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21 NOV 22

SUBJECT: THE CAPABILITIES AND ACHIEVEMENTS OF FNMOC'S ACAF ATLAS AUTOMATION TOOL (AAA-TOOL)

1. Abstract. AAA-Tool is introduced as a software suite to automate and standardize regional climatology packages. AAA-Tool generates the components of a ready-to-brief PowerPoint consisting of 213 slides of relevant climate products created from data spanning recent PORs. Few inputs are needed, and with the ability to run in parallel, AAA-Tool has proven to be a beneficial tool for the DoD. The required inputs and capabilities of AAA-Tool are discussed, and the table of contents outlining all produced climate products is presented. Links to download some of AAA-Tool's outputs are also provided.

2. Introduction. The ability to obtain relevant climate products in a timely manner is a necessity for the Navy and the Department of Defense (DoD). It is well known that climate change does not take the same form at all locations around the world making regional climate products fundamental to any operation. Fleet Numerical Meteorology and Oceanography Center (FNMOC) hosts a plethora of premade climatology products on its portal, but still receives a significant number of tailored requests for climatology with more recent period of records (POR).

For this reason, the ACAF Atlas Automation Tool (AAA-Tool) was built to standardize and automate a climatology package in the form of a PowerPoint. The AAA-Tool consists of a suite of scripts to generate a climatology package consisting of 213 slides of relevant atmospheric climatology products. AAA-Tool was built to interface with Modernized Analysis of the Trends and Tendencies of Climate and Forensics (MATTCAF) to generate the output in a format easily added to a ready-to-brief PowerPoint presentation. MATTCAF is discussed in another technical report in detail. This technical report outlines the capabilities and successes of AAA-Tool as it is still used operationally by FNMOC's climatology team. These briefs are titled "ACAF Atlases" as the products produced are all able to be reproduced in Advanced Climate Analysis and Forecasting (ACAF) if the user so desires.

The source code is maintained in-house at FNMOC as it has been designed, tested, built, and run on FNMOC systems using FNMOC archives. For this reason, it will not be made publically available. This project was conducted independently with no funding from outside sources.

3. Capabilities. AAA-Tool requires very little input making it a powerful and capable tool. To run AAA-Tool, a template Bash shell script and a template folder must be copied and renamed to an appropriate location title. The template folder contains all required sub folders and section images for the base of an ACAF Atlas to include appropriately numbered section slides and table of contents. The Bash shell script is set up to create all atlas parameters at all levels with appropriate numbering. The only required inputs are listed in Table 1.

Required Inputs for AAA-Tool
Highest Latitude
Lowest Latitude
Western Longitude
Eastern Longitude
Map Projection
File Name Prefixes
Save Location

Table 1. Required inputs for AAA-Tool.

Highest Latitude, Lowest Latitude, Western Longitude, and Eastern Longitude are used to define the lat/lon box for all images. Map projection is self-explanatory, but usually set to "plate" for Cartopy's PlateCarree. File Name Prefixes add an identifying prefix for the user's selected area. Save Location ensures the generated files are placed in the correct ACAF_ATLAS folder. With these inputs, AAA-Tool will begin populating the monthly subfolders with climate products starting with January and moving forward. This is run in series, but can be parallelized by running multiple versions of the shell script each with a different range of months. One artifact occurs when the longitude range crosses the International Date Line due to the inherent features of MATTCAF. When this occurs, AAA-Tool can be run as described above, but the user must make a copy of TEMPLATE_Cross_Anti_Meridian.sh rather than TEMPLATE_ACAF_ATLAS.sh otherwise the script will crash.

4. Example Output. AAA-Tool's output cannot be fully presented on a technical report due to the number of images associated with the output, but some can be downloaded from FNMOC's portal. A list of the parameters and levels produced by AAA Tool are presented in Figure 1. The numbers corresponding to parameters and levels in Figure 1 depict the associated slide number for easy reference.

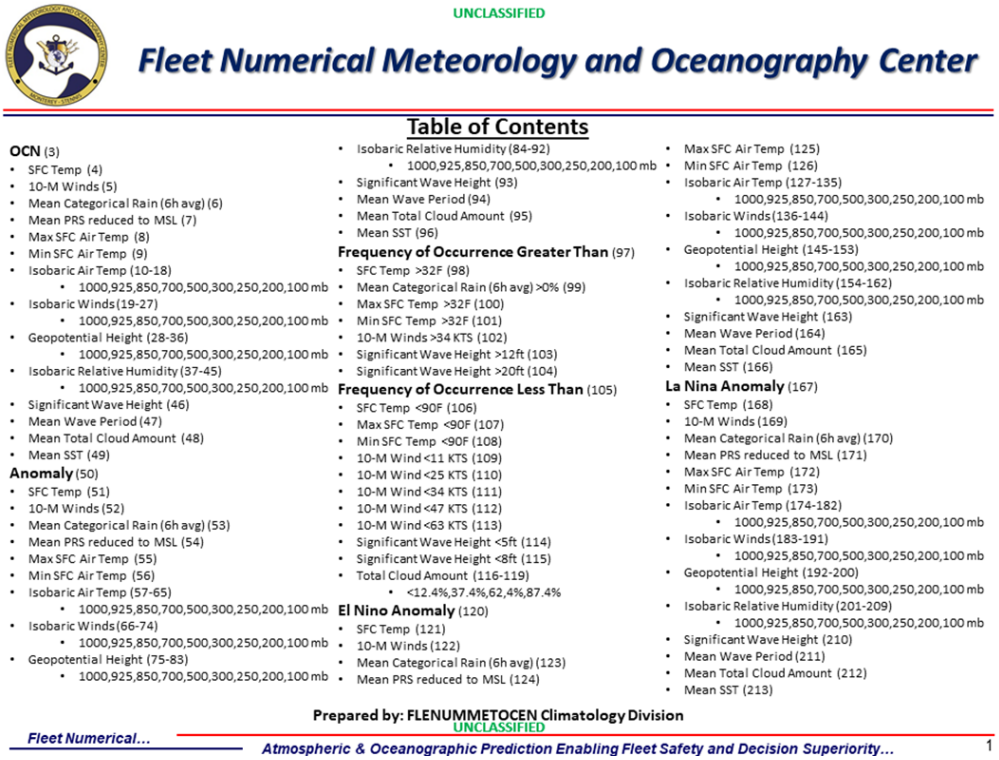
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Figure 1. The full list of generated climatology products in a new ACAF Atlas produced from AAA-Tool. Atmospheric products are available at multiple isobaric levels. Frequency of Occurrence products are available at standard intervals. El Niño and La Niña anomaly products are included for all parameters.

5. Successes. FNMOC has used AAA-Tool to create 22 ACAF Atlases spanning a significant portion of the globe. Each ACAF Atlas consists of 12 PowerPoints, one for each month, resulting in a total of 264 PowerPoints or 56,232 individual climate products. Many of these are currently hosted on FNMOC's special support pages and Climoportal. FNMOC has received positive feedback from the fleet.

6. Conclusion. The ability to obtain relevant climate products in a timely manner is a necessity for the Navy and the DoD as the nature of climate change varies by location. AAA-Tool provides the ability to swiftly generate ready-to-brief regional climatology packages for operational users. AAA-Tool has proven to be successful and timely for FNMOC's climatology team.

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