

# The Global Change Information System

## Nuts and Bolts

Brian Duggan<sup>12</sup>, Steve Aulenbach<sup>12</sup>,  
Robert Wolfe<sup>23</sup>, Justin Goldstein<sup>12</sup>

<sup>1</sup>UCAR, <sup>2</sup>USGCRP, <sup>3</sup>NASA

July 9, 2014

<http://data.globalchange.gov>  
<http://github.com/USGCRP/gcis>

# Outline

## 1 NCA3 Report Assembly

- What
- Who
- How
- Resources
- Role of the GCIS
- Identifiers

## 2 Implementation

- Functionality
- SPARQL
- Testing
- Server Architecture
- Clients

## 3 Information Model

- Concepts
- Details

## 4 Discussion

# What

- The Third National Climate Assessment
- PDF(s) (<http://data.globalchange.gov/report/nca3>)
- Website (<http://nca2014.globalchange.gov>)

# Who

- Scientists (Authors)
- Science analysts
- Editors
- Graphic designers
- Web developers
- Data managers
- Project managers

# How

- Spreadsheets
- Google docs
- Email
- Endnote
- Scientific Software
- Graphics Software
- Content Management Systems
- Wikis
- Various miscellaneous desktop and cloud software

# Resources

The tools are used to represent and manipulate various resources.

- Journal Articles
- Reports
- References
- Figures
- Images
- Tables
- Findings
- Organizations
- People
- Datasets

# Role of the GCIS

- Common points of reference
- Common vocabulary across teams
- Language, terminology, vocabulary, ontology
- Uniform Resource Identifiers
- URLs are actionable : URLs
- Information manipulation via API or web forms
- Information extraction via API or browsing
- Information modeling with relational or semantic models
- Fine grained tracking of all changes.
- Convenient useful information entry
- Highly scalable information retrieval

## Resources

### GCIDs

<http://data.globalchange.gov>

- [/article/10.1080/15287390801997625](http://data.globalchange.gov/article/10.1080/15287390801997625)
- [/report/usfs-pnw-gtr-855](http://data.globalchange.gov/report/usfs-pnw-gtr-855)
- [/reference/007a7014-723e-4ceb-a395-5c986b1bf884](http://data.globalchange.gov/reference/007a7014-723e-4ceb-a395-5c986b1bf884)
- [/report/nca3/figure/global-temperature-and-carbon-dioxide](http://data.globalchange.gov/report/nca3/figure/global-temperature-and-carbon-dioxide)
- [/image/26fc56f4-b4e0-425b-adc8-14c6d961d558](http://data.globalchange.gov/image/26fc56f4-b4e0-425b-adc8-14c6d961d558)
- [/report/nca3/table/decisions-scales](http://data.globalchange.gov/report/nca3/table/decisions-scales)
- [/report/nca3/finding/extreme-precipitation-increase](http://data.globalchange.gov/report/nca3/finding/extreme-precipitation-increase)
- [/organization/nasa](http://data.globalchange.gov/organization/nasa)
- [/person/0000-0001-6667-7047](http://data.globalchange.gov/person/0000-0001-6667-7047)
- [/dataset/nca3-cddv2-r1](http://data.globalchange.gov/dataset/nca3-cddv2-r1)



# Functionality

- Support NCA3 report production
- Support NCA3 website (client side jQuery)
- Provide minimal landing pages for resources
- Provide a public JSON API  
`http://data.globalchange.gov/api\_reference`
- Provide semantic information
- Be interoperable (e.g. use existing identifiers)
- Provide a public SPARQL endpoint  
`http://data.globalchange.gov/sparql`
- JSON, RDF, schema.org, HTML, Turtle, RDF/XML

# SPARQL

<http://bit.ly/gcistest>

```
PREFIX dbpediaowl: <http://dbpedia.org/ontology/>
PREFIX bibo: <http://purl.org/ontology/bibo/>
PREFIX gcis: <http://data.globalchange.gov/gcis.owl#>
PREFIX cito: <http://purl.org/spar/cito/>
```

```
SELECT DISTINCT ?gcisjournal
FROM <http://data.globalchange.gov/sparql>
WHERE
```

```
  SERVICE <http://data.globalchange.gov/sparql>
    ?gcisjournal a bibo:Journal .
    ?gcisjournal bibo:issn ?issn .
    ?gcisarticle gcis:inPublication ?gcisjournal .
    ?gcisarticle cito:isCitedBy <http://data.globalchange.gov/report/nca3> .
```

```
  BIND(STRLANG(?issn, "en") AS ?issn_en)
```

```
  SERVICE <http://dbpedia.org/sparql>
    ?dbpjjournal dbpediaowl:frequencyOfPublication "Monthly"@en .
    ?dbpjjournal dbpediaowl:issn ?issn_en .
    FILTER(STR(?issn_en) = ?issn)
```

# Testing

- Test driven development (unit tests)
- SPARQL tests
- Continuous Integration Testing (github, travis-ci.org)
- Test driven data acquisition
- Continuous Content Validation  
<http://github.com/USGCRP/gcis-qa>

# Server Architecture

- RDBMS (PostgreSQL) for storage  
Fine-grained transaction auditing, referential integrity
- HTML templates
- Turtle templates (and other formats)
- Scrape into triple store (Virtuoso)
- Data structures into JSON, YAML
- nginx reverse proxy cache

# Clients

- Python (Andrew)  
`http://github.com/USGCRP/gcis-py-client`
- Perl  
`http://github.com/USGCRP/gcis-pl-client`
- Javascript (jQuery)
- php (Drupal)

# Narrative vs structure

# Semantic vs Relational

# Resources



# Identifiers

# Publications, Contributors (Entities, Agents, Activities)

`http://data.globalchange.gov/resources`

## Discussion