ICP Materials

Progress in activities in 2020 and future work

Sixth Joint Session of the EMEP Steering Body and the Working Group on Effects
14 - 18 September 2020
Contents

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• Trends in corrosion, soiling and pollution 1987–2019 – importance of individual pollutants
• UNESCO cultural heritage sites – importance of individual pollutants
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• Invitation to meeting in 2021
Progress in work plan items, ECE/EB.AIR/144/Add.2: 2020–2021 workplan for the implementation of the Convention

• 1.1.1.5 Impact of corrosion and soiling including trends
  – Revision of the Mapping Manual to include soiling (2021) – First draft and decisions on included materials

• 1.1.1.6 Policy-relevant user-friendly indicators (UNESCO sites)
  – Report focused on the relative importance of individual pollutants regarding the cost of damage for selected UNESCO sites (2020) – Report 89 Published on web page – selected results in this presentation
  – Report on application of models with increased resolution (1km x 1km) at selected UNESCO sites (2021) – Preliminary selection of suitable sites and model outputs
Monitoring and assessment of the impact on the environment of corrosion and soiling effects on materials and their trends

Report 88
Acidification – SO$_2$

For most materials, the effect of SO$_2$ is still significant despite the low levels.

Many other factors influence the corrosion as well.

The predictive ability of existing dose-response functions has decreased.

Figure 5 Correlation between carbon steel corrosion loss and individual environmental parameters
Ozone is included in the present dose-response function for copper (combined with SO$_2$).

There is no direct effect.
Ozone – copper 2(2)

Ozone can possibly have a small contribution, but this is only seen in a complicated non-linear analysis.
PM – soiling of modern glass

PM is included in dose-response function for Haze.

There is no decreasing trend of haze.
PM – soiling of coil coatings

For the new coil coated soiling materials there is a strong correlation between PM10 and gloss.

No trend data so far.
PM - corrosion

No correlation between PM and corrosion (despite several potential effects)

Zinc

Copper
Gathering information on policy-relevant user-friendly indicators to evaluate air pollution effects on materials by conducting case studies on UNESCO cultural heritage sites

Report 89
Limestone recession: 60% attributable to HNO₃; important contribute of Pm₁₀.

Copper corrosion: attributable to the combined effect of SO₂ and O₃.

Glass soiling: PM₁₀ and NO₂ contribute to about 90% of the cleaning cost of glass surfaces, almost divided between the two pollutants.

Limestone soiling: PM₁₀ only damage agent considered.
Depending on monuments and environmental conditions, 2050 target is achieved by pollutants reduction of 20-50% that allows a saving in maintenance/repair cost due to air pollution of 32-40% for both Limestone recession and Copper corrosion.
36th meeting
May 6-8, 2020, Teams

There were total of 24 participants from 13 countries, including the chair and secretariat of the working group on effects.

Separate sessions, general and
- Exposure for trend analysis
- Update of mapping manual
- Update of dose-response functions for zinc
- Measurements for evaluation of chloride deposition
- UNESCO Cultural heritage sites
Summary (as text) – 1(2)

1. The Head of ICP Materials reported on developments and the outcomes of the thirty-sixth meeting of the ICP Materials Task force (Teams, 6-8 April 2020). The main items discussed at the meeting were:
   a) Trends in pollution, corrosion and soiling;
   b) Update of the mapping manual to include soiling; and
   c) The call for data on UNESCO cultural World Heritage Sites.

2. Results from the recent trend analysis (1987–2019) show that acidification (SO₂) still plays a role for corrosion, but minor, and ozone is of minor importance for the corrosion of copper. There has not been possible to show any effect of PM on corrosion, but the effect on soiling (modern glass, coil coated materials) is high and significant. There is no decreasing trend in soiling of modern glass, which is one of the new materials to be included in the future update of the mapping manual to include soiling for the first time. A new exposure for trend analysis will start in 2020 with one- and four-year samples withdrawal in 2021.
3. At United Nations Educational, Scientific and Cultural Organization (UNESCO) cultural World Heritage Sites, the recession, estimated from present dose-response functions, and the consequent estimated maintenance/repair cost of calcareous stone materials seems to be dominated by the presence in the atmosphere of HNO$_3$, and PM$_{10}$. Copper corrosion is dominated by SO$_2$ and O$_3$ combined effect (dry deposition). PM$_{10}$ and NO$_2$ contribute to glass soiling for about 90%. PM$_{10}$ is the only pollutant considered for limestone soiling. A decrease in the concentrations of NO$_2$ in the atmosphere could bring benefits in reducing the damage and therefore the cost of the damage of the corrosion of the limestone and in the soiling of the glass. A decrease in the concentrations of PM$_{10}$ could bring benefits in reducing the damage and the cost in corrosion and soiling of limestone and soiling of glass.
37th meeting
May 5-7, 2021

Welcome to Bochum and the German mining Museum!

We hope to have the meeting next year that we could not have this year!