ARISCC - Adaptation of Railway Infrastructure to Climate Change

Workshop, October 19 & 20 2010, Paris

Roland Nolte, IZT Berlin
Tuesday, October 19 (afternoon)

- Welcome & Introduction
  Jerzy Wisniewski, UIC Director Fundamental Values

- Global Adaptation Network (United Nations)

- The European perspective – the position of the rail sector:
  Adapting rail infrastructure to Climate Change
  Anne-Laure Le Merre, CER

- Overview over the ARISCC project
  Roland Nolte, IZT Berlin
The First R: Readiness

How can the Railways prepare for extreme weather events and respectively the consequences of climate change?

A. How to inform about current weather and potential hazards?
   Example InfraWeather, Christian Rachoy, ÖBB

B. How to learn from past events?  Example: Event recording & GIS based System at SBB, Andreas Meyer, SBB

C. How to monitor and document the status of infrastructure assets?  Example: Monitoring & Maintenance of protective structures and civil engineering structures at SBB, Andreas Meyer, SBB
ARISCC

- Focuses on integrated management of weather & climate related natural hazards
- Aims at keeping/improving railway infrastructure performance
- Helps to avoid/minimize damage to railway infrastructure
- Starts with managing today’s weather conditions
- Develops solutions & strategies to prepare for future weather/climate conditions
**ARISCC** covers the following weather & climate related factors, natural hazards and respective risks for railway infrastructures.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Trend</th>
<th>Effect</th>
<th>Impact on Railways/Assets</th>
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<tbody>
<tr>
<td><strong>1. Temperature</strong></td>
<td>change of distribution patterns, higher average and maximum temperature</td>
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<td>1.1 High temperatures and heat waves</td>
<td>overheating</td>
<td>infrastructure equipment</td>
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<td>1.2 Sudden temp changes</td>
<td>tension</td>
<td>track buckling</td>
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<tr>
<td>1.3 Intense sunlight</td>
<td>overheating</td>
<td>track buckling, slope fires, signaling problems</td>
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</table>

| 2. Precipitation | change of distribution patterns, more extreme events | | |
| 2.1 Intense rainfall | soil erosion, land slides, flooding | damage to embankments, earthwork | |
| 2.2 Extended rain periods | slower drainage, soil erosion | other infrastructure assets, operation | |
| 2.3 Flooding: coastal, surface water, fluvial | landslides | drainage systems, tunnels, bridges | |
| 2.4 Drought | desiccation | earworks desiccation | |

| 3. Wind | change of distribution patterns, more extreme events | | |
| 3.1 Storm/gale (inland) | higher wind forces | damage to installations, catenary | |
| 3.2 Coastal storms & sea level raise | Coastal flooding | embankments, earthwork, operation | |

| 4. Lightning strikes and thunderstorms | Overvoltage | catenary and signaling | |

| 5. Vegetation | faster plant growth, new plants | vegetation management | |

All listed factors/events will occur more often and their impacts will be more severe according to the existing climate models.
Deutsche Bahn
Finish Rail Administration
Network Rail
ÖBB
SBB
SNCF
Solutions for Natural Hazard Management & Early Warning

- Monitoring, impact assessment,
- Vulnerability mapping,
- Early warning, Risk assessment

ARISCC Webpage - Knowledge Base & Exchange Platform

- Good practice, Pilot projects
- Competence mapping,
- Country profiles, contacts…
Guidance Document: Natural Hazard Management, Risk Analysis & Adaptation Measures

- Guidance for integrated natural hazard management
- Easy to use document, Detailed examples

Case Studies: UK West Coast, Rhine Valley

- Priority Setting, Vulnerability Mapping
- Risk & costs assessment
- Cost scenarios 2030 with/without adaptation
What has been done so far:

- Solutions for **Integrated Natural Hazard Management** (detailed)
- Collection of **good practice projects** and measures (30 examples)
- **Competence mapping** for adaptation of railway infrastructure to climate change
- **Guidance document** (Integrated natural hazard management)
- **Coordination** with relevant adaptation to climate change projects (TraCCA, Chamäleon, PARAmount)
Integrated Natural Hazard Management & Adaptation to Climate Change – Guidance Document (1)

- Weather Information & Weather Warning
- Monitoring & Documentation of Status of Assets
- Event Recording, Documentation & Assessment
- Regional Climate Projections & expected Climate Loads
- Natural Hazard Mapping
Integrated Natural Hazard Management & Adaptation to Climate Change – Guidance Document (2)

- Vulnerability Mapping
- Risk Assessment & Risk Management
- Implementation of Adaptation Aspects in all Steps
- Alternative Adaptation Scenarios (costs & impacts)
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Integrated Natural Hazard Management

Today's Weather (Information, Monitoring) → Weather Warnings
Past Weather (Extreme weather events) → Event Database
Future Weather (Regional Climate Models, Weather Generators) → Modelled Weather Parameters → Detailed Data on Infrastructure Assets (Locations, Maintenance, Status, Values)

Natural Hazards Maps (flooding, landslides, storms, windthrow, rockfall, avalanches...)
Incident/Failure Database (Delay minutes, line closures, reported damage)

Vulnerability Maps → Risk Management & Risk Maps (Risks to Asset integrity, environment, operation, safety, image)

Priority Setting (Risk classes, cost/benefit assessment, cost scenarios)

Adaptation Measures & Strategies
- Alarm Systems
- Monitoring Systems
- Protective Measures
- Change of Standards
- Relocation of Assets

Paris, October 19 2010
Thank you for your attention!