

Understanding EO – MOOC by MOOC

New Approaches to Introducing Remote Sensing and European Earth Observation in Schools

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Outline

1. Activities in teaching basic EO-knowledge
2. eLearning Approaches and Material
3. Learning Videos for Schools and MiniMOOCs
4. Producing Content for MiniMOOCs
5. Conclusion and Outlook



Activities in teaching basic EO-knowledge

e-Learning material and online portals

- Interactive Lessons for Physics, Math, Geography, Biology, Computer sciences
- Information on RS basics compiled with pupils in mind
- Live and archived EO videos from the ISS
- Lessons on EO and Space using classic material as well as AR and interactivity

www.fis.uni-bonn.de

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About FIS What is Remote Sensing? Teaching Materials Research Tools Analysis Tools Evaluation

Learning with Satellite Images

Remote Sensing in Schools

Welcome ...
... to the website of the learning portal "Remote Sensing in Schools". The project "Remote Sensing in Schools" (FIS = German acronym) is run by the Remote Sensing Research Group of the Department of Geography at the University of Bonn and aims at a more intensive use of remote sensing in school lessons.

Learning with Digital Satellite Images
On our website you can find many interactive learning modules as well as research and analysis tools concerned with remote sensing in school lessons. You can also discover important advice and didactical commentary.

Enjoy working with our learning materials.
Your FIS team

Basic subjects

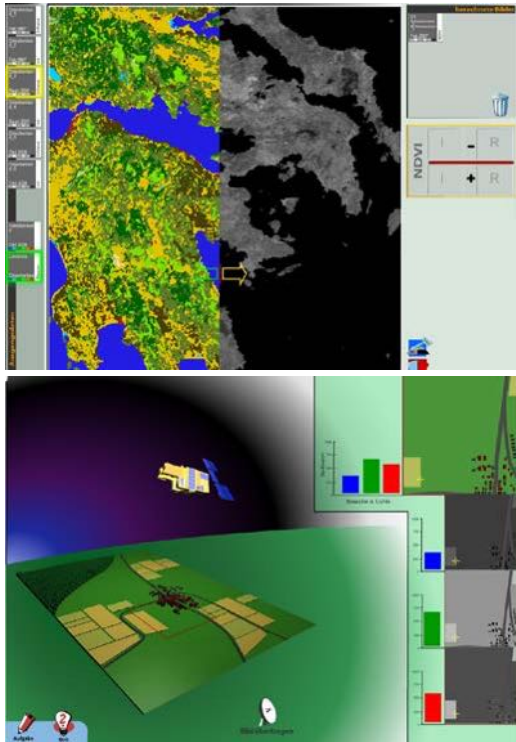
eLearning Approaches and Material

Interactive Lessons and their "evolution"

Interactive Lessons

Curriculum based material for direct use in STEM

RS-functionalities in interactive lessons



Apps / Augmented Reality



Virtual Reality



eLearning Approaches and Material

Open learning resource on RS their "evolution"

Open learning resources

Information on RS basics compiled with pupils in mind

Info Box

Infos on RS with Interactions and illustrations

The screenshot shows a website interface with a search bar and navigation tabs for 'Info-Box', 'Beginners', and 'Professionals'. The main heading is 'Remote Sensing Systems'. Below the heading, there is a paragraph explaining that remote sensing techniques are distinguished by the type of electromagnetic radiation used. It describes passive systems (receiving reflected sunlight) and active systems (emitting microwaves). Two diagrams illustrate these: one for passive systems showing sunlight reflecting off the ground to a satellite, and one for active systems showing a satellite emitting waves that reflect off the ground and return to the satellite. Below this, another paragraph discusses transportation techniques, distinguishing between airborne sensors (high resolution, small area) and satellite sensors (lower resolution, large area). Two images show a satellite in orbit and a 3D visualization of a satellite's sensor footprint on the ground.



Learning Videos / MiniMOOCS

Short clips on RS Basics and applications that can be combined into short courses

The collage consists of three vertically stacked images. The top image is a diagram showing a satellite in orbit with a sensor that emits a beam of light towards the Earth's surface, which reflects it back to the satellite. The middle image shows the Sentinel-2 satellite in orbit above the Earth, with a scale bar indicating a distance of 800 km. The bottom image is a 3D visualization of a satellite's sensor footprint on the ground, showing a wide area of coverage with a color gradient representing different sensor channels.

Learning Videos for Schools and MiniMOOCs

Producing content for Mini-MOOCs

What is a MiniMOC / MOOC ?



Challenges

- Need of staff for support
- Hard to fit into schedule of school curricula

- No digital material for secondary school level education

- FIS LMS not capable of fully hosting MiniMOOCs

Three main prerequisites

Course Characteristics:

- Learner is guided by a tutor
- Sequencing (Chapter 1,2,3...)
- Outcome evaluated

Digital Learning Content:

- Course makes use of mainly videos
- Also quizzes, interactions etc.

Learning Environment

- Courses are hosted online on a LMS (Learning Management System)

Solutions

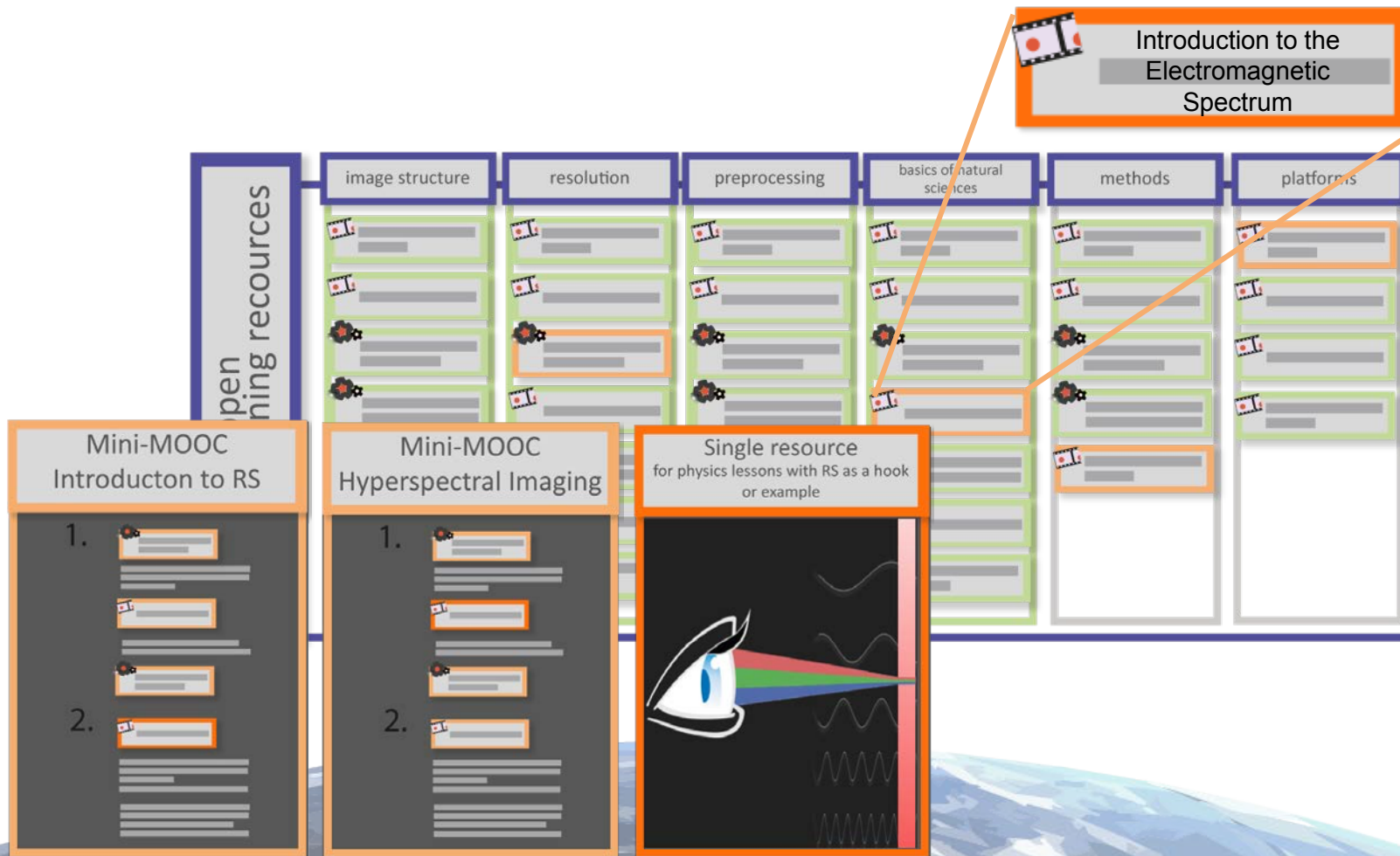
- As open as possible (no fixed dates)
- Bridging gap between OER and MOOC
- Not restricting the use to schools only

- Creating it

- Other Hosts (EO-College)
- Concentrating on Material that can be compiled to a MOOC on any LMS

Producing Content for MiniMOOCs

Producing content for multiple purposes



Producing Content for MiniMOOCs

Production Process

Finding the topic

School curricula

3.1 Prozessbezogene Kompetenzen im Fach Physik

Die prozessbezogenen Kompetenzen beschreiben die Handlungsfähigkeit von Schülerinnen und naturwissenschaftliche Denk- und Arbeitsweisen erforderlich sind. Sie werden auf dem für einen formuliert. Auf die Darstellung einer Progn die Komplexität der Anwendungssituation dem jeweiligen altersgemäßen Entwicllung Lernausgangslage und Umgehungsweise R Arbeitens verstanden.

Kernlehrplan für das Gymnasium – Sekundarstufe I (G8) in Nordrhein-Westfalen

Kompetenzbereich Erkenntnisgewinn

Kompetenzbereich Kommunikation

Kompetenzbereich Bewertung

Erdkunde


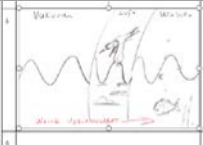


RS Topics

EM spectrum
infrared indices
desertification
Food Security
Climate Change

Texting and Storyboarding

Fernerkundung und Klima
Teaser - Bilder aus dem All - Wie erleben Satellitenbilder?

STORYBOARD V | G | B

Nr.	INHALT DER VISUALISIERUNG	RECHENWEG DER VISUALISIERUNG	WISSEN / BEREICHT
1		Satelliten sind ein Instrument zur Beobachtung von Überflüge (z.B. Wetter, Umwelt, Landwirtschaft, etc.) Wie können sie genutzt werden? Wie werden sie genutzt? Wie werden sie genutzt? Wie werden sie genutzt?	Bilder aus dem All zu zeigen um einen Planeten aus unserer Atmosphäre zu sehen. Die Bilder zeigen die Erde von oben und die Atmosphäre ist sichtbar. Die Bilder sind in verschiedenen Farben dargestellt. Die Bilder sind in verschiedenen Farben dargestellt.
2		Die Wellenlänge ist die Distanz zwischen zwei aufeinanderfolgenden Wellen. Die Wellenlänge ist die Distanz zwischen zwei aufeinanderfolgenden Wellen.	Wellenlänge ist die Distanz zwischen zwei aufeinanderfolgenden Wellen. Die Wellenlänge ist die Distanz zwischen zwei aufeinanderfolgenden Wellen.
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Production



Audio

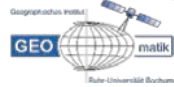


Video

Producing Content for MiniMOOCs Visual Examples



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Production Process

Production Plan and MiniMOOCs

Introduction to EO	Advanced EO	Application
Images from Space	Radar Remote Sensing	Remote Sensing in Land Use Land Cover Changes
The Electromagnetic Spectrum 1	Images From Microwaves	Remote Sensing in Climate Change
The Electromagnetic Spectrum 2	Hyperspectral Remotes Sensing	Detecting Mass Movements (Interferometry)
Infrared		Remote Sensing of Vegetation
Spectral Resolution		
Radiometric Resolution		
Spatial and Temporal Resolution		

finished
in production
production pending

MiniMooc on:

Detailed remote sensing of
 Landslides from
 Introduction to RS
 sense of
 space
 vegetation



Conclusion and Outlook

- Interactive learning materials as well as the open learning resources (InfoBox) are going to be updated and extended by Learning Videos and MiniMOOCs
- Most Important production paradigms are reusability and modularity
- Learning Videos can be used as a single learning resource or combined to MiniMOOCs.
- In the long run, videos along with additional interactive material should define a pool of learning resources which can be used in MOOCs as well as other learning arrangements.



Thank you!

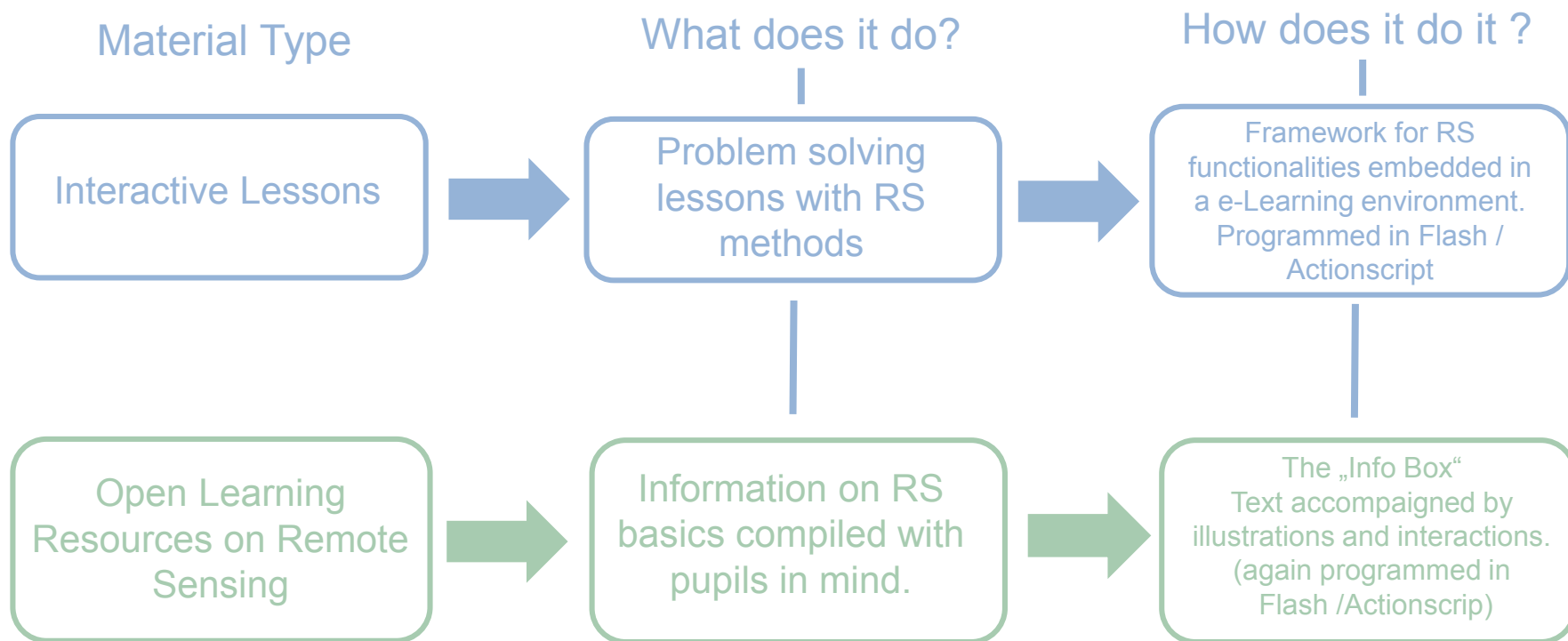
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e-Learning Approaches and Material

two major types of materials:



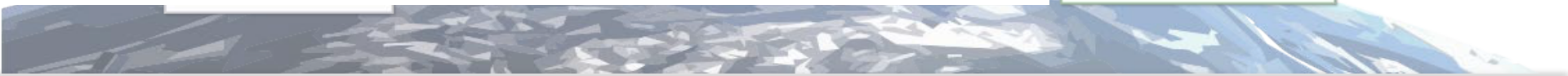
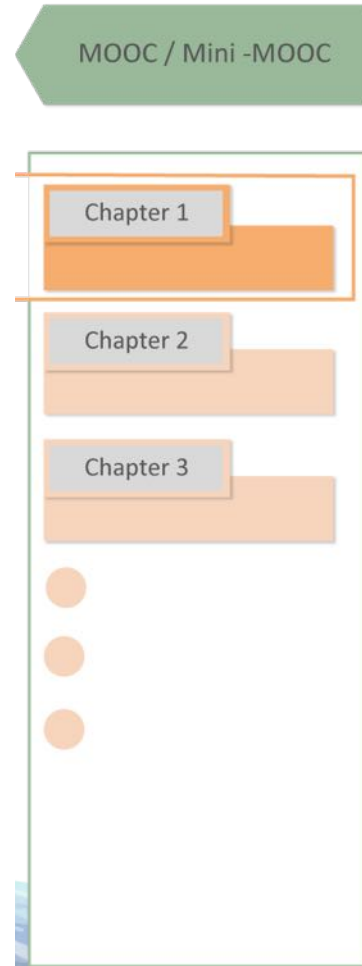
Updating the Material / Learning resources

Producing content for multiple purposes



Producing Content for MiniMOOCs

Producing content for Mini-MOOCs



Updating the Material / Interactive materials

Updating with Sentinel Data - The "easy" part

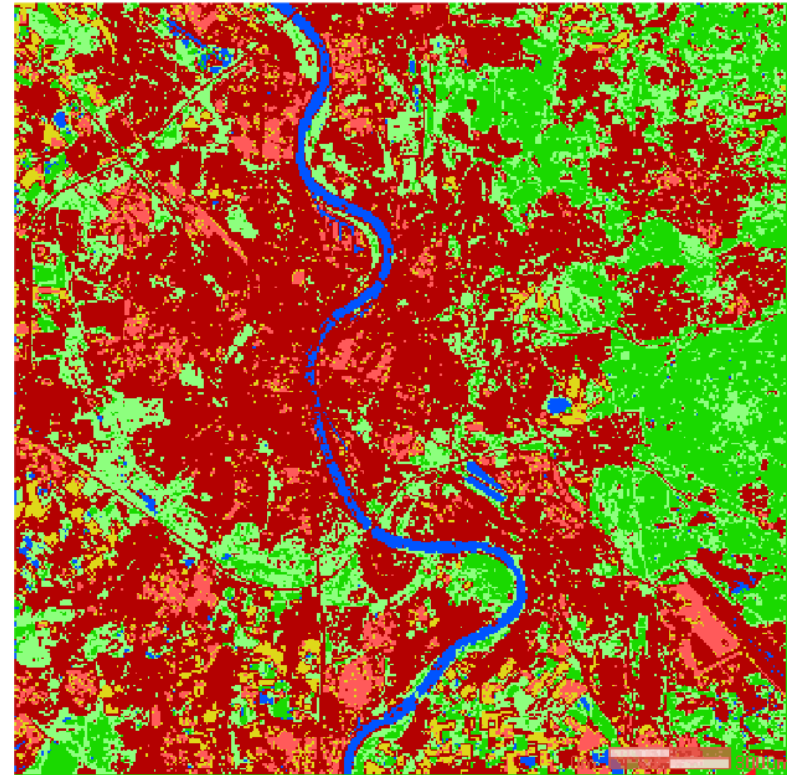
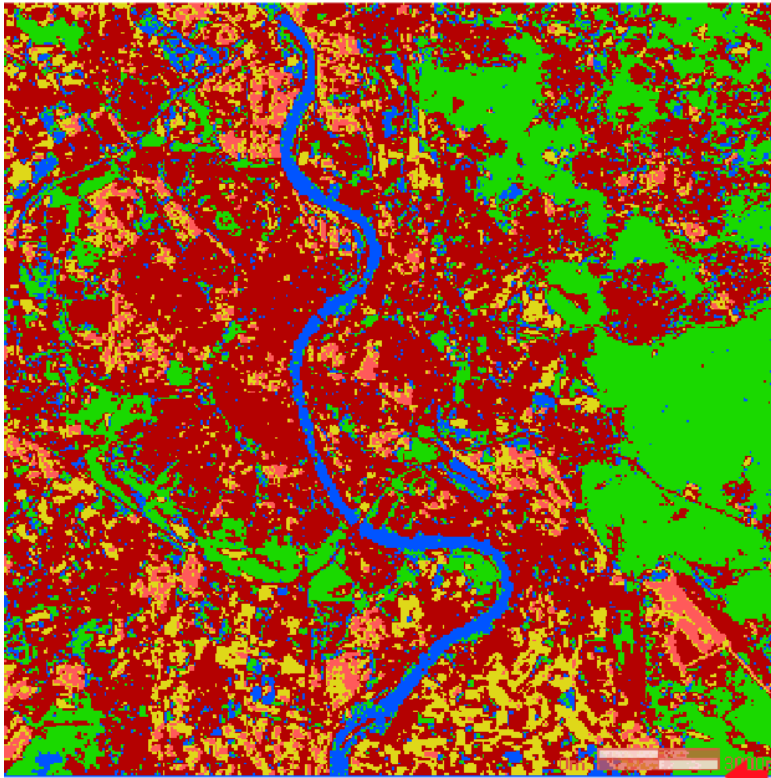


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Updating the Material / Interactive materials

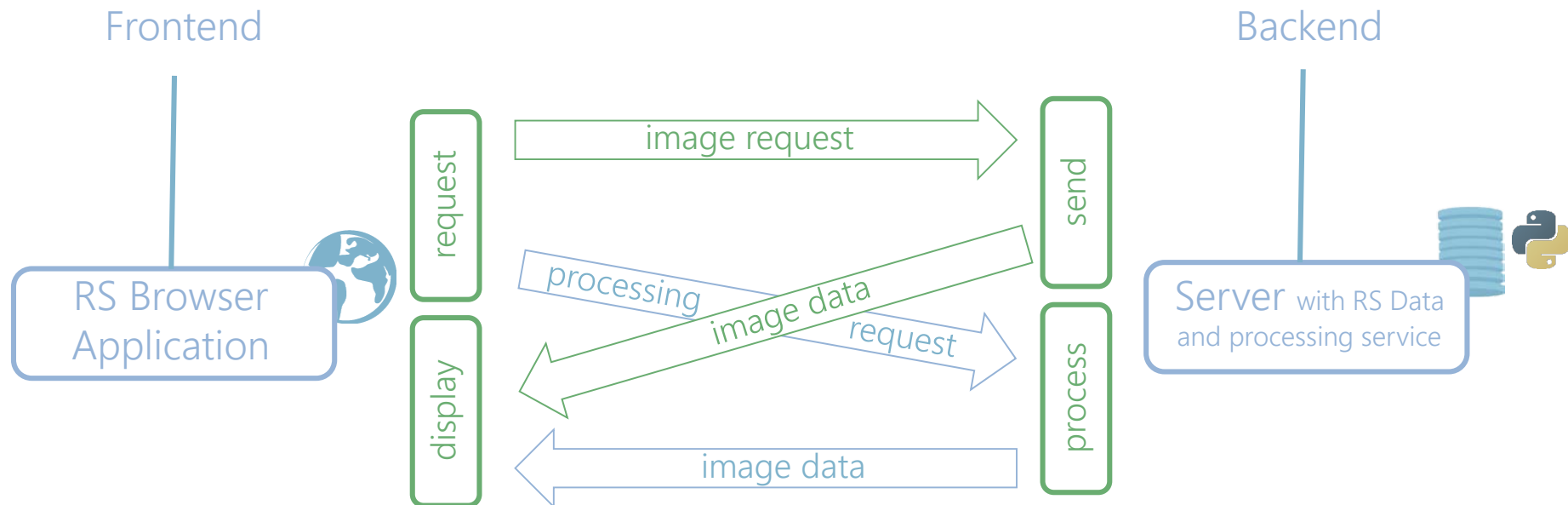
Updating with Sentinel Data - The "easy" part



Updating the Material / Interactive materials

Changing from Flash to HTML5 / JavaScript – “The hard part”

Using backend services for RS



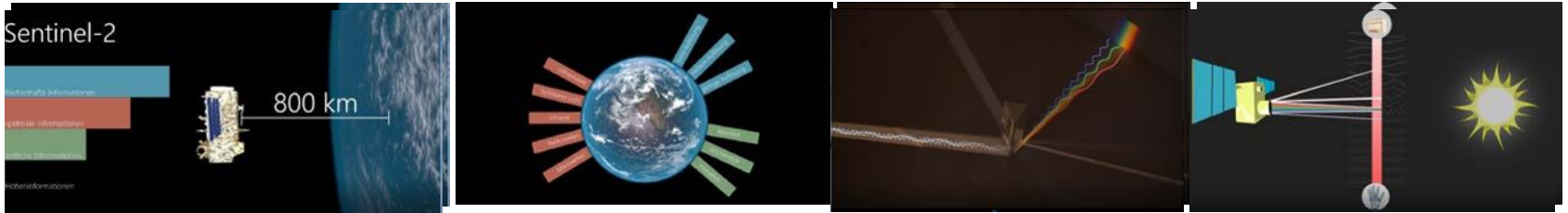
Upsides:

- No need for a RS library as they already exist
- Working with original data
- Proven concept
- Fast processing

Downsides:

- Not as versatile
- Restricted to online use and fast Internet
- Maintenance of server
- Severe impact if service fails

Updating the Material / Learning resources



Learning Videos for Schools and MiniMOOCs

MOOCS in school lessons

What is a MiniMOC / MOOC ?

➔ Massive Open Online Course ➔

What is a lesson in school ?

➔ ~~Massive Open Online Course~~ ➔



Updating the Material / Learning resources

Producing content for Mini-MOOCs

MOOC / Mini -MOOC

Chapter 1

Chapter 2

Chapter 3

