Occurrence of emerging flame retardants from e-waste recycling activities in the northern part of Vietnam

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Abstract

This study investigated the contamination status of 21 emerging flame retardants (FRs) in soils (n = 32) and river sediments (n = 8) from an e-waste recycling (EWR) site in the northern part of Vietnam. Among analyzed FRs, higher levels of decabromodiphenyl ethane (DBDPE) (ND-4200 ng/g dw), 1,2-bis-(2,4,6-tribromophenoxy)ethane (BTBPE) (ND-350 ng/g dw) and Dechlorane Plus isomers (DPs) (ND-65 ng/g dw) were found in soils near EWR workshops and open burning places. The highest concentrations of DBDPE (20 ng/g dw), BTBPE (5.7 ng/g dw) and DPs (6.7 ng/g dw) were also detected in sediments collected from the middle of the EWR site. The levels decreased concomitantly with increasing distance from the EWR site. These results indicate that these FRs were released to the surrounding environment from improper recycling activities, such as manual dismantling of devices and open burning of e-wastes. Moreover, the estimated daily intakes of those FRs via soil ingestion were approximately ten times higher for children than adults. To our knowledge, this is a first comprehensive study on characterization of soil and sediment contamination by a series of emerging FRs at an EWR site in Vietnam.

Relationship between land use variations and spatiotemporal changes in amounts of thermal infrared energy emitted from urban surfaces in downtown Tokyo on hot summer days

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Abstract

This study investigated spatial and temporal changes in amounts of thermal infrared (TIR) energy emitted from urban surfaces in downtown Tokyo, using 2 m spatial resolution data obtained from airborne TIR measurements at midday on the three different hot summer days: August 7, 2007, August 19, 2013, and August 19, 2014. Detailed land use data were also used for analyses of relationship between amounts of TIR energy and land use variations. The results showed significantly large amounts of TIR energy in high density wooden residential areas, whereas amounts of TIR energy in areas with office and commercial buildings were relatively small. As for the areas with office and commercial buildings, we found that amounts of TIR energy in many parts of urban renewal areas had clearly decreased between 2007 and 2013. In the renewal areas, many green surfaces have been provided in public open spaces. This would be one of the main causes of the decreases in amounts of TIR energy. Creation of public open spaces has been promoted by an incentive-based policy that offers an increase in the floor area ratio as a reward for constructing public spaces. These results strongly indicate that some governmental measures like the incentive system enacted for the areas with office and commercial buildings are required to reduce radiant heat in the high density wooden residential areas, because the maximum occurrence frequency of heat strokes tends to be recorded in residential areas and at midday.

東京湾の荒川及び多摩川河口域における放射性セシウム堆積状況

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Distribution of radio-cesium around the Tokyo Bay estuaries of Arakawa and Tamagawa Rivers

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Abstract

Surface sediment samples (approx. 0 - 8 cm) were collected from 7 stations of Tokyo Bay estuaries of Arakawa and Tamagawa Rivers for three years (Jul./2011 - Jul./2013), and analyzed for radio-cesium and dioxins. In 2011, radio-cesium activity was higher at the river mouth and it decreased apparently with the distance from the river mouth. On the contrary, dioxins concentration increased with the distance from the river mouth. This difference suggests that radio-cesium is bound to heavy particles such as

clay minerals, and dioxins are bound to light particles such as organic matters.
In 2011 - 2013, radio-cesium at the stations, about 4km apart from the river mouth, showed remarkable migration of radio-cesium from the upstream of each rivers.
Sediment core samples (10 cm X 1m) were collected at the deepest station (25m) among the 7 stations. The cores were cut into pieces with 2.5 cm depth, freeze-dried, and ^{137}Cs and dioxins were measured. ^{137}Cs was detected in 0 - 50 cm layer. There were several peaks of typical ^{137}Cs fallout events. By plotting the core depth and the event year, linear relationship was obtained: Sedimentation year = 2010 - 1.28 x Core depth (cm). The vertical profile of dioxins was well explained by the various environmental measures taken in the estimated years.

都市及び周辺地域におけるごみ焼却主灰のセメント資源化システムに関するモデル分析

(土木学会論文集G(環境), 72,(6),(環境システム研究論文集　第44巻), pp.Ⅱ_35-Ⅱ_44 (2016))

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要　　旨

本論文では、一般廃棄物最終処分場の延命化に寄与すべく，大都市におけるごみ焼却主灰のセメント資源化のシステム最適化を検討した．まず，セメント原料の化学成分を考慮し，既存セメント工場への主灰受入可能量を推計した．次に，既存セメント工場，新設エコセメント工場で資源化を実施した場合の主灰処理計画モデルを提案した．モデルによる分析の結果，主にトラック及び内航船舶による既存セメント工場への輸送が優先的に行われ，単独の自治体によるエコセメント工場は新設されないことがわかった．次世代型のエコセメント工場として他県との共同運営を検討し，既存工場とともに費用便益分析を行ったところ，今後既存工場での処理量を段階的に増やすのではなく，早期に他自治体とのエコセメント工場の共同運営を検討するべきであることが示唆された．

東京都における木造建築物のフロー・ストックの時系列的変化に関する研究

(土木学会論文集G(環境), 72,(6),(環境システム研究論文集　第44巻), pp.Ⅱ_35-Ⅱ_44 (2016))

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要　　旨

東京都は，日本の中心として，社会資本や建築物などの整備が進められ，蓄積されたストック量は膨大であり，かつ，現在においても大量の物質投入と排出を繰返している．本研究においては，木造建築物の時系列的なフロー・ストックモデルを構築し，東京都における1872 年から2050 年までの180 年間に適用した．建築物の残存率は，各建築世代に依存する構造的な寿命などの要因と災害や経済変化等の排出時点におけ

る外圧の双方により決定されると仮定し，統計値と合致するようフィッティング計算を行った．この結果，木造建築物のストック量（床面積）は 2033 年頃，滅失は 2047 年頃にピークを迎えることを示した．また，戦災やバブル経済などは，排出ピークを 10〜12 年程度シフトさせる影響力があったことが示唆された．

自治体における気候変動適応策の導入方法の検証と結果 —九都県市首脳会議地球温暖化対策部会におけるワークショップの実践—

（土木学会論文集 G(環境) 第 44 回環境システム研究論文発表会講演集，pp.171-176（2016））

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要　　旨

自治体における気候変動適応策（以下，適応策という）の導入過程には多くの課題があり，これを克服し速やかに適応策を導入するため，インタラクティブ・アプローチ（以下，本方法という）を提案した．

2014 年度は九都県市首脳会議環境問題対策委員会地球温暖化対策特別部会１）地球温暖化対策ワーキンググループ会議（以下，九都県市 WG という）において，９つの自治体職員によるワークショップ（以下，WS という）を通して，本方法の有効性を検証，さらなる頑健性の強化と本方法の改善を目指した．

その結果，課題克服だけでなく，本方法が具体的適応策の案出や関係部局の説得，参加者のキャパシティビルディング，適応策のトレードオフや相乗効果等の検討にも効果があることが確認できた．

環境・製錬分野における金属資源の分析方法に関する考察 — 環告 19 号試験，レアメタル等暫定分析法，マット融解法—

（廃棄物資源循環学会論文誌，27，pp.176-187（2016））

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要　　旨

廃電子機器や溶融メタル等，循環利用が可能な金属資源については，環境省告示による分析法は規定されていない。しかしながら，資源である以上，適切な資源性の評価方法が必要とされる。そこで，廃電子機器，溶融メタル等を分析試料として用い，環境省告示第 19 号(環告 19 号)，レアメタル等暫定分析法，および非鉄金属製錬分野において資源性の評価方法として利用されているマット融解法による各分析値の比較を行った。環告 19 号では，他の方法と比較して分析値は低濃度であったが，スクリーニング試験としての適用可能性が示唆された。一方，レアメタル等暫定分析法ではマット融解法と比較してやや分析の再現性は低かったものの，両者の分析値はおおむね一致していた。マット融解法は製錬業以外では実施が困難であるが，レアメタル等暫定分析法は自治体の環境研究所等で多種の金属分析が可能である。これにより，今後の自治体等での資源循環分野における分析方法として活用が期待できる。

東京湾北西域の環境基準点 St.35 における底質の堆積速度とダイオキシン類の鉛直分布

（水環境学会誌, 39,(6), pp.225-232 (2016)）

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Sedimentation Rate and Vertical Distribution of Dioxins in Sediment at Environmental-Quality Monitoring Station No. 35 in Northwest Tokyo Bay

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Abstract

Sediment core samples with a length of about 1 m were collected at station 35, which is located at the intersection of the extended lines of the Arakawa and Tamagawa Rivers in northwest Tokyo Bay. The core samples were cut into pieces of 2.5 cm depth and ^{137}Cs and dioxins were analyzed. There was a clear relationship between the depth and the years of some marked ^{137}Cs fallout events. The sedimentation rate at 0 - 50 cm depths was estimated to be 0.78 cm y-1.

On the other hand, the dioxin concentration began to increase in 1946, reached its maximum in 1970, and then gradually decreased. The change in the dioxin concentration was well explained by governmental actions, such as the establishment of environmental laws in the estimated years. The dioxins compositions in the surface sediments of seven stations around the Arakawa and Tamagawa Rivers showed that the sediment at station 35 was derived mainly from the Arakawa River.

Emission of Biogenic Volatile Organic Compounds from Trees along Streets and in Urban Parks in Tokyo, Japan

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Abstract

Ozone concentration in Tokyo Metropolitan area is one of the most serious issues of the local air quality.

Tropospheric ozone is formed by radical reaction including volatile organic compound (VOC) and nitrogen oxides (NOx). Reduction of the emission of reactive VOC is a key to reducing ozone concentrations. VOC is emitted from anthropogenic sources and also from vegetation (biogenic VOC or BVOC). BVOC also forms ozone through NOx and radical reactions. Especially, in urban area, the BVOC is emitted into the atmosphere with high NOx concentration. Therefore, trees bordering streets and green spaces in urban area may contribute to tropospheric ozone. On the other hand, not all trees emit BVOC which will produce ozone locally. In this study, BVOC emissions have been investigated (terpenoids: isoprene, monoterpenes, sesquiterpenes) for 29 tree species. Eleven in the 29 species were tree species that did not emit BVOCs. Three in 12 cultivars for future planting (25%) were found to emit no terpenoid BVOCs. Eight in 17 commonly planted trees (47%) were found to emit no terpenoid BVOC. Lower-emitting species have many advantages for urban planting. Therefore, further investigation is required to find the species which do not emit terpenoid BVOC. Emission of reactive BVOC should be added into guideline for the urban planting to prevent the creation of sources of ozone. It is desirable that species with no reactive BVOC emission are planted along urban streets and green areas in urban areas, such as Tokyo.

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