MAXIMIZING “Experience Index”

of GIRO Data Repositories

Ivan Galkin

University of Massachusetts Lowell
Center for Atmospheric Research

IGF 2014
XIV INTERNATIONAL GIRO FORUM · 20-23 MAY

Outline

- Getting to Ionogram data
- Getting to Plasma Drift data
- Getting to Global Ionosphere Specifications

Scenarios

- Scientist:
  - URSI ionospheric characteristics
  - Electron density profiles
  - Global Ionosphere
- Expert Scientist:
  - Ionograms
  - Plasma drifts
- Student:
  - Understand data
- Engineer:
  - Raw data
- HF Prediction Agencies and Radio Amateurs:
  - Real-time specifications
- Other Instrument Teams:
  - Validate their instrument

What do we all want?

GIRO Users:

- Model ionosphere
- Study processes
- Locate relevant data
- Access data **quickly**
- Get good quality data
- Avoid format problems
- Avoid fighting computers
- Publish **quickly**
- Enjoy life

GIRO Crew:

- Enjoy life
- Make GIRO a powerful tool
- Cut development costs
- Cut maintenance costs
- Cut troubleshooting costs
- Cut documentation costs
- Cut computer HW costs
- Cut networking costs

Three paths to GIRO data

WWW PORTALS

- DIDBase Portal
- Fast Chars on the Web
- DriftBase Portal

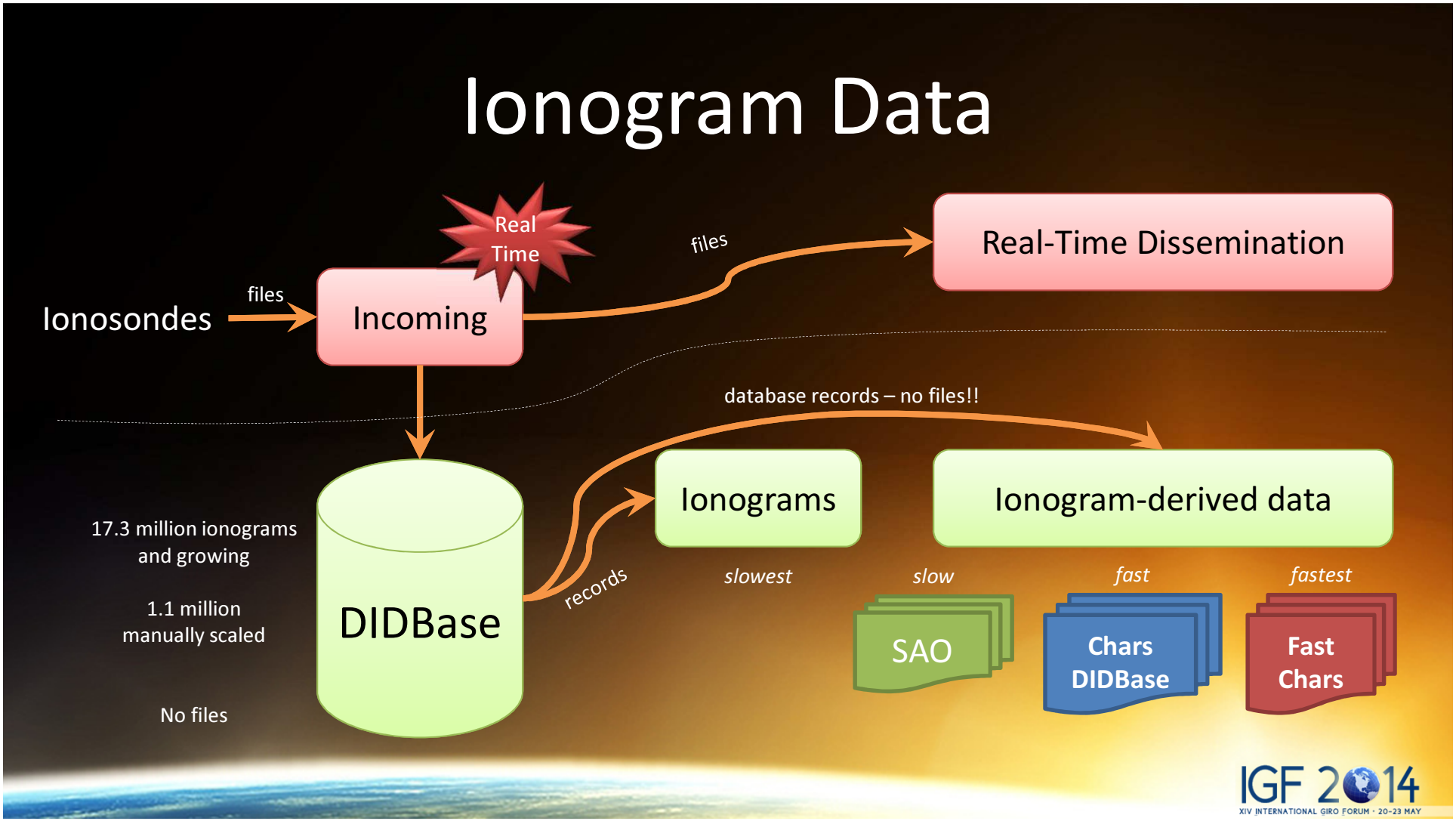
(no registration necessary)

EXPLORERS

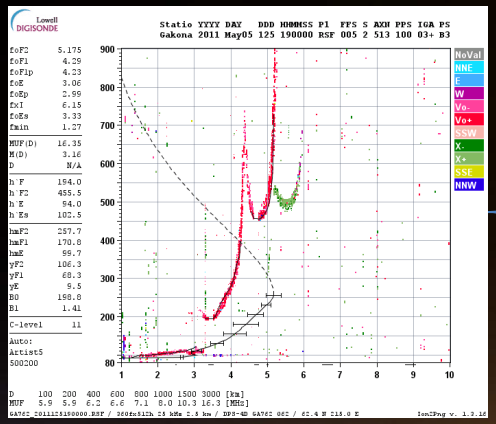
- SAO Explorer
- Drift Explorer

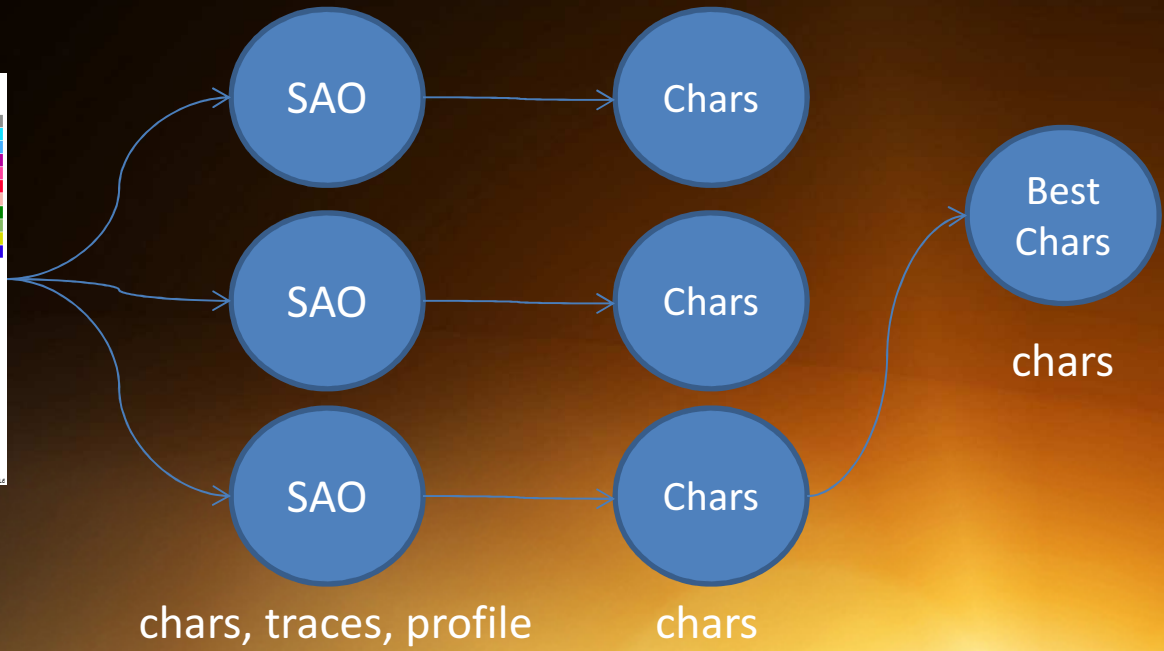
REAL-TIME DISSEMINATION

- FTP Release Server


Ionogram Data
Real Time
files
Real-Time Dissemination
Ionosondes
files
Incoming
database records – no files!!
Ionograms
Ionogram-derived data
17.3 million ionograms and growing
1.1 million manually scaled
No files
DIDBase
records
slowest
slow
fast
fastest
SAO
Chars DIDBase
Fast Chars
IGF 2014
XIV INTERNATIONAL GIRO FORUM · 20-23 MAY

Three access modes to DIDBase





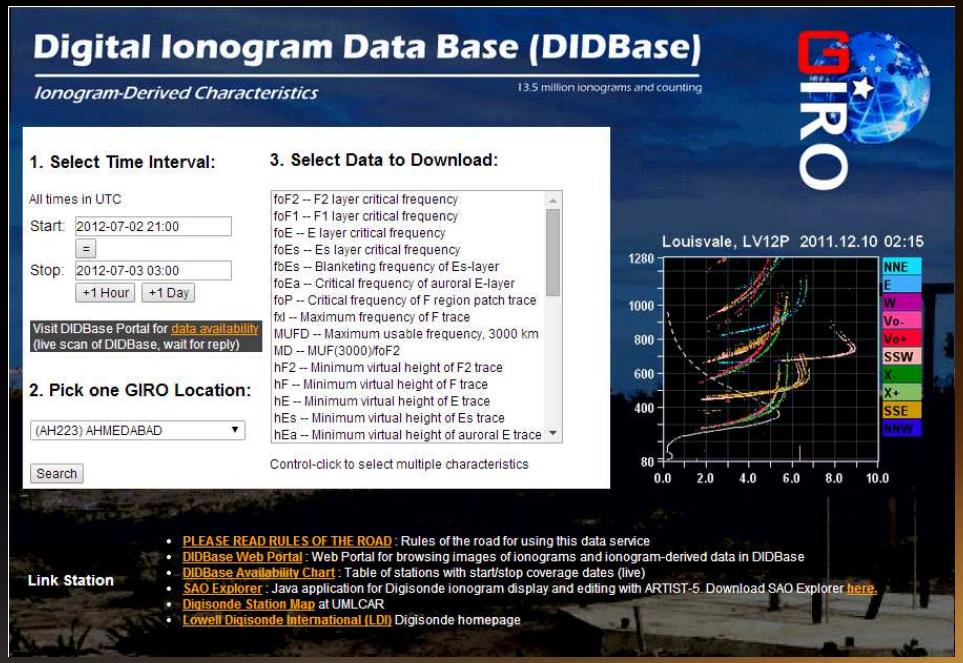
IGF 2014
XIV INTERNATIONAL GIRO FORUM · 20-23 MAY

Real Time

Fast Chars on the Web

Fast Chars

DIDBase




```
# Global Ionospheric Radio Observatory
# GIRO Tabulated Ionospheric Characteristics, Version 1.0 Revision B
# Generated by DIDBGetValues on 2014-04-24T17:32:40.785Z
#
# Location: GEO 23.0N 72.5E, URSI-Code AH223 AHMEDABAD
# Instrument: Ionosonde, Model: DPS-4D
#
# Query for measurement intervals of time:
# 2012-07-02T01:00:00.785Z - 2012-07-03T07:00:00.785Z
#
# Data Selection:
# CS is Autoscaling Confidence Score (from 0 to 100, 999 if manual scaling,
# foF2 [MHz] - F2 layer critical frequency
# foF1 [MHz] - F1 layer critical frequency
# foE [MHz] - E layer critical frequency
#
#Time                      CS   foF2 QD  foF1 QD   foE QD
2012-07-02T01:07:30.000Z  95   5.825 //   ---  __  2.01 //
2012-07-02T01:15:00.000Z 100   5.875 //   ---  __  2.06 //
2012-07-02T01:22:30.000Z  95   6.000 //   ---  __  1.96 //
2012-07-02T01:30:00.000Z 100   6.025 //   ---  __  2.28 //
2012-07-02T01:37:30.000Z 100   6.125 //   ---  __  2.13 //
2012-07-02T01:45:00.000Z  95   6.225 //   ---  __  2.33 //
2012-07-02T01:52:30.000Z  95   6.200 //   ---  __  2.38 //
2012-07-02T02:00:00.000Z  95   6.350 //   ---  __  2.58 //
2012-07-02T02:07:30.000Z  95   6.413 //  3.43 //  2.68 //
2012-07-02T02:15:00.000Z  95   6.450 //   ---  __  2.68 //
2012-07-02T02:22:30.000Z 100   6.625 //   ---  __  2.88 //
```

http://giro.uml.edu/didbase/scaled.php

Compare to http://www.swpc.noaa.gov/ftpdir/lists/iono_day/

IGF 2014
XIV INTERNATIONAL GIRO FORUM · 20-23 MAY

GIRO Fast Chars vs. NOAA SWPC

```
# Global Ionospheric Radio Observatory
# GIRO Tabulated Ionospheric Characteristics, Version 1.0 Revision B
# Generated by DIDBGetValues on 2014-04-24T17:32:40.785Z
#
# Location: GEO 23.0N 72.5E, URSI-Code AH223 AHMEDABAD
# Instrument: Ionosonde, Model: DPS-4D
#
# Query for measurement intervals of time:
# 2012-07-02T01:00:00.785Z - 2012-07-03T07:00:00.785Z
#
# Data Selection:
# CS is Autoscaling Confidence Score (from 0 to 100, 999 if manual scaling,
# foF2 [MHz] - F2 layer critical frequency
# foF1 [MHz] - F1 layer critical frequency
# foE [MHz] - E layer critical frequency
#
#Time                      CS   foF2 QD  foF1 QD   foE QD
2012-07-02T01:07:30.000Z  95  5.825 //   --- __  2.01 //
2012-07-02T01:15:00.000Z 100  5.875 //   --- __  2.06 //
2012-07-02T01:22:30.000Z  95  6.000 //   --- __  1.96 //
2012-07-02T01:30:00.000Z 100  6.025 //   --- __  2.28 //
2012-07-02T01:37:30.000Z 100  6.125 //   --- __  2.13 //
2012-07-02T01:45:00.000Z  95  6.225 //   --- __  2.33 //
2012-07-02T01:52:30.000Z  95  6.200 //   --- __  2.38 //
2012-07-02T02:00:00.000Z  95  6.350 //   --- __  2.58 //
2012-07-02T02:07:30.000Z  95  6.413 //  3.43 //  2.68 //
2012-07-02T02:15:00.000Z  95  6.450 //   --- __  2.68 //
2012-07-02T02:22:30.000Z 100  6.625 //   --- __  2.88 //
```

GIRO Fast Chars

```
:Product: ElArensillo_iono.txt
:Issued: 2014 Apr 30 1425 UTC
# Prepared by the U.S. Dept. of Commerce, NOAA, Space Weather Prediction Center
# Please send comments and suggestions to SWPC.Webmaster@noaa.gov
#
# Units for foF2, MUF(D), foEs, foE, fMUF, foF1, fxI & fbEs = MHz
# Units for yF2, D, hmE, h'F, h' & hmF2 = km
# Units for TEC = 10^16 el/m^2
# Missing data: -1.0,-1,-1.00
#
#       Real-Time Ionosonde Data
#       El Arenosillo N37E353 Instituto Nacional de Tecnica Aerospacial-DGS-256
#
# UT Date   Time
# YR MO DA  HHMM     foF2 hmF2 MUF(D) D  h'F yF2 fMUF  h'  fxI foF1  foE hmE foEs fbEs  ITEC
#-------------------------------------------------------------------------------------------
2014 04 29  0000      6.3 287  2.77   -1 287  88  5.9 429  7.0 -1.0 -1.0  -1  3.9 -1.0   9.6
2014 04 29  0015      6.3 307  2.74   -1 307  91  5.8 425  6.9 -1.0 -1.0  -1  2.4 -1.0   9.9
2014 04 29  0030      6.3 317  2.72   -1 317  94  5.8 428  7.1 -1.0 -1.0  -1 -1.0 -1.0  10.4
2014 04 29  0045      6.3 302  2.73   -1 302  83  5.9 440  6.9 -1.0 -1.0  -1  3.6 -1.0   9.1
2014 04 29  0100      6.4 302  2.61   -1 302 102  5.9 461  6.9 -1.0 -1.0  -1 -1.0 -1.0  11.4
2014 04 29  0115      6.2 297  2.71   -1 297  93  5.7 430  6.9 -1.0 -1.0  -1 -1.0 -1.0   9.8
2014 04 29  0130      6.5 297  2.66   -1 297 106  5.9 434  7.1 -1.0 -1.0  -1 -1.0 -1.0  12.4
2014 04 29  0145      6.4 292  2.70   -1 292 104  5.9 436  7.0 -1.0 -1.0  -1 -1.0 -1.0  11.8
2014 04 29  0200      6.2 292  2.73   -1 292  91  5.8 441  6.8 -1.0 -1.0  -1 -1.0 -1.0   9.7
2014 04 29  0215      6.3 297  2.73   -1 297  91  5.9 441  6.9 -1.0 -1.0  -1 -1.0 -1.0  10.0
2014 04 29  0230      6.3 297  2.75   -1 297  95  5.9 437  7.1 -1.0 -1.0  -1 -1.0 -1.0  10.5
2014 04 29  0245      6.3 287  2.83   -1 287  78  5.9 415  7.0 -1.0 -1.0  -1 -1.0 -1.0   8.6
2014 04 29  0330      6.4 267  2.86   -1 267  94  5.8 387  6.9 -1.0 -1.0  -1 -1.0 -1.0  10.6
2014 04 29  0345      6.4 257  2.84   -1 257 100  5.9 400  7.1 -1.0 -1.0  -1 -1.0 -1.0  11.3
2014 04 29  0400      6.3 267  2.85   -1 267  85  5.7 382  6.9 -1.0 -1.0  -1 -1.0 -1.0   9.2
2014 04 29  0415      6.3 270  2.96   -1 270  70  5.9 387  7.1 -1.0 -1.0  -1 -1.0 -1.0   7.7
2014 04 29  0430      6.6 262  2.99   -1 262  76  6.2 380  7.2 -1.0 -1.0  -1  2.0 -1.0   9.2
```

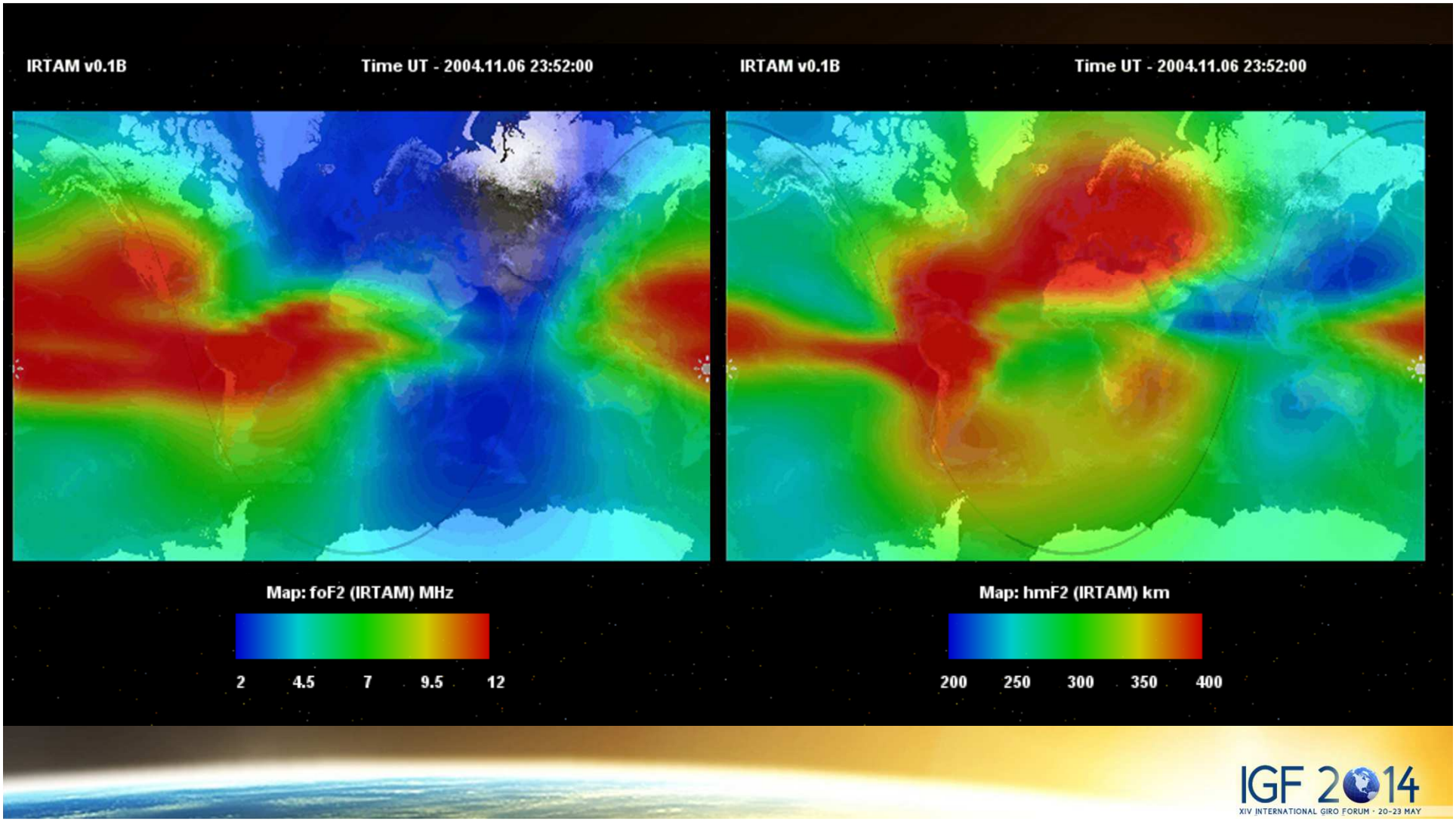
SWPC iono_day

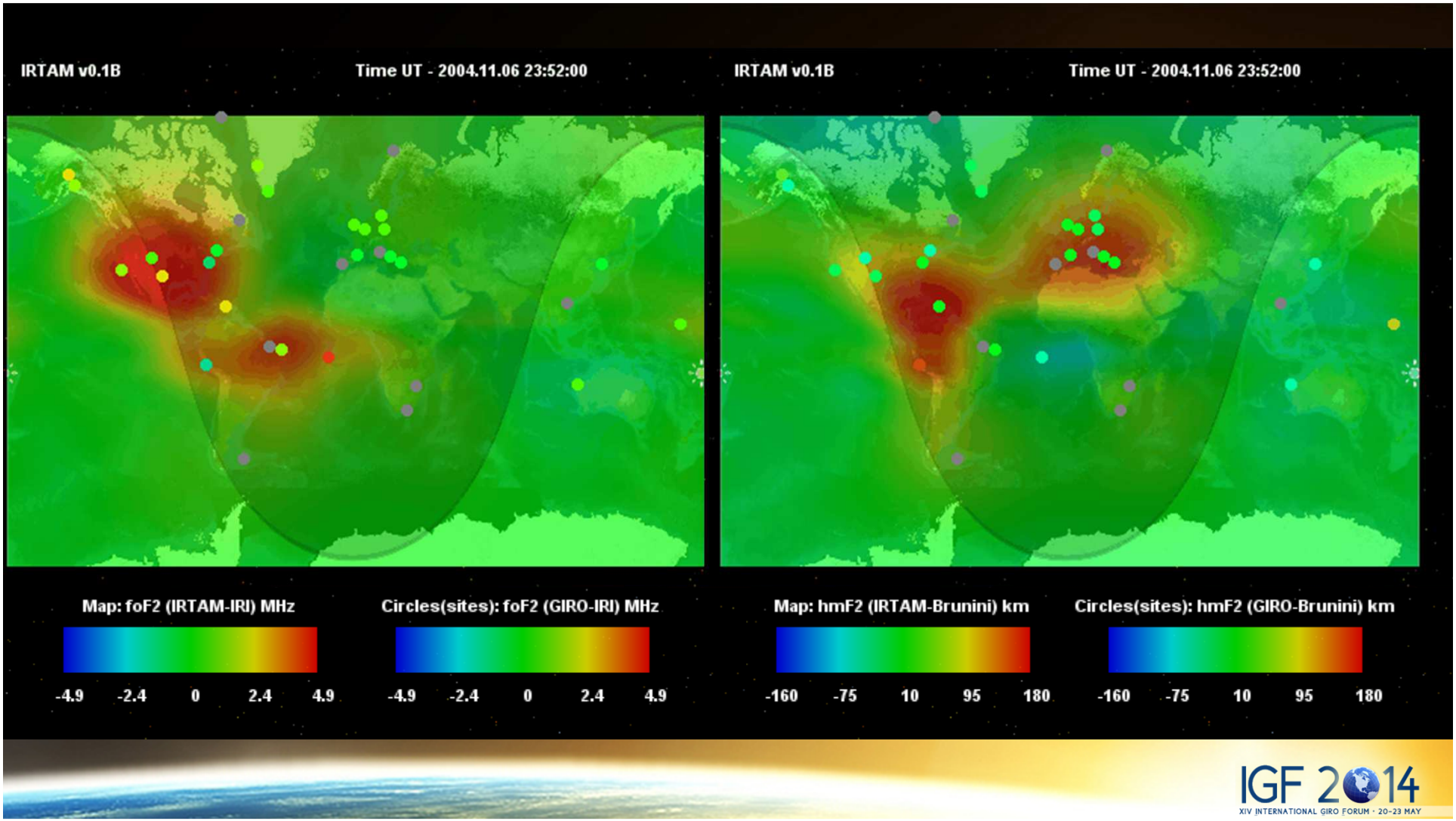
IGF 2014
XIV INTERNATIONAL GIRO FORUM · 20-23 MAY

DIDBase vs DriftBase on the Web

Faster than Explorers

IGF 2014
XIV INTERNATIONAL GIRO FORUM · 20-23 MAY


IRTAM v0.1B
Time UT - 2004.11.06 23:52:00
Map: foF2 (IRTAM) MHz
2
4.5
7
9.5
12
IRTAM v0.1B
Time UT - 2004.11.06 23:52:00
Map: hmF2 (IRTAM) km
200
250
300
350
400
IGF 2014
XIV INTERNATIONAL GIRO FORUM · 20-23 MAY


IRTAM v0.1B
Time UT - 2004.11.06 23:52:00
IRTAM v0.1B
Time UT - 2004.11.06 23:52:00
Map: foF2 (IRTAM-IRI) MHz
-4.9 -2.4 0 2.4 4.9
Circles(sites): foF2 (GIRO-IRI) MHz
-4.9 -2.4 0 2.4 4.9
Map: hmF2 (IRTAM-Brunini) km
-160 -75 10 95 180
Circles(sites): hmF2 (GIRO-Brunini) km
-160 -75 10 95 180

Dissemination of IRTAM data

- Currently only animated latest 24-hour maps published on GIRO Web Portal
- GAMBIT Project is near future

Past data

Gambit

Global Adaptive Modeling
of the Bottomside Ionospheric Timelines

Prototype is running, release plans by Christmas 2014

IGF 2014
XIV INTERNATIONAL GIRO FORUM · 20-23 MAY

Take-home summary

- Fast Chars on the Web: good solution for many tasks
  - Real-time data are available
  - Please pay attention to Confidence Score (CS)
- Use DriftBase Web Portal
- Setup a “GIRO Mirror” is latency is too high
- Watch for GAMBIT Première in December 2014


Dalu
감사합니다
Gracias
Danke
Ευχαριστίες
THANK YOU
Obrigado
Köszönöm
Grazie
Спасибо
Dank
Tack
谢谢
Merci
ありがとう
IGF 2014
XIV INTERNATIONAL GIRO FORUM · 20-23 MAY