Met Service and university participants. Keynote lectures and training were provided by Alexander Baklanov and Ian Bell. Topics included nowcasting, radar interpretation, air pollution and dust storms. Presentations and training were well received and Iran Met Service is interested to host a training workshop potentially in 2017.

Action: No discussion on how to proceed. WMO or WG to follow up with Iran or wait for Iran to contact the WMO?

LAFE

Volker Wulfmeyer (Germany) and Dave Turner (U.S.) are leading a scientific project to study the energy budget and obtain high resolution measurements of atmospheric fluxes. A large array of instrumentation will collect measurements including scanning water vapor DIAL, scanning RAMAN lidar, HALO and Wind CUBE systems, micro-pulse lidar, energy flux stations, AERIs and soundings and flux towers. Another component of LAFE is the assimilation of observations into NWP models. LAFE has been applied to WMO to consider LAFE a RDP.

Action 18: Evaluation of LAFE RDP proposal.

10 Summary of meeting outcomes, decisions, actions

Meeting concluded. Summaries to be provided to WMO later.

ACTION ITEMS

1. **Jeanette** is planning to attend and **Paul** has taken the lead to connect with them on research questions for the polar region.
 - a. Will need to nominate a new contact to YOPP since Jeanette's and Paul's terms are ending
2. WGNMR to nominate a contact with GURME (as a result of the merging of Working Groups)
3. **Alexander** has contacted Silvina Carou (WMO) to inform her of proposed training activities for RELAMPAGO RDP/FDP. **Rita** to follow up with specific details on dates for proposed RELAMPAGO training activities.
4. WG to provide a prioritized list of activities for the next two years that will be included in the Progress Report and presented to the SSC during the 24-27 October 2016 meeting. Co-chairs will present the prioritized list. Progress report to focus on what the WG is currently doing.
5. ICE-POP to provide a more detailed scientific implementation plan regarding modeling and impact assessment. This should include:
 - a. The science questions will be addressed
 - b. The operational needs will they be advancing.
 - c. Confirmation from modeling groups of their participation
 - d. Suggest that each of the NWP groups draft up a timeline of their plans, along the lines of Table 9 in the ICE-POP Science Plan, but in 3 monthly rather than 6 monthly blocks, covering timelines for
 - i. Process studies

- ii. Model Optimization, calibration, configuration of physical parametrizations etc.
 - iii. Pre-FDP trials
 - a. **Pete** will attend their November planning meeting.
6. **WMO** is exploring whether to expand the AvRDP into an Inter-commission Aviation Research Project (CAS/CAEM/CBS). Need to come up with a coordinated road map for the project in support of future operational solutions.
7. SMN needs split up the proposed RDP and FDP efforts and make clearer in their proposal including:
- a. Clarify international cooperation for RDP
 - b. Clarify the international FDP plan and identify international countries who will participate in these efforts.
 - c. Listing specific financial requests.
 - i. WMO training branch should be considered for help with training needs.
 - ii. WMO will work with SMN to identify funding sources for international forecaster involvement and for travel to participate in training workshops.
 - d. **Alexander** has contacted Silvina Carou (WMO) to explore availability of support from WMO.
 - e. **Jeanette** to document specific information still needed from SMN in order to formulate formal request to WMO for assistance
 - f. **Rita** will contact SMN to get further clarifications made on their proposed RDP and FDP activities.
8. **Jian Jie** or **Alexander** will forward the application to WGNMR so that the group can evaluate for the scientific questions that will be applicable to WWRP (Urban), funding and sustainability concerns.
- a. **SURF Organizers** need to engage and confirm additional international partners.
 - b. **WGNMR** to make a recommendation on whether SURF should move forward as an RDP or FDP
9. **Yu Hui** to contact Dr. Luo and ask if WMO approval for an RDP is desired. If so, an official application will need to be submitted to the SSC.
- a. WG Tropical Meteorology Research is taking the lead on this program so there may already be some approval of a second phase. **Yu Hui** to find out.
10. **WGNMR** to explore options for running both atmospheric and lake NWP models over LVB
11. **WGNMR** to review and suggest revisions to RDP/FDP guidelines and to clarify the submission process.
- a. **Alexander** to work with WMO Secretariat to resolve who would be the appropriate lead for new FDPs and RDPs. The issue is that if it is a genuine cross-cutting demonstration

project then should it be managed by the Science Committee of the relevant Project (HIW, PPP, S2S)

12. WGNMR members communicate with other Working Groups to convey needs and avoid areas of overlap. WGNMR members need to convey to groups running RDPs or FDPs to align their science questions with HIW concern, when possible. Also they need to ensure that projects solicit end-users needs. It is the responsibility of the SWFDP to disseminate and provide operational products to forecasters and end-users.
13. Peter Li will write up a summary about WSN16 and to include recommendations regarding next WSN for the SSC's considerations.
14. WGNMR to continue discussions on the next symposium regarding location, date, thematic content, local organizers, etc.
15. Pete will distribute the WGNMR edited implementation plan to the committee members for any final comments or edits.
16. A table will be prepared by **Rita** and distributed to the committee showing existing committee members and their expertise, and gaps in expertise. This document will also include a starting list of potential candidates that have been forwarded to Rita, and a solicitation for additional candidate names from the WG members.
17. Wind Turbine interference document to be distributed for members to review
18. No discussion on how to proceed. WMO or WG to follow up with Iran or wait for Iran to contact the WMO?
19. Evaluation of LAFE RDP proposal.