The Role of the Science and Operations Officer

Kevin Scharfenberg
The SOO’s Three-Legged Stool

- Leadership
- Science
- Operations
- Training
Science

Leadership
Science
Operations
Training

Review of NCEP GFS Forecast Skills and Major Upgrades

TRMM
Tropical Rainfall Measuring Mission

National Weather Service
National Oceanic and Atmospheric Administration

MIA
MIAMI
SOUTH FLORIDA
Science and Technology

Leadership
Science
Operations
Training

Virtual Reality

Quantum Computing

National Weather Service
Miami South Florida
Social Sciences

- Behavioral sciences
- Communication
- Linguistics
- Sociology
- Social Geography
Question #1

Which of these is the best approach to being an effective station scientist?

a) Attending every relevant science conference in person
b) Buying every piece of new technology to try it out
c) Becoming an expert in social geography and human communication
d) Being curious about a wide range of science and technology
Question #1

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b) Buying every piece of new technology to try it out
c) Becoming an expert in social geography and human communication
d) Being curious about a wide range of science and technology
Discussion

What emerging science and technology do you think will improve future tropical operations?
Operations

Leadership

Science

Operations

Training

Continuity of Operations Plan (COOP)

Warnings 1

TAFs

2018 Tropical Operations Plan

Priority: Preparing, issuing, and disseminating Tropical Operations Staffing

• The plan should be implemented in part on
• The plan should also be implemented as rec
Operations – Must Haves

1) Operations Plans for Various Scenarios
2) Continuity of Operations Plan
3) Training, exercises, and drills
4) Help Sheets
5) Supplies and materials
Meteorological service’s emergency operations strategy:

• Planning in advance for the threat
• Practicing and exercising the plan
• Implementing the plan
• Periodically assessing and adjusting the plan
• Reviewing the event
• Applying lessons learned to future plans
Emergency Operations Plan

Planning in advance

For each reasonable threat, determine:

• Tasks necessary
• Level of effort for each task
• Skill sets needed

Then develop a staffing strategy to achieve the tasks. Think ahead about how to match the team’s skill sets with the tasks.
Emergency Operations Plan

Practicing & Exercising

Various levels of exercise based on resources.

Make drills and exercises as realistic as possible.

See FEMA courses IS-120.A and IS-139.A

“Train like you fight”
Implementing the Plan

Need a clear trigger for implementing the plan

Too early and risk exhausting personnel on many false alarms

Too late and might get behind

Have a list of tasks at start of plan
Emergency Operations Plan

Implementing the Plan

Discussion:
What are some possible action items needed at the start of emergency tropical operations?

• Prepare building for damage
• Fill generators with diesel fuel
• Stock water, food, essentials
• Send personnel to backup office?
Emergency Operations Plan

Assessing and Adjusting

*During the event:*

- Are requirements not being met?
- Is the meteorological situation changing?
- Is the community situation changing?
- Are personnel getting tired?

*Adjust the plan as necessary.*
Emergency Operations Plan

Reviewing the event

After operations & the community have stabilized:

• Gather feedback from your staff and from partners
• “Hot wash” – Conducted as soon as possible while memories are fresh
• “After Action Review” – Somewhat more in-depth
• “Service Assessment” – Most thorough

Output

• Findings – Factual statements
• Recommendations – Specific ways of improving
• Best Practices – Successes that are repeatable
Emergency Operations Plan

Applying Lessons Learned

Assure recommendations and best practices are incorporated into the future plans

Gather feedback from your staff and from partners during and after the event

- “Hot wash” – Conducted as soon as possible while memories are fresh
- “After Action Review” – Somewhat more in-depth
- “Service Assessment” – The most thorough
Emergency Operations Plan

Continuity of Operations Plan (COOP)

A generic plan for how the department will perform essential operations during an emergency and/or community disruption.

• Focus on any type of disaster, with or without warning
• Can’t possibly plan for every disaster scenario
• Think about people, infrastructure, data, food/water, etc.
• Consider short term and long term disruptions
• Have a couple of separated backup sites
Question #2

Which of these is a part of a meteorological service’s emergency operations strategy?

a) Planning in advance for the threat
b) Practicing and exercising the plan
c) Implementing the plan
d) Periodically assessing and adjusting the plan
e) Reviewing the event
f) Applying lessons learned to future plans
g) All of the above
Question #2

Which of these is a part of a meteorological service’s emergency operations strategy?

a) Planning in advance for the threat
b) Practicing and exercising the plan
c) Implementing the plan
d) Periodically assessing and adjusting the plan
e) Reviewing the event
f) Applying lessons learned to future plans
g) All of the above
Discussion Break

What are some examples of lessons learned in previous emergencies you have applied to future plans?
Operations – Must Haves

1) Operations Plans for Various Scenarios
2) Continuity of Operations Plan
3) Training, exercises, and drills
4) Help Sheets
5) Supplies and materials
Help Sheets for Operations

*Training is necessary but help sheets assure performance in a crisis*

Use simple job sheets, checklists, or diagrams

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<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
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<tbody>
<tr>
<td><strong>COORDINATOR -- ADVISORY CYCLE</strong></td>
<td><strong>UTC DATE:</strong></td>
<td><strong>NAME OF STORM:</strong></td>
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<td><strong>1500 UTC Cycle</strong></td>
<td><strong>2100 UTC Cycle</strong></td>
<td><strong>WHO</strong></td>
<td><strong>WHAT</strong></td>
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<tr>
<td>2215</td>
<td>1815</td>
<td>0415</td>
<td>0015</td>
<td>1015</td>
<td>0615</td>
<td>1615</td>
<td>1215</td>
<td>OPL/Intern</td>
<td>Prep for upper air observation</td>
<td>Make sure communication duties are covered.</td>
</tr>
<tr>
<td>2215</td>
<td>1815</td>
<td>0415</td>
<td>0015</td>
<td>1015</td>
<td>0615</td>
<td>1615</td>
<td>1215</td>
<td>HLS desk</td>
<td>Begin analyzing output from PSurge in D2D</td>
<td>After running turn ISC on to compare to neighbors. This Psurge is from previous advisory cycle. Save but don't publish.</td>
</tr>
<tr>
<td>2215-30</td>
<td>1815-30</td>
<td>0415-30</td>
<td>0015-30</td>
<td>1015-30</td>
<td>0615-30</td>
<td>1615-30</td>
<td>1215-30</td>
<td>HLS desk</td>
<td>Run TCStormSurgeThreat procedure</td>
<td>This is the step where we look at guidance closely so we are ready for the collaboration with NHC/SSU.</td>
</tr>
<tr>
<td>2215</td>
<td>1815</td>
<td>0415</td>
<td>0015</td>
<td>1015</td>
<td>0615</td>
<td>1615</td>
<td>1215</td>
<td>HLS desk + coordinator</td>
<td>Internal Coordination for upcoming Storm Surge Watch/Warning</td>
<td>When received from NHC, Watch for red banner and join NWChat room.</td>
</tr>
<tr>
<td>2300</td>
<td>1900</td>
<td>0500</td>
<td>0100</td>
<td>1100</td>
<td>0700</td>
<td>1700</td>
<td>1300</td>
<td>HLS desk</td>
<td>Make edits to storm surge watch/warning grid - save to ISC within 30 minutes</td>
<td></td>
</tr>
<tr>
<td>2300</td>
<td>1900</td>
<td>0500?</td>
<td>0100?</td>
<td>1100</td>
<td>0700</td>
<td>1700?</td>
<td>1300?</td>
<td>OPL/Intern</td>
<td>Launch balloon</td>
<td>Make sure communication duties are covered.</td>
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<td>1230-45</td>
<td>0830-45</td>
<td>---</td>
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<tr>
<td>0030-40</td>
<td>2030-40</td>
<td>0630-40</td>
<td>0230-40</td>
<td>1230-40</td>
<td>0830-40</td>
<td>1800-10</td>
<td>1400-10</td>
<td>HLS desk</td>
<td>Run TC Tornado Threat procedure and edit</td>
<td>After running turn ISC on to compare to neighbors. Times based on SPC advisory cycles assuming day 1 &amp; day 2 threat. For 09Z cycle - wait till 0400am EDT for TCTornadoThreat if it’s primarily a Day 3 threat.</td>
</tr>
<tr>
<td>0040</td>
<td>2040</td>
<td>0640</td>
<td>0240</td>
<td>1240</td>
<td>0840</td>
<td>1840</td>
<td>1440</td>
<td>HLS desk</td>
<td>Start WRCRMS situation overview</td>
<td>Use closest model/blend, ISC on, check WPC forecast.</td>
</tr>
<tr>
<td>0100</td>
<td>2100</td>
<td>0700</td>
<td>0300</td>
<td>1300</td>
<td>0900</td>
<td>1900</td>
<td>1500</td>
<td>Grid desk</td>
<td>Finalize QPF grid</td>
<td>Turn ISC on after running to compare to neighbors! Save but don't publish yet.</td>
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<tr>
<td>0115-30</td>
<td>2115-30</td>
<td>0715-30</td>
<td>0315-30</td>
<td>1315-30</td>
<td>0915-30</td>
<td>1915-30</td>
<td>1515-30</td>
<td>HLS desk</td>
<td>Run TCFloodingRainThreat procedure and edit</td>
<td>Use model with track closest to the expected package track. DON'T OVERSHOOT</td>
</tr>
<tr>
<td>0130-0210</td>
<td>2130-2210</td>
<td>0730-0810</td>
<td>0330-0410</td>
<td>1330-1410</td>
<td>0930-1010</td>
<td>1930-2010</td>
<td>1530-1610</td>
<td>Grid desk</td>
<td>Finalize background wind fields - cap at 30 kts (run Link20 smart tool as all times)</td>
<td></td>
</tr>
</tbody>
</table>

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NATIONAL WEATHER SERVICE

MIAMI
SOUTH FLORIDA
Supplies and Materials for Operations
Training

There is no one-size-fits-all training solution.

Every student and every topic is different

The key is reinforcing key points during & after

Consider:

• Baseline training
• Specialist training
• Cross training
Training

**Baseline training**
- Skills everyone in the group should have

- Frequently exercised
- Minimal need for “cheat sheets”
- Can perform with limited oversight
- Preference for lower risk tasks
Training

**Specialist training**
- For critical but less-frequently needed requirements

- Regularly exercised
- Special course work
- Considerable oversight when learning
- Certification & recertification
- Background education, skill sets, and interest
Training

Cross training

• Assuring enough people can carry out tasks to meet a challenging situation

- Occasionally exercised
- Job aides needed such as cheat sheets, workflow diagrams
- Considerable oversight when learning
Question #3

Which of these is a best practice for a training program?

a) Sending a list of reading materials to the students
b) Continuing reinforcement of key material
c) Showing a long training video with a quiz at the end
d) Hoping they learn what they need from colleagues
Question #3

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Discussion Break

Do you have any experience with training techniques that were successful?
Case Study
Hurricane Matthew 2016
WFO MIAMI HURRICANE MATTHEW FINAL AFTER ACTION FINDINGS AND RECOMMENDATIONS

Best practices:
• Great feedback from partners for this event
• Did partial deployment to Miami-Dade EOC
• We were able to field numerous interviews, including nearly 100 Spanish language interviews and about 150 overall.
• On-site ITO was familiar with existing software/systems and was proactive anticipating and responding to potential issues, saving considerable time compared to relying on remote ITO assistance/ticketing systems.
• 6am/pm shift changes worked for most
• Good internal coordination at night, but perhaps due to less interview/phone load
• Periodic time-outs on the floor to discuss message/strategy helped
• Pushing out HTI grids/graphics ASAP after advisory time got good feedback. Graphics used on air.
• Don’t wait on package to issue AFD, and make it local impact value added
• Great coordination with NHC storm-surge unit
Note: The cone contains the probable path of the storm center but does not show the size of the storm. Hazardous conditions can occur outside of the cone.
<table>
<thead>
<tr>
<th>Who</th>
<th>When</th>
<th>Where</th>
<th>Type</th>
<th>Medium</th>
<th>Language</th>
<th>Reach</th>
<th>Outlet</th>
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<tr>
<td>Tony</td>
<td>315 pm</td>
<td>NHC Media Room</td>
<td>Live</td>
<td>TV Crew</td>
<td>Spanish</td>
<td>International</td>
<td>CNN Espanol</td>
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<tr>
<td>Ian</td>
<td>500 pm</td>
<td>Phone</td>
<td>Live</td>
<td>Radio</td>
<td>English</td>
<td>Local</td>
<td>610 WIOD am M</td>
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Sunday, September 3

<table>
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<th>Who</th>
<th>When</th>
<th>Where</th>
<th>Type</th>
<th>Medium</th>
<th>Language</th>
<th>Reach</th>
<th>Outlet</th>
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<tbody>
<tr>
<td>Tony</td>
<td>1005 am</td>
<td>Media Room</td>
<td>Live</td>
<td>Skype</td>
<td>Spanish</td>
<td>International</td>
<td>America TV</td>
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<tr>
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<td>1115 am</td>
<td>Media Room</td>
<td>Live</td>
<td>Skype</td>
<td>Spanish</td>
<td>International</td>
<td>Radio Caracol</td>
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<tr>
<td>Tony</td>
<td>1145 am</td>
<td>NHC Media Room</td>
<td>Live</td>
<td>TV Crew</td>
<td>Spanish</td>
<td>National</td>
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<tr>
<td>Tony</td>
<td>1230 pm</td>
<td>Phone</td>
<td>Recorded</td>
<td>Radio</td>
<td>English</td>
<td>Local</td>
<td>Noticias 1260 M</td>
</tr>
<tr>
<td>Tony</td>
<td>105 pm</td>
<td>Phone</td>
<td>Live</td>
<td>Other</td>
<td>English</td>
<td>National</td>
<td>NY Times</td>
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<tr>
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<td>305 pm</td>
<td>Media Room</td>
<td>Recorded</td>
<td>Skype</td>
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<tr>
<td>RAG</td>
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<td>Media Room</td>
<td>Live</td>
<td>Other</td>
<td>English</td>
<td>Local</td>
<td>Miami Herald</td>
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Monday, September 4

Notes: BOLD items are scheduled (unbold when completed)
| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y |
| Media/grids/SM | MT | MT | MT | MT | MT | MT | MT | MT | MT | MT | MT | MT | MT | MT | MT | MT | MT | MT | MT | MT | MT | MT | MT | MT |
| Coord/HLS | SK | SK | SK | SK | SK | SK | SK | SK | SK | SK | SK | SK | SK | SK | SK | SK | SK | SK | SK | SK | SK | SK | SK | SK |
| Warnings | IL | IL | IL | IL | IL | IL | IL | IL | IL | IL | IL | IL | IL | IL | IL | IL | IL | IL | IL | IL | IL | IL | IL | IL |
| UA/grids/TAFs | LK | LK | LK | LK | LK | LK | LK | LK | LK | LK | LK | LK | LK | LK | LK | LK | LK | LK | LK | LK | LK | LK | LK | LK |
| UA/pub svc/SM | AN | AN | AN | AN | AN | AN | AN | AN | AN | AN | AN | AN | AN | AN | AN | AN | AN | AN | AN | AN | AN | AN | AN | AN |
| Warnings | JT | JT | JT | JT | JT | JT | JT | JT | JT | JT | JT | JT | JT | JT | JT | JT | JT | JT | JT | JT | JT | JT | JT | JT |

- **Warnings/Mesoanalysis**: DD, DD, DD, DD, DD, DD, DD, DD, DD, DD, DD, DD, DD, DD, DD, DD, DD, DD, DD, DD, DD, DD, DD, DD
- **Coord/HLS**: RAG, RAG, RAG, RAG, RAG, RAG, RAG, RAG, RAG, RAG, RAG, RAG, RAG, RAG, RAG, RAG, RAG, RAG, RAG, RAG, RAG, RAG
- **UA/SM/pub svc**: CF, CF, CF, CF, CF, CF, CF, CF, CF, CF, CF, CF, CF, CF, CF, CF, CF, CF, CF, CF, CF, CF, CF, CF
- **UA/SM/pub svc/TAFs**: CC, CC, CC, CC, CC, CC, CC, CC, CC, CC, CC, CC, CC, CC, CC, CC, CC, CC, CC, CC, CC, CC, CC, CC

**Dates**:
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**Deploy MDC**: AM, AM, AM, AM, AM, AM, AM, AM, AM, AM, AM, AM, AM, AM, AM, AM, AM, AM, AM, AM, AM, AM, AM, AM

**Key Messages** (keep short & simple!)

- Irma is a serious threat to South Florida. This is a potentially deadly situation!
- Residents and visitors must now implement emergency safety plans.
- Preparations to protect life and property should be completed **by Friday night**.
- People in mobile homes and evacuation areas should move to safer location.
- Take final shelter **by early Saturday morning**.
- If not evacuating, prepare a safe room to hide from destructive winds. Interior room on lowest floor.
- Monitor official info and don’t spread rumors.

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**Current Duties**

<table>
<thead>
<tr>
<th>Coordinator</th>
<th>Meso+Warnings</th>
<th>HTI+HLS+HWO</th>
<th>Grids + TAFs</th>
<th>Pub. Svc. + UA</th>
<th>Comms + media</th>
<th>Soc. Media</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robert G.</td>
<td>Dan G./Ian</td>
<td>Ian/Robert G.</td>
<td>Chuck/Dan G.</td>
<td>Chris/Andrew</td>
<td>Dan D./Andrew Team</td>
<td></td>
</tr>
</tbody>
</table>

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**Public Information**

- [www.ReadySouthFlorida.org](http://www.ReadySouthFlorida.org)
- 511 for Transit information in FL
- 311 in Miami-Dade & Broward
- 211 in PB, Collier, Glades, Hendry
- FDEM PIO for media/EM inquiries: 850-321-8503
- Kelli Pirtle 405-203-4839

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**Current ops level:** 1 Emergency Ops

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**Tropical formatters ARE in use for CWF and ZFP**

**MIAMI SOUTH FLORIDA**
1 of 3
FRM: Robert Garcia - NOAA Federal
SUBJ: FIU Traffic Update
MSG: In order to enter and exit the University you must do so at 112th and
(Con't) 2 of 3
8th
St until further notice. There will be an officer posted there to give you access, just state you are an employee at the NHC, and
(Con't) 3 of 3
please have your CAC cards with you to avoid any issues.
(End)
Challenges for Irma

- Parking spaces for cars - our plan failed
- Several on our staff didn’t *actually* have arrangements for family/pets/etc.
- Visiting forecasters - travel problems & spin-up
- Duplicated/overlapping info requests coming from above
- “Evacuation pay” and travel orders
- Shelter-in-place logistics
Review

- Be curious about a wide range of science and technology, including social science
- Remember the emergency operations cycle – plan, practice, implement, assess, correct
- Continually reinforce key training concepts
Thank you!

Kevin.Scharfenberg@noaa.gov