



Royal Netherlands Meteorological Institute
Ministry of Infrastructure and the Environment



Science & Technology
Facilities Council



Deutscher Wetterdienst
Wetter und Klima aus einer Hand



ECMWF contribution to the EU funded CHARME Project: A Significant Event Viewer tool



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EUROPEAN CENTRE FOR MEDIUM-RANGE WEATHER FORECASTS

Agenda

- **CHARMe**
- ERA-CLIM project
- Significant Event Viewer tool

What is CHARMe

“**CHAR**acterization of **Me**tadata to enable high-quality climate applications and services”.

- CHARMe is a European collaborative project.
- CHARMe consortium: University of Reading, ECMWF, STFC, Met Office, CGI, DWD, KNMI, Airbus Defence and Space.
- It has a duration of two years and commenced in January 2013.

*How can climate data users decide
whether a dataset is fit for their purpose?*

<http://www.charme.org.uk>

Where can users of climate data go for help?

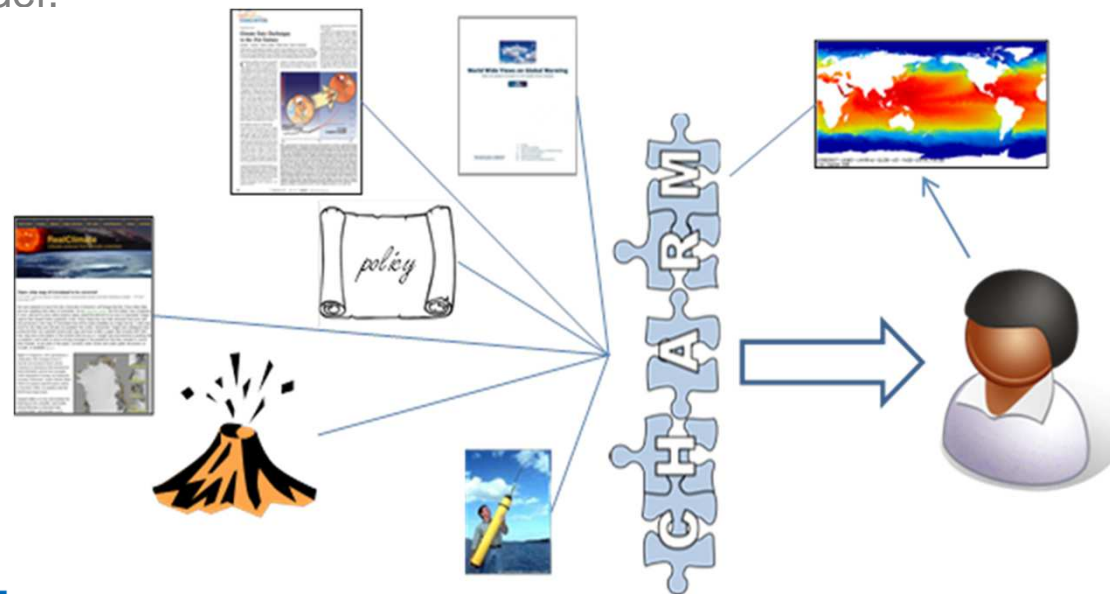
- **Scientific literature**
 - Huge, verbose and inaccessible to some communities.
 - Not well linked to source data.
- **Technical reports and conference proceedings**
 - Hard to find, scattered or inaccessible.
- **Data centres**
 - Increasingly strong at providing some important metadata, but don't usually include community feedback.
 - Not all countries and communities have data centres!
- **Websites and blogs**
 - Increasingly useful, but scattered.

CHARMe Objectives

- CHARMe project **aims** to improve the amount and quality of information that can be discovered about climate data to help users decide whether a dataset can meet their needs.
- There has been a great deal of work done on helping data providers to describe their datasets better.
- CHARMe is focusing on a **different dimension** to the problem:
 - how can users find out knowledge and opinions from **other users**.
- It will provide tools to enable users to:
 - **share information** about climate data.
 - decide on the **quality and suitability** of a climate dataset.
- This information is called “**commentary metadata**”.

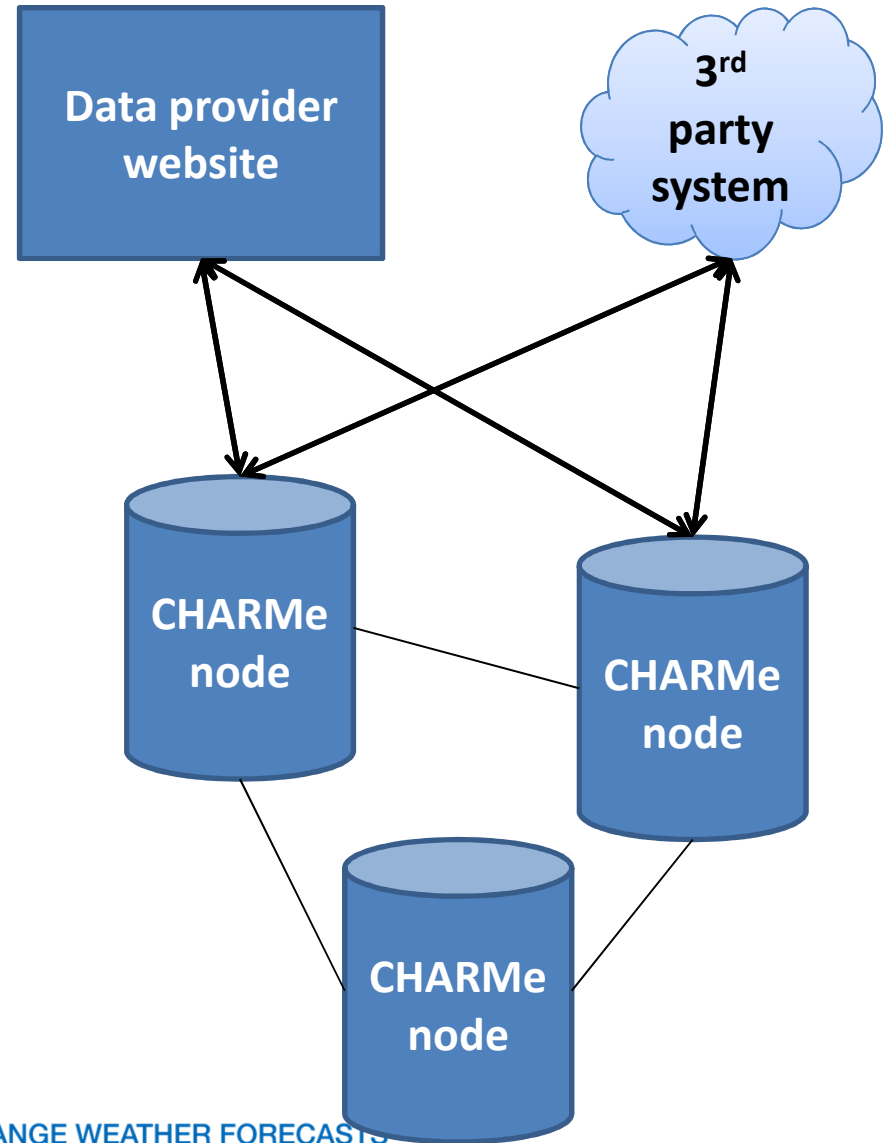
Commentary Metadata

- **Post fact annotations:** citations, ad-hoc and peer review comments and notes.
- **Results of assessments:** validation campaigns, comparisons with models or other observations, reanalysis, quantitative error assessments.
- **Significant events:** volcanic eruptions, El-Niño index, satellite or instrument failure, operational changes to satellite orbit calculations.
- **Properties of data distribution:** data policy and licensing, timeliness (is the data delivered in real time?), reliability.
- **Supplementary dataset quality information:** validity period, updates, quality flags.
- **Any other** post-fact information or information defined by sources other than the Data Provider.



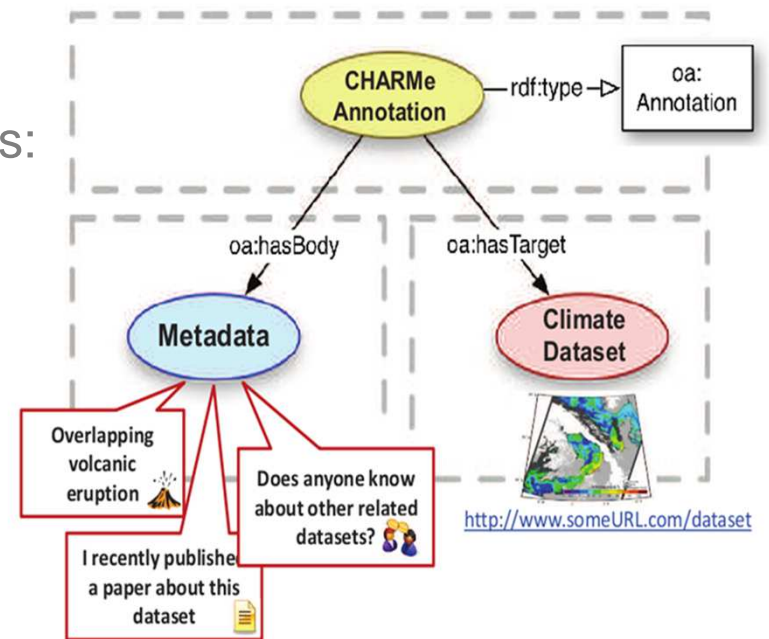
How will this be done?

- CHARMe will create connected repositories of commentary information
 - “CHARMe nodes”
- Information can be read and entered through websites or Web Services



Data Model – Open Annotation

- An annotation links a **target** (the subject of the annotation) with a **body** (any resource which is associated with the target).
- W3C Open Annotation data model has been adopted for modelling annotations.
- It maps directly to CHARMe requirements:
 - a **target** could be a climate dataset.
 - the annotation **body** could be:
 - some **user comment** about that dataset,
 - or a **reference** to a publication,
 - or a **question** from the user community.



[W3C Open annotation](#) : an interoperable framework for creating associations between related resources...

What CHARMe will enable

(some examples)

- **Users:**
 - “Find me all the documents that have been written about this dataset”
 - “... In both peer-reviewed journals and the grey literature”
 - “... and specifically about precipitation in Africa”
 - “What factors might affect the quality of this dataset?”
 - e.g. upstream datasets, external events
 - “I want to find datasets that are related to the one I’m looking at”
- **Data providers:**
 - “Who is using my dataset and what are they saying about it?”
 - “Let me subscribe to new user comments and reply to them”

What this will not enable

- “Give me the best dataset on sea surface temperature”
- CHARMe will not provide a new “quality stamp” for datasets
 - But will be able to link to such things if other people publish them
- CHARMe will not provide access to actual data
 - (Cf. Web of Science – enables discovery, but access not in scope)
- Not planning to create (another) “one-stop shop” for information
 - We want the information to appear where users are already looking

Agenda

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ERA-CLIM Project

- EU collaborative research project.
- Goal: **prepare** input observations, model data, and data assimilation systems **for a global atmospheric reanalysis of the 20th century.**
- Climate reanalysis:
 - **Reprocesses past observations** using the **latest** available forecast model and software in order to reconstruct the evolution of the atmosphere.
 - Combines in-situ observations with satellite data.
 - **Unobserved parameters** are obtained from the forecast model.
 - Generates **coherent** representation of atmospheric parameters.
 - Provides timely information for **climate monitoring.**
 - Supports regional reanalysis, seasonal prediction, climate model development.

ERA-CLIM: Datasets

- **ERA-15**
 - Reanalysis of the period **Jan 1979 - Dec 1993** using an early version of the Integrated Forecast system (IFS) done in 1993 - 1996.
- **ERA-40**
 - Reanalysis of the period **Sep 1957 - Aug 2002**; used a 2001 version of IFS, with a spatial resolution (T159L60) with a 3D-Var analysis.
- **ERA-Interim**
 - Reanalysis of the **period Jan 1979 - present**; uses a 2006 version of IFS, configured for a spatial resolution of approximately 79 km, on 60 model levels 4D-Var analysis. This dataset is updated monthly.
- **ERA-20CM**
 - An **ensemble of climate model** integrations using the IFS, **covers Jan 1900 - Dec 2010**. Data is mostly monthly averaged fields, however, a limited number of daily parameters is available at a spatial resolution of approximately 125 km.

ERA-CLIM: Datasets

- **ERA-20C**
 - An **ensemble of 20th century reanalysis** of surface weather observations. Only observations from ISPD (surface pressure) and ICOADS (surface pressure and marine winds) are used in the reanalysis.
- **ERA-20CL**
 - An **ensemble of 20th-century land-surface** reanalyses based on ERA-20C meteorology, but at a spatial resolution of 25km.
- **ERA-SAT**
 - Reanalysis of **satellite data**, will be available in **2015**.
 - Produce the best estimate at any give time.
 - Use as many observations as possible.
 - Closely tied to forecast system development (NWP and seasonal).
 - Near-real time product updates .

Available from: <http://apps.ecmwf.int>

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Significant Events

- This information will be complemented with a database of **significant events (SE)**.
- SE are any **external** events that can **affect** a climate dataset.
- They are **not annotations**.
- Current categories and subcategories:
 - **Climate events:** Hurricane, Volcanic eruption, El Nino, Storm, Wildfire.
 - **Software/System events:** software cycle updates IFS System.
 - **Operational events:** satellite or instrument failure, operational changes to satellite orbit calculations.
 - **Data/Observing System events:** how the data was obtained, Satellite, Dropsonde, Aircraft, Buoy, Ship, Land station, Mobile, Weather station, Radar.

Significant Events Viewer

- A **web-based** graphical interface developed in **ECMWF**.
- Users interactively browse and visualise **time series** of data with their **associated events**.
- Initially developed to explain signals in ERA-CLIM, but it can be applied to **any climate time-series datasets**.
- The **aim** is to help users to access **uncertainties** in climate products to determine whether the **climate signals** represented by the product are **real**.
- Allows the user to:
 - **visualise** relevant information about the data product (source, limitations, error estimates, etc.)
 - **search** for alternative climate products.
 - **study** possible causes of variability, shifts and drifts apparent in the climate product.

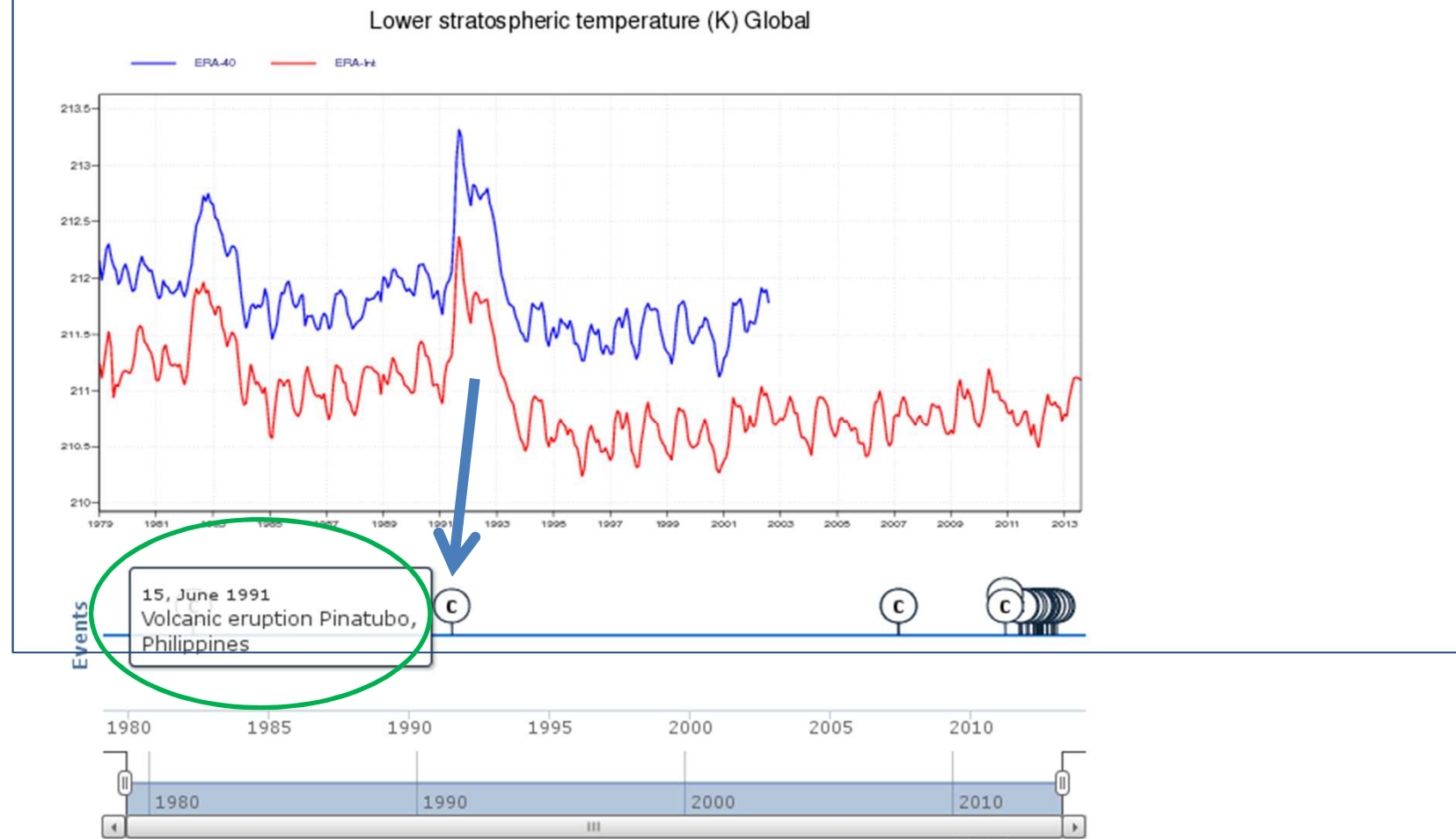
Significant Events Viewer Tool

Step 1: the user selects **data** and **events** and clicks “Plot” (a time-series of interest)

The screenshot shows the user interface of the Significant Events Viewer Tool. On the left, a vertical sidebar contains two main sections: 'Datasets' and 'Actions'. The 'Actions' section includes the following options: 'Show significant event form', 'List events', 'Submit events', 'Plot!', and 'Reset page'. The 'Plot!' option is circled in yellow. The main content area is divided into two columns. The left column, titled 'Datasets', contains several input fields: 'Series' with checkboxes for 'ERA-40' and 'ERA-Int' (both checked); 'Parameter' with a dropdown menu set to 'T'; 'Level' with a dropdown menu set to '0001'; 'Region' with a dropdown menu set to 'Global'; 'Start date' with a text input '1979-01-01'; 'End date' with a text input '2013-08-31'; and 'Display' with checkboxes for 'normal' (checked), 'anomaly', 'yearly mean', 'decadal mean', and 'running mean'. A blue circle highlights the 'Datasets' section, and a blue arrow points from the word 'data' in the text above to this circle. The right column, titled 'Significant events', contains several categories of events with checkboxes: 'C: Climate Events' (checked for 'Hurricane' and 'Volcanic eruption', unchecked for 'El-Nino', 'Drought', 'Storm', 'Wildfires'); 'S: Software/System Events' (unchecked for 'IFS', 'System'); 'O: Operational Events' (unchecked for 'Operational'); and 'D: Data/Observing system Events' (unchecked for 'Satellite', 'Dropsonde', 'Aircraft', 'Buoy', 'Ship', 'Land station', 'Mobile'). There is also an 'Alarm' section with checkboxes for 'Weather station' and 'Radar'. At the bottom of this column, there is a 'Filter events by' dropdown menu set to 'No filtering'. A red circle highlights the 'Significant events' section, and a red arrow points from the word 'events' in the text above to this circle.

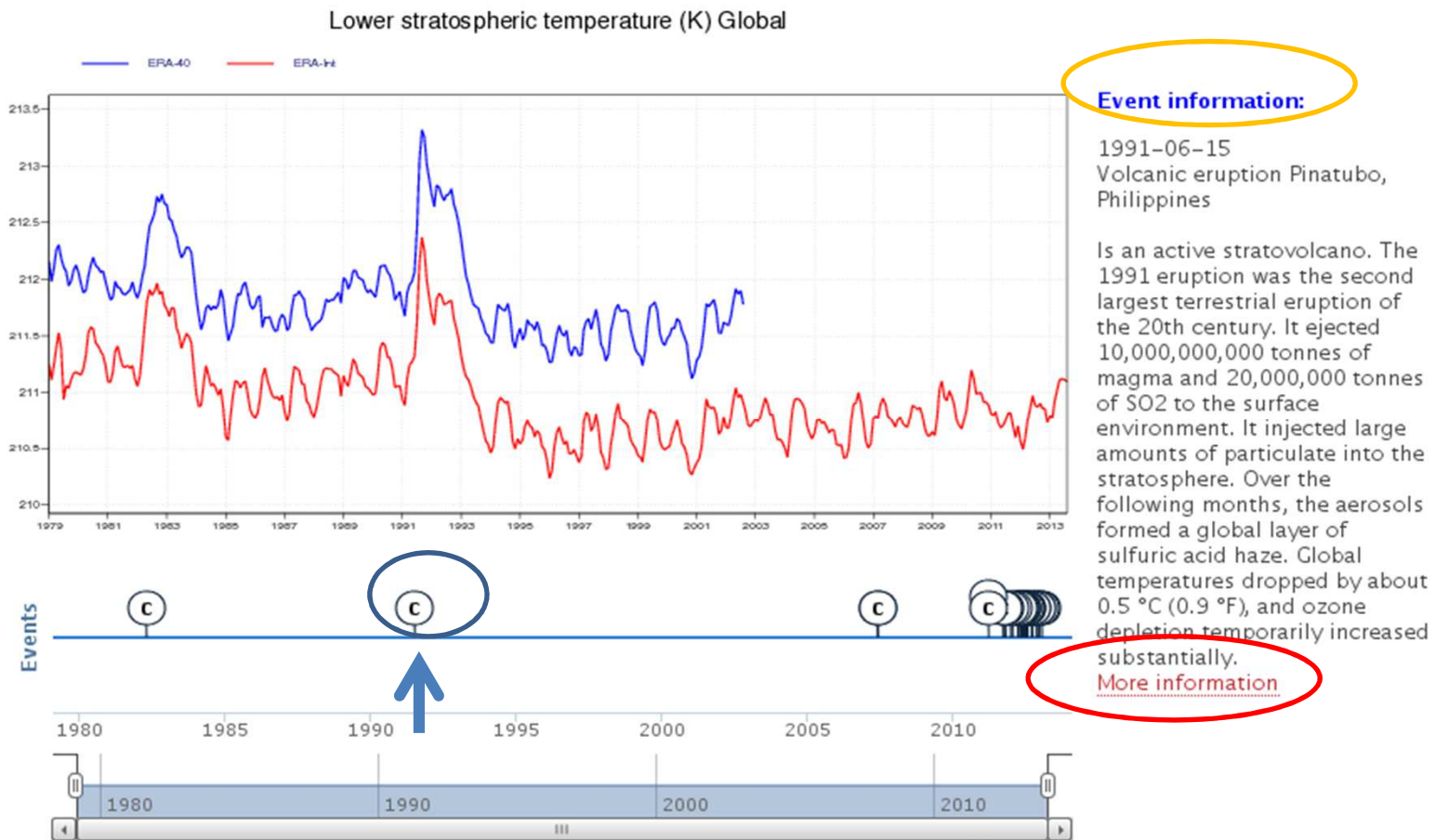
Significant Events Viewer Tool

- **Step 2:** A plot of a selected **time-series** is displayed.
 - Below is a timeline showing the corresponding **event**.
 - **Hovering** the mouse on an **event** will show its **name**.



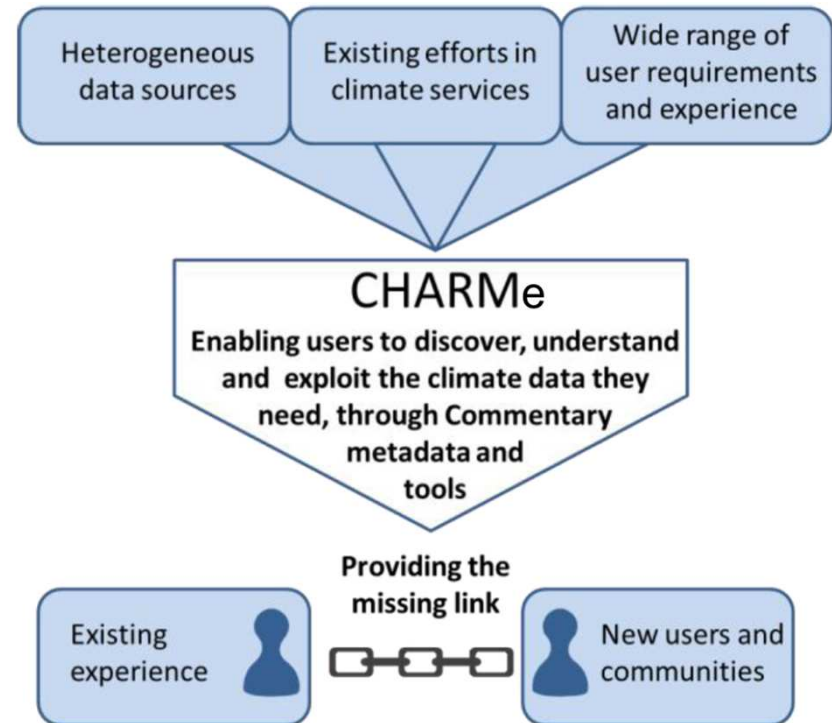
Significant Events Viewer Tool

- **Step 3:** The user “**clicks**” on the **event**.
 - A **longer description** of the **event** is displayed,
 - together with a link to some **extended information**.



Summary

- CHARMe aims to **connect users** of climate data with **all the experience** that has built up in the community.
- Provides a mean for data providers to get **feedback**.
- CHARMe information can be **shared** widely through **websites** and **Web Services**.
- Based on principles of **Linked Data** and the **Semantic Web**.
- **Significant Event Viewer** tool will help users to understand if the climate signals represented by the product are real or caused by an external event etc.





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Thank you!

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