

Raytheon/NWS AWIPS II “TIM” Concentrating on IFPS/GFESuite

Dave Metze(ITO/Meteorologist)

david.metze@noaa.gov

NWS Pueblo, CO(PUB)

Dave Tomalak(ITO/Meteorologist)

david.tomalak@noaa.gov

NWS Boulder, CO(BOU)

4 May 2009

Below are notes and suggestions from the Raytheon/NWS AWIPS II “TIM”(Technical Interchange Meeting) concentrating on IFPS/GFESuite design.

ifpImage

- Still used by NWS field offices for local and experimental customer service.
- Below are examples of how it is being used in the field:
 - NWS St. Louis(LSX) <http://www.crh.noaa.gov/lx/?n=hwo1>
 - NWS Tampa Bay(TBW) <http://www.srh.noaa.gov/tbw/ghwo.htm>
- **ENHANCEMENT SUGGESTION**: Add capability to create KML files.

ifpnetCDF and iscMosaic

- Extremely critical for digital service GFESuite operations.
- **ifpnetCDF** and **iscMosaic**, including associated sub-scripts(e.g. **iscExtract**, etc), are used for ISC, Service Backup, and official point-base forecast capabilities.
- **ifpnetCDF** is used for customer services...below are explains how it is being used in the field:
 - In Central Region(CR), the netCDF file is used to create local digital forecast png images clipped(or masked) to the County Warning Area(CWA).
 - <http://www.weather.gov/forecasts/wfo/sectors/pub.php>
 - Currently, this methodology is preferred due to the office’s finer grid resolution of 2.5km vs the NDFD at 5km.
 - Also, in Central Region(CR), the netCDF file is used to derive a “point-click” forecast.
 - <http://forecast.weather.gov/MapClick.php?map.x=152&map.y=88&site=pub>
- **iscMosaic** is critical for ISC and Service Backup capabilities given the AWIPS I IFPS/GFESuite conventional design.

GHG

- GHG Monitor is subjectively critical – some NWS offices extensively use it while others hardly at all, except to receive VTEC/Text Product expiration alert banners. Currently, an office has to manually launch the GHG Monitor only to get the VTEC/Text Product expiration alert banners.
- **ENHANCEMENT SUGGESTION:** Without the GHG Monitor running, send the VTEC/Text Product expiration alert banners to the GFE 'parent' GUI. It was, also, my understand that alerts will pop up in the Alert Viz(aka AWIPS I Guardian). If the VTEC/Text Product expiration alert messages do go through Alert Vis even without the GHG Monitor running, then there may be no need to send alert banners to the 'parent' GFE GUI.

ISC

- Extremely critical to IFPS/GFESuite including all the associated sub-scripts/"wrappers"(e.g. **iscExtract**, **iscMosaic**, IRT, etc).
- One known source of GFESuite performance issues during high ISC traffic given the AWIPS I single-server methodology.
- New design concepts were discussed with Raytheon and Mark Mathewson(previous GSD GFESuite designer).
- Also, critical in digital services(IFPS/GFESuite) service backup capabilities.
- GFESuite Tools/Procedures used to monitor ISC border-to-border meteorological consistency are the Show_ISC family of "tools." These tools are run manually for user selected Weather Elements and a time range.
- **ENHANCEMENT SUGGESTION:** In AWIPS I IFPS/GFESuite, there is a tool called "Show_ISC_Highlights." This tool is run manually on a grid(s) to calculate the ISC border-to-border forecast discrepancies for user selected Weather Elements and time range. If critical ISC discrepancies are found, then the Weather Element's grid box in the GFESuite's Grid Manager would turn 'orange' or 'red' based on the inconsistency severity. A new concept(well back in 2005-2006) is(was) the Show_ISC_Highlights tool should be automatically running in the GFESuite's background with the output viewable from GFESuite's Grid Manager Display toggle. The NWS OSIP project was cancelled since the AWIPS I IFPS/GFESuite(single server) architecture could not support the concept, but a mult-thread server could. See Appendix A for further concept details.

Service Backup(IFPS/GFESuite)

- Extremely critical and very complex issue.
- NWS service backup can be...
 - scheduled or non-scheduled.
 - It could require all services(e.g. warnings, digital, aviation, etc) or selected services(e.g. just aviation, etc).
- NWS service backup is required < 1% of a year, but it is extremely critical when needed at any time of the day.
- “Spin-up” needs to be “nearly instantaneous”(desired < 5 minutes). IFPS/GFESuite Service Backup “Spin-up” is defined at the field level from beginning the invoke to being able to edit grids using all the necessary databases and “tools.”
 - AWIPS I IFPS/GFESuite Service Backup downloading configuration files and the digital Fcst database takes approximately 17 minutes for a 5km office and 25 minutes for a 2.5km office. Also, a forecaster will have to wait another 30-90 minutes for ISC and model data grids to process for the “failed” site’s GFESuite.
- IFPS/GFESuite service backup discussion is, also, related to ISC and iscMosaic since these concepts are used during the backup process. Mark Mathewson(original GSD GFESuite designer) collaborated with Raytheon on some great new ideas to make service backup(and ISC) more flexible.
- Will need feature that allows AWIPS I netcdf database files to port to AWIPS II HDF5 database files and vice versa.
- Like idea of storing all incoming ISC data into individual files. This would result in a virtual ISC data that could provide future flexibility with Service Backup.
- Allow for AWIPS II -> AWIPS I Service Backup, AWIPS I -> AWIPS II Service Backup, and AWIPS II -> AWIPS II Service Backup.
- Provide method to Mosaic Databases into other databases (Example: ISC data into Fcst database).
- Another Example: Restore database into Fcst Database.
- Provide method to export Service backup to Backup Offices Restore Database.
- Allow method for preserving backup offices smart tools/procedures.

Temporal Editor

- Literally never used at NWS Pueblo and Boulder (and probably many other offices) due to inadequate grid editing methodology.
- One NWS office(Boise(BOI)) uses it as a viewer to compare forecast statistics.
- **ENHANCEMENT SUGGESTION:** This function could be a powerful grid editing tool if it was smarter with its grid edit. When used with an edit area, the propagated change should become less to near 0 when it gets closer to the edit area edge(e.g. taper). Tim Barker’s(NWS Boise(BOI)) Serp tool uses a serpentine function on a flat surface or by terrain elevation, which would be ideal. Also, another new feature would allow the Temporal Editor the capability of editing based on latitude/longitude with the change propagating in a serpentine function like Barker’s Serp tool.

Daily Forecast Critique

- Literally never used at NWS Pueblo and Boulder (and probably many other offices) due to the point-based concept, and it is useless in the grid editing process.
- Developer's time could be better spent in other areas; however, we fully understand the NWS-Raytheon contract for AWIPS II.
- BOIVerify has powerful statistics and grid editing capabilities, and widely used in the field. If possible, suggest working with both Tim Barker(NWS Boise(BOI)) and Paul Jendrowski(NWS Blacksburg(RNK)).

Additional Suggestions

- Suggest having local AWIPS I GFE model on each box. By populating with periodic ISC/Fcst/Model data, developers will have a model in which to simulate.
- GHG Automater is a series of scripts that allow GHG to simulate products being sent from SPC. This includes convective watches and warnings.
- Suggest open communication with GSD/Field. Allow Raytheon developers to interact with ITOs when questions arise. RPP format has proven to be very cost effective.
- Utilize live data feed in GSD for T11+ reviews. Have forecasters test/review AWIPS II at GSD/BOU and provide feedback back to Raytheon. This is a very low cost, but highly effective method to simulate AWIPS II in live mode prior to OT&E.
- Apply an AWIPS II severe stress test. Suggest having 3 CAVE GUIs running on each workstation monitor with D2D panes loaded with data and "long" loops, GFE running, SCAN running, and FFMP running.

IFPS/GFE TO11(Slice 2) Testing

- Spent approximately 90 minutes testing functionality. Wednesday's testing issues may have been related to a corrupted build. Wednesday's issues were not duplicated during Thursday's testing and a new build. Found the following...
 - GFE Shift Key functionality not the same on AWIPS I as AWIPS II. The test case was in regards to panning.
 - Grid Manager disappears too easily in non-detached mode.
 - Contours not labeled.
 - Contours were labeled independently of Grids.
 - In other words, if one draws a contour in the Spatial Editor, the contour remains until calculate "New Grid" is selected. The contour line(s) get "orphaned" and remain in the Spatial Editor. There needs to be an alert banner when switching to a new Weather Element while in an unfinished contour grid edit mode.

- Only Smart Tools associated with a Weather Element should be listed. The exception would be for an empty grid in which all tools can be listed in the smart tool editor.
- GHG MakeHazard should first create a temporary grid. Once created, mergeHazard merges the Hazard/s into the Hazards Grid
- Missing Time Scale (Right click in grid manager time) should show the following options
 - Select Grids by Time
 - Select all Wx Elements
- Weather Element Group takes an usually long amount of time to load in the Grid Manager.
- "Select All" in Break Lock(s) does not select all entries.
- Grid Manger grid box does not have a "m" on the grid box. This is likely a font issue, because the "m" is present when expanding the time scale in the Grid Manager.
- Like the detached Grid Manager and the capabilities to use in another monitor. Currently, AWIPS workstations are not set up to "float" GUIs from monitor-to-monitor. This may be related to the DR about not being able "shuffle" the detached Grid Manager behind the GFE 'parent' GUI.

Appendix A : ISC – Automated ISC Discrepancy Tool (from 2006)

NWS OSIP Statement of Need(Cancelled Project 06-083)

1. Title:

GFESuite - Automated ISC Discrepancy Need

2. Originator:

Dave Metze, NWS Pueblo, CO, 719-948-3838

3. Submitting Authority:

Gary Foltz

4. Description:

Currently, the Graphical Forecast Editor Suite (GFESuite) software has a tool called ISC_Discrepancies. The tool is manually run to review the Intersite Coordination (ISC) grid discrepancy scores, in the GFESuite's Grid Manager as is shown in Example C of the supporting documentation, before sending the grids to the National Digital Forecast Database (NDFD). Each National Weather Service Forecast Office (NWSFO) is required to run this tool manually, in order to meet the goal of a seamless NDFD, every time ISC grids are received at an office, to review the most current ISC discrepancy scores. NWSFOs are constantly changing forecast ISC grids and sending them to neighboring offices thus, the tool would need to be run manually each time neighboring sites change their forecast ISC grids. First problem that ensues is that the tool takes about 30-60 seconds, depending on the number of Grid Manager Weather Elements, for the Graphical User Interface (GUI) to pop up. The next problem is that the forecasters will likely need to remove Weather Elements in the ISC_Discrepancies Tool's GUI to trim down the number of Weather Elements on which to perform ISC discrepancy checks. This not only takes time to do but also reduces the number of elements on which discrepancy checks are performed. Thus, the tool and methodology make it challenging to review ISC discrepancies before sending grids to the NDFD. Given the field office duties, this would be next to impossible to achieve. Therefore, NDFD consistency scores remain below 100% (seamless).

Creating a GFESuite baseline infrastructure "background" tool that continuously scores ISC discrepancies would make it easier for the forecasters to review possible NDFD consistency issues before the grids are sent to the NDFD. No longer would the forecaster have to manually run the ISC Discrepancies Tool. The

"background" tool would run when ISC grids arrive at the home office. ISC discrepancy data would be reviewed via a new GFESuite "Grid Manager Display Mode" called "Discrepancies." This would be similar to reviewing the grids "Normal", "History", "Saved", "Modified", "Published", and "Sent" modes in the GFESuite's Grid Manager, as is shown in Example B of the supporting documentation.

5. Justification:

5.1 Origination, Documentation, and Drivers:

A number of field forecasters using the GFESuite have commented on the consumption of time that it takes to manually run the ISC Discrepancies Tool. Below is from the ifps Listserver on 18 January 2006:

"List -

Is there a way or has anyone modified the ISC_Discrepancies tool to check only those grids that are being sent to NDFD?

Having the tool check all the grids is a bit time consuming and it takes a long time to run the tool. Why not be able to set a time period up of just the NDFD Grids or modify it somehow to just check the NDFD hours.

I know that saved time ranges must be a true range (hours 12-24 and everything in between) and not exclusive (Hours 12, 15, 18, 21, 24 only). But, it would be nice if it were able to be exclusive.

Anyone have any Ideas/comments/suggestions?

- Jason"

If the ISC discrepancy scores were performed automatically in the GFESuite "background," then forecasters would not need to worry about wasting time running the tool manually.

5.2 Linkages:

This need either directly reflects, or strongly supports, the objectives identified in the NOAA strategic plans listed below:

- NOAA 2005-2008 Strategic Plan: *"Objectives for the Weather and Water Mission: **NOAA will invest in new technologies, techniques and weather and water forecast modeling. Increased number of modeling advances by government and academia demonstrated to improve the NOAA operational prediction suite.**"*
- NWS 2005-2010 Strategic Plan: *"**Expand digital services – allow communication of forecast information with greater resolution in time and space and facilitates integrating data in all service program areas.**"*
- NOAA 2005 STIP (Science and Technology Improvement Plan) Needs and Solutions Objectives: *"**Improve gridded forecast preparation applications to increase forecast and warning lead times, accuracy, location, specificity, and enhance product formats. Applications that incorporate new science and techniques, which interpret and assess model output and forecasts, also will be implemented for more efficient and accurate preparation of surface, three-dimensional, and eventually four-dimensional digital forecast grids.**"*

- NOAA 2005 NSIP (NWS Service Improvement Plan): *“Visionary science will support the digital database modifications through integrating observing systems, improved forecast preparation applications, and expanded data coverage.*

6. Existing capabilities/capacities and limitations related to the need:

Currently, in order to see the ISC discrepancy scores, the ISC Discrepancies Tool must be run manually. This takes up too much valuable time in the digital service grid editing process. It would be much more beneficial to have these ISC discrepancy scores run automatically in the GFESuite "background" when ISC grids are received. The ISC discrepancy scores would be accessed via the GFESuite's Grid Manager Display Mode feature

7. Benefits and Performance Impact:

7.1 Performance Measure Impacts:

This new GFESuite infrastructure change would allow forecasters to spend more time analyzing meteorological data and digital forecast grid editing. This could be critical in the new CONOPS "Peer Cluster" concept when an office needs to perform more and more ISC grid consistency checks based on increased "neighboring grid sites." The more neighboring grid sites will increase the number of ISC grids coming into the home office. Thus, NDFD consistency checks will be increasing.

7.2 Socio-economic Impacts:

8. Key Customers and Stakeholders:

8.1 Customers:

NDFD Customers: Receive a spatially consistent (seamless) digital forecast.

8.2 Stakeholders:

NWS Forecasters: Using their digital forecast development time more efficiently.

9. Supporting Information:

The supporting documentation are modified screen capture GFESuite GUIs to illustrate how the new design would look. Also, below are some configurable needs for the GFESuite's automated ISC discrepancy infrastructure.

1. This change will require a GFESuite baseline infrastructure GUI change to add "Discrepancies" to the

"Grid Manger Display Mode," and to add the ISC discrepancy score algorithm to the "background" when

ISC grids are received at the office.

2. NWSFOs will need a configuration to temporally filter what times get consistency scores vs what times do not need consistency scores...NDFD times vs non-NDFD times. For example, all T grids (0 to 168 hours) do not need to have consistency scores, right now. This will make the "background" tool run faster.

3. NWSFOs will need the ability to configure by Weather Element. Many offices have "in-house" Weather Elements that do not need consistency scores. Need a list of Weather Elements that do not need ISC consistency scores.

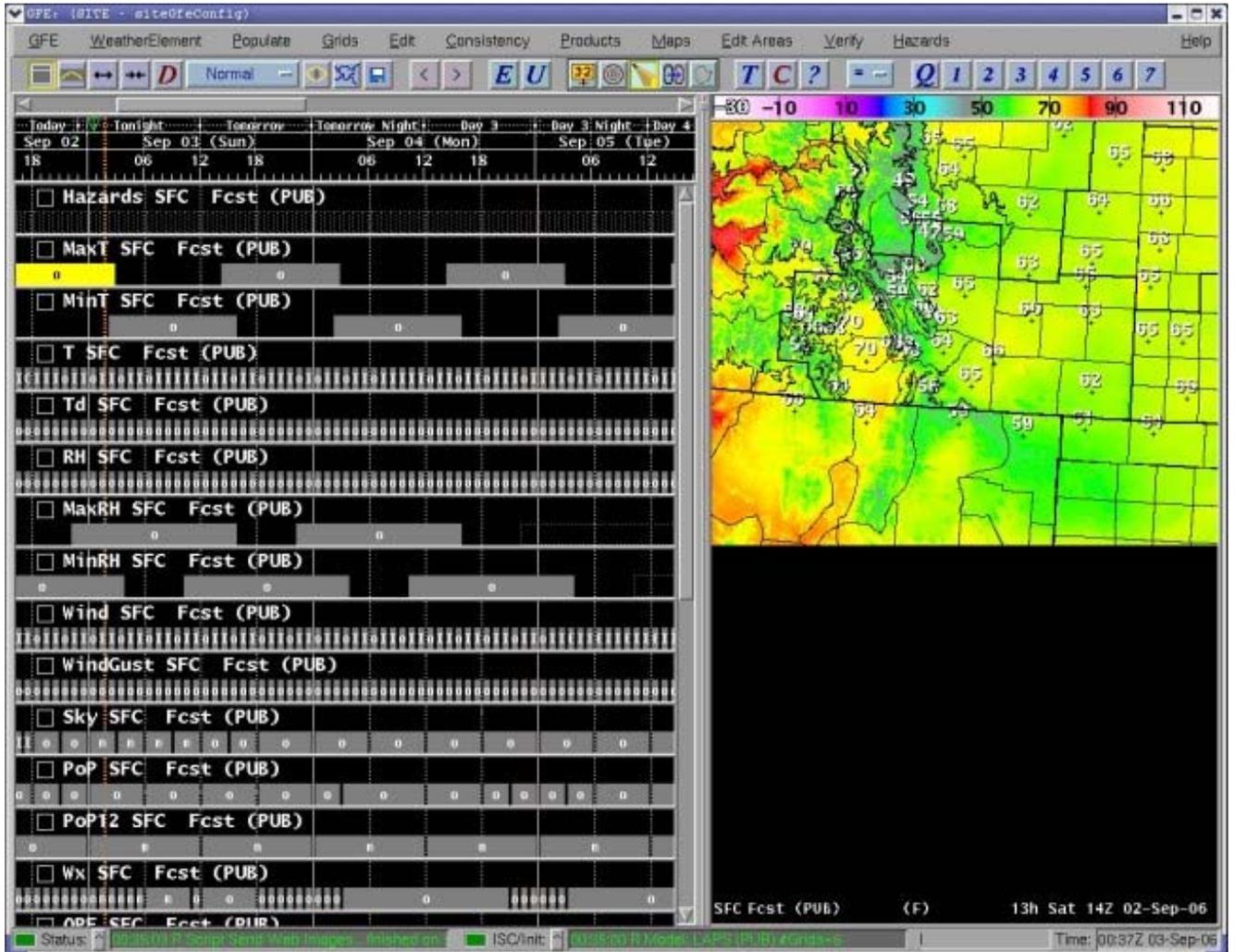
Automated ISC Discrepancy Tool GFESuite Screen Captures (from 2006)

(Supplement for "GFESuite – Automated ISC Discrepancy Tool" Statement of Need Form)

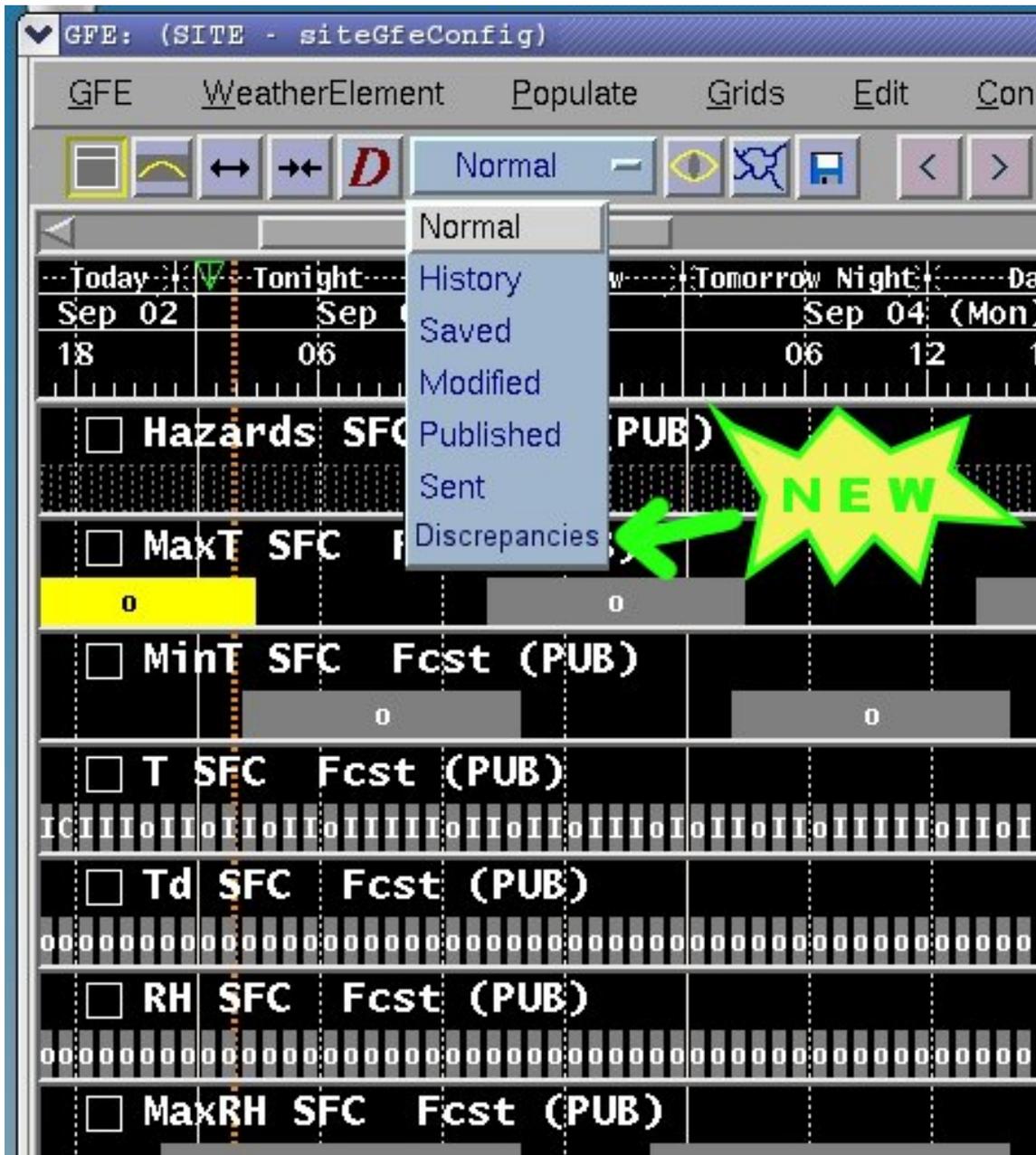
Dave Metze
NWS Pueblo, CO

david.metze@noaa.gov

A. Below is an example of the GFESuite in "Normal" mode.



B. The forecaster wants to review the ISC discrepancy scores that are automatically being calculated in the GFE Suite's "background." The forecast selects the new category, "Discrepancies," from the GFE Suite's "Grid Manager Display Mode."



C: The set ISC discrepancies error scores are displayed in the GFE Suite's Grid Manager grid boxes. Grid boxes that "pass" are still "gray." Grid boxes that fail are "red." "Orange" grid boxes are "slightly failed." If you kept the "Discrepancies" Mode, then you would see the consistency scores change as ISC grids come into the home office.

