Climate Change and Real Estate Prices

Igor Semenenko¹ & Junwook Yoo²

¹Acadia University, Wolfville, Canada

²California State University, East Bay Hayward, United States

Correspondence: Igor Semenenko, Acadia University, Wolfville, NS, B4P 2R6, Canada. Tel: 1-902-585-1294. E-mail: igor.semenenko@acadiau.ca

Received: August 26, 2019	Accepted: September 15, 2019	Online Published: October 8, 2019
doi:10.5539/ijef.v11n11p1	URL: https://doi.org/10.5539/ijef.v11n11	p1

Abstract

Direct real estate returns are correlated with shifts in weather patterns, which are proxied by changes in four moments of distribution for differences in average and maximum daily temperatures, deviations from optimal temperatures and climate risk index reported by Germanwatch. Changes in the volatility of daily temperatures are inversely correlated with direct real estate returns. The volatility effect appeared to be marginal in 1996-2007, but it became more pronounced in 2010-2017. Other moments of the distribution, including changes in means, skewness and kurtosis, fail to obtain predictive power. Results are robust to tests in a smaller sample of capital cities and the exclusion of observations with the most significant volatility increases.

Keywords: climate change, direct real estate, residential real estate, moments of distribution, volatility, temperature

1. Introduction

Increase in global average temperatures has been documented since the mid-twentieth century, and weather scientists agree that global surface temperatures will increase by 1.5-2.0 degrees Celsius between by the end of the 21st century relative to 1986-2005, triggering heatwaves and changes in precipitations (IPCC, 2014).

Climate change affects economic outcomes directly and indirectly. First, it can impact the aggregate level of output, including labour productivity. Second, it can lower forward-looking asset prices by applying higher discount rates due to uncertainty and risk and/or by changing expected cash flows. The latter strand of literature includes explanations based both on market efficiency (Giglio, Maggiori, Stroebel, & Weber, 2015) and ehavioural arguments (Hirshleifer & Shumway, 2003).

Not surprisingly, forecasts of climate change on economic activity differ. Initially, weather impact research focused on the most vulnerable industries – health, insurance, tourism (Butsic, Hanak, & Valletta, 2011; Dlugolecki, 2008) and construction (see Ballesteros-Perez, Smith, Lloyd-Papworth, & Cooke, 2018, for excellent literature overview on the impact of climate change on construction). With a growing realization of climate change onset, the effort shifted from measuring weather impact to analysis of most vulnerable industries and areas of the globe (Patt et al., 2010; E. Somanathan, R. Somanathan, Sudarshan, & Tewari, 2015; Zander, Botzen, Oppermann, Kjellstrom, & Garnett, 2015). Finally, several studies attempted to perform broader assessment of climate risk impact on the aggregate economy (Deryugina & Hsiang, 2014).

Roback's (1982) study was the first to study impact of climate on house prices. More recently, a growing body of research attempted to establish a link between real estate economics and climate change (Bunten & Kahn, 2014; Giglio et al., 2015). In its methodological approach, this study follows previous work that utilized a regression framework to assess the effects of climate change on asset prices (Kahn, 2009; Hanak & Valetta, 2011; Albouy et al., 2016). Our paper contributes to a growing body of research on climate adaptation policies (Lesnikowski et al., 2019; Mechler et al., 2019).

In the real estate space, our paper is directly related to studies on market efficiency and risk premiums (Linneman, 1986; Case & Shiller, 1989; Ho, Addae-Dapaah, & Glascock, 2015). Several authors, including Case and Shiller (2003), Krainer and Wei (2004) and Campbell, Davis, Gallin, and Martin (2009), related house price inflation to lower expected risk premiums, suggesting one possible link between real estate returns and proxies for climate changes.

This paper attempts to estimate the potential impact of change in weather conditions on real estate prices using a sample of international data. We do not find a link between temperature increases and house inflation, but volatility changes in average daily temperatures are inversely related to price dynamics. These results suggest that the real estate market could be pricing in changes in long-term weather trends.

The rest of the article is structured as follows. The next section introduces my empirical methodology, which is followed by a description of the data, discussion of results, robustness checks, and concluding remarks. The appendix describes sources of data for weather and several control variables used in this study.

2. Methodology

2.1 Motivation

Ex-ante, it is not apparent that climate change will negatively affect asset prices, including direct real estate. Bunten and Kahn (2014) cite price increases in Miami, a coastal area at high risk of sea-level rise, suggesting that homeowners are not compensated for risk with a price discount. to other market segments, direct real estate is a prime candidate to test the impact of weather changes. First, it is a physical asset directly exposed to elements. Second, whereas corporations can diversify their asset base via cross-border investments and acquisitions, residential real estate is trapped by geography.

I put to the test several variables to examine their potential impact on housing prices. First, I 1st, 2nd and 4th moments of the distribution on daily temperature changes over 1996-2017 period compared to a control sample of 1950-1990. Real estate price changes could react to both temperature changes and shift in the properties of the distribution – higher volatility and fatter tails. Further, climate change is primarily related to temperature increases, so we examine the change in statistical properties of both average and maximum daily temperatures. In existing literature, Li, Cheng, and Shoaib (2018) document impact of temperature on real estate prices in the Hong Kong market, and Li (2009) finds inverse relationship between volume of monthly residential properties transactions and various weather metrics in Hong Kong.

The motivation to examine higher moments of distribution is related to Nordhaus (2001), Weitzman (2011) and Barro (2006). Barro employs rare-disasters framework to explain high equity premiums, low real interest rates and volatile stock returns and suggests an extension of the asset menu to include real estate and related housing price to disaster probabilities. This is the proposition tested in this study using higher moments of distribution and climate risk index reported by Germanwatch (see discussion below).

Second, we investigate whether asset prices are related to temperature deviation from optimal levels. Two benchmarks were tested – a daily average of 65 degrees Fahrenheit (18.3 degrees Celsius), a preferential daily average of the U.S. households (Albouy et al., 2016) and 57.7 degrees Fahrenheit (14.3 degrees Celsius), the daily average temperature in San Francisco in 1950-1990. This avenue of investigation was motivated by Bunten and Kahn (2014), who postulated that real estate price differential between San Francisco and Detroit could narrow if the climate in New England improves.

Finally, we examine whether housing prices are related to the risk of extreme events using climate risk index (CRI) developed by Germanwatch e.V., which uses data from the Munich Re reinsurance company. The index takes on low values when the climate is consistently fraught with risks or if a country is temporarily affected by adverse weather events.

Methodologically it is difficult to untangle climate trends defined as longer-term shifts in the climate over several decades from climate shocks - extreme weather events like natural disasters, floods, and droughts which are exacerbated by climate trends. However, the use of different proxies can help capture some of the effects of climate changes on asset prices.

2.2 Time Effects

We divide our sample into three subperiods using two classification criteria. One is related to the incidence of climate change, and the other reflects the onset of the financial crisis. To measure how climate risk assessment has changed over the period included in this study, we examined how the number of publications on related topics has changed in media outlets. We conducted a search on "climate change" string in the Factiva database and determined that coverage increased dramatically in 2007 (see figure 1).

This finding, together with the timing of the most recent financial crisis, prompted sample separation into three subperiods, including 1996-2007, 2008-2009 and 2010-2017. We examine the impact of weather metrics on property prices in each of these subsamples.

2.3 Literature Review and Model Specifications

Literature that examines the influence of macroeconomic variables on house prices could be grouped into three broad categories: econometric models, affordability indicators and asset pricing approach (Girouard, Kennedy, van den Noord, & Andre, 2006; Kishor & Marfatia, 2017). This study falls into the first of the three groups – it employs econometric models to establish fiscal policies impact on housing prices.

To the best of our knowledge, this the first study that relates climate change to a panel dataset of international residential real estate. One of the advantages of this paper is that it puts to test a variable that is clearly exogenous in the context of employed econometric models.



Figure 1. Number of hits on "climate change" in Factiva in "All News" and "Corporate/Industrial News" category

We use two model specifications to differentiate between long-term and transitory effects - short-run price reaction can differ from the long-run response (Adams & Füss, 2010; Kishor & Marfatia, 2017). First, we run an OLS regression with mean changes in inflation-adjusted real estate returns as a dependent variable, weather change proxies and a group of control variables:

$$\overline{\mathbf{r}} = \alpha_{i} + \beta_{\text{WEATHER}} ? \Delta_{\text{WEATHER}} + \beta_{t} ? X_{it} + e_{it}, \qquad (1)$$

where a mean inflation-adjusted return on real estate $\Delta_{WEATHER}$ measures climate change impact and X_{R} is a vector of country characteristics. Second, I re-visit the results using a panel data set, annual frequency data and Newey-West corrected errors. We put weather change variable to test in six models. All OLS models with means – see tables 4, 6 and 8 – use the same specifications as reported in panel A in table 4, but due to space considerations, we report only betas on climate change proxies and goodness-of-fit statistics. In a similar vein, all annual regressions reported in tables 5 and 7 replicate models from panel A of table 5. In each table, weather change betas are reported for three subperiods.

Explanatory variables aim to capture demand- and supply-side factors. The determinants from the demand side include real interest rate, population and immigration increases, domestic currency depreciation, changes in household credit and real GDP per capita growth, while supply (cost) side is captured by a change in building permits and construction costs (see Appendix A for sources of data).

3. Data

Daily weather data were retrieved from the National Centers for Environmental Information of National Oceanic and Atmospheric Administration (see Appendix A for exact locations). Weather stations were chosen based on proximity to capital (major) cities; when data were incomplete, the second- and third-best options were chosen. When fewer than 360 observations were available for each year, that data was omitted from calculations. This filter reduced weather sample size by 8 percent in 1950-2017. Table 1 reports averages for three moments of distribution based on daily average and maximum temperatures, and changes in subsequent periods.

Regression models test weather change variables in OLS models with means and Newey-West models using data with annual frequencies. To make results directly comparable, we restricted our sample to include countries for which data was available for all years in 2010-2017 period. This left 50 countries in the sample.

	Mean	Volatility	Kurtosis	Mean of maximum	Volatility of maximum	Kurtosis of maximum
1951 - 1990	13.1	6.64	-0.63	17.3	7.49	-0.59
1996 - 2007	0.78	-0.04	0.03	0.82	-0.07	0.00
2008 - 2009	1.08	-0.19	-0.04	1.28	-0.22	0.00
2010 - 2017	1.10	0.09	-0.02	1.23	-0.02	0.02

Table 1. Moments of distribution for weather variables in national markets

Note. the table reports first, second and fourth moment of distribution for average and maximum daily temperatures for control period from 1951 to 1990 and changes in subsequent periods.

Data on GDP growth, population changes, net migration and foreign exchange rates were sourced from the World Bank and the International Monetary Fund for Taiwan. The World Bank reports net migration in five-year intervals, so each figure was spread over a five-year period and scaled by starting population level to measure annual change. Total credit to households was obtained from the Bank for International Settlements credit to the non-financial sector (CRE) dataset (Note 1). Appendix A reports sources for interest rates, building permits and construction cost series from the DataStream database system. Use of a 10-year Treasury bond yield as a measure of nominal long-term discount rate is consistent with Lai and Van Order (2017) and Campbell et al. (2009).

4. Empirical Analysis

4.1 Weather Proxies and Correlations Analysis

Table 2 reports pairwise correlations between inflation-adjusted returns and various climate change proxies. Increase in volatility is inversely related to housing inflation in 2010-2017 and, less significantly, in 1996-2007. Maximum temperatures convey less information than average daily temperatures. Finally, neither climate risk index nor changes in temperature deviations from optimal values were significant in 2010-2017. It appears that households valued temperature changes toward optimum in 1996-2007, but not in later periods. In the remainder of this article, our analysis will focus on changes in the second moment of distribution for daily average temperatures.

	Variable means over each period			Annual frequencies		
	2010-2017	2008-2009	1996-2007	2010-2017	2008-2009	1996-2007
Mean	-0.20	-0.05	0.24	-0.02	0.10	0.08
Volatility	-0.49***	0.15	-0.28*	-0.19***	-0.00	-0.07
Excess kurtosis	-0.12	-0.08	0.39**	-0.04	-0.06	0.02
Mean of maximum	-0.33	0.07	0.37**	-0.04	0.20	0.14*
Volatility of maximum	-0.37*	0.16	-0.31	-0.13*	-0.09	-0.10
Excess kurtosis of max.	-0.04	0.11	0.23	-0.01	0.08	0.05
Climate risk index	0.07	-0.19	0.24	0.03	-0.08	0.12**
Deviation from 65 Fahr.	-0.02	0.25*	-0.45***	-0.04	0.16	-0.21***
Deviation from California	0.20	0.25*	-0.38**	0.04	0.13	-0.16***

Table 2. Pairwise correlations

Note. the table reports pairwise correlations of inflation-adjusted real estate returns and various weather change proxies - three moments of distribution for average and maximum daily temperatures, climate risk index and two measures of average temperature deviation from optimal temperatures defined as 65 Fahrenheit and San Francisco averages in 1950-1990. *,** and *** indicate a p-value of 10%, 5%, and 1%, respectively.

Table 3 reports 2010-2017 inflation-adjusted returns in 50 national markets included in this study, 28 capital cities and three moments of distribution that characterize weather changes relative to the 1950-1990 control period – change in mean annual temperature, the volatility of temperature and kurtosis, which measures fat tails of the distribution.

N	Country	Return in national market	Return in capital cities	Change in mean	Change in volatility	Change in kurtosis
1.	Spain	-3.4%	n.a.	1.59	0.78	-0.09
2.	Russia	-6.7%	-6.5%	1.58	0.75	-0.22
3.	Mexico	0.6%	3.6%	3.01	0.56	-0.39
4.	Croatia	-1.0%	-1.9%	2.00	0.54	0.04
5.	Serbia	-4.7%	-0.6%	1.49	0.44	0.16
6.	Greece	-6.2%	-7.0%	0.91	0.43	0.02
7.	Chile	2.4%	3.5%	0.84	0.42	0.00
8.	Hungary	1.1%	5.8%	1.41	0.42	0.06
9.	Czech	1.6%	n.a.	1.28	0.37	-0.01
10.	Romania	-2.3%	-4.9%	1.45	0.36	0.14
11.	Korea	0.1%	n.a.	0.79	0.34	-0.05
12.	Morocco	-1.2%	0.3%	0.89	0.33	-0.26
13.	Japan	1.5%	2.4%	0.89	0.27	-0.06
14.	Latvia	2.1%	n.a.	1.07	0.26	0.36
15.	Italy	-3.4%	n.a.	1.02	0.25	0.04
16.	Estonia	5.1%	n.a.	1.01	0.25	0.33
17.	Australia	4.0%	5.6%	0.65	0.23	-0.12
18.	Malta	-1.4%	n.a.	0.92	0.23	0.01
19.	Slovakia	0.2%	n.a.	1.11	0.18	0.03
20.	Israel	6.8%	n.a.	1.56	0.15	0.02
21.	Slovenia	-1.4%	-0.2%	1.45	0.14	0.00
22.	Austria	4.2%	4.3%	1.28	0.14	0.07
23.	Lithuania	1.4%	2.1%	0.99	0.13	0.22
24.	Kazakhstan	0.5%	n.a.	1.67	0.13	-0.17
25.	Luxembourg	3.7%	n.a.	1.53	0.12	0.02
26.	Malaysia	6.2%	7.2%	0.85	0.08	-0.37
27.	Cyprus	-0.3%	n.a.	1.47	0.06	0.09
28.	Taiwan	4.9%	n.a.	0.53	0.05	0.01
29.	Indonesia	-0.1%	-1.2%	1.05	0.04	-0.08
30.	Brazil	4.4%	1.0%	0.69	0.03	-0.24
31.	Portugal	0.1%	n.a.	0.35	0.02	-0.06
32.	South Africa	0.0%	n.a.	0.17	0.02	0.06
33.	United States	1.7%	n.a.	1.26	0.01	-0.03
34.	Switzerland	3.5%	n.a.	0.75	0.00	0.03
35.	Germany	2.4%	6.9%	1.18	0.00	0.06
36.	Ireland	-0.3%	3.0%	0.11	-0.03	0.03
37.	Singapore	-0.1%	n.a.	0.73	-0.05	-0.36
38.	Canada	5.3%	7.1%	1.14	-0.06	-0.12
39.	Thailand	1.7%	1.7%	0.67	-0.08	0.35
40.	France	0.3%	4.0%	1.04	-0.09	0.04
41.	New Zealand	5.6%	6.0%	0.39	-0.09	0.09
12	United	2 1%	5.2%	1.05	-0.09	0.04
72.	Kingdom	2.170	5.270	1.05	-0.09	0.04
43.	Netherlands	-1.2%	n.a.	1.34	-0.09	0.02
44.	Belgium	0.7%	n.a.	0.87	-0.20	0.08
45.	Colombia	4.8%	5.2%	0.96	-0.22	-0.87
46.	Sweden	5.6%	n.a.	1.32	-0.26	-0.06
47.	Iceland	5.1%	5.4%	0.96	-0.30	-0.29
48.	Finland	0.2%	0.5%	1.60	-0.33	0.06
49.	Norway	3.9%	5.3%	0.99	-0.50	-0.03
50.	Denmark	1.4%	n.a.	0.80	-0.73	0.18

Table 3. Changes in moments of distribution in 2010-2017 relative to 1950-1990 control period

Note. the table reports selected data for 2010-2017, including mean inflation-adjusted returns in the national market and capital cities, and changes in mean, volatility and kurtosis of average daily temperatures. Years with fewer than 360 observations are omitted. Countries are ranked by changes in volatility in descending order.

Results suggest several possible lines of investigation. First, changes in the volatility of daily temperatures could be correlated with levels of ; countries at the top of the list are less developed than the G7 group. Second, it appears that an increase in average temperature may be positively correlated with volatility increases. Pairwise correlation between the first and second moment of distribution reported in table 3 is 0.39, and the statistic is significant at one percent level. However, the result does not hold for data with annual frequencies and is not observed in previous periods.

4.2 Multivariate Tests

We proceed to test changes in volatility in regression with means. In panel A in table 4 volatility variable attains significance at conventional levels in all models; in a univariate model, it explains 24 percent of the variance in real estate returns. The result does not appear to be spurious – betas are negative in the 1996-2007 period, although they attain significance in only two models out of six in panel C of table 4. In 1996-2007, volatility increase explained 8 percent of the variance the dependent variable.

Panel A. OLS Regression models results for domestic markets, 2010-2017						
	(1)	(2)	(3)	(4)	(5)	(6)
Change in volatility	-0.05***	-0.04***	-0.05***	-0.05***	-0.04***	-0.05***
	0.01	0.01	0.01	0.01	0.01	0.02
Real interest rate		-0.37***				
		0.17				
FX depreciation		-0.39***				
		0.15				
Immigration			2.21*			
			1.18			
Population increase, net				1.23**		
				0.49		
Increase in household credits						0.13
						0.15
Increase in building permits					0.07**	
					0.03	
Construction costs						-0.02
						0.02
Growth, GDP per capita			0.57**	0.47**		
			0.24	0.23		
N. of observations	50	48	49	50	45	32
R-square	0.24	0.38	0.35	0.38	0.34	0.29
Adjusted R-square	0.23	0.34	0.30	0.34	0.30	0.21
Panel B. Betas and goodness-of-fit meas	sures, 2008-2009					
Change in volatility	0.02	0.02	0.01	0.01	0.02	0.01
	0.02	0.02	0.02	0.02	0.02	0.02
R-square	0.02	0.24	0.19	0.12	0.03	0.02
Panel C. Betas and goodness-of-fit meas	sures, 1996-2007					
Change in volatility	-0.09*	-0.11**	-0.06	-0.06	-0.07	-0.04
	0.05	0.05	0.04	0.04	0.05	0.03
R-square	0.08	0.25	0.47	0.46	0.06	0.57

Table 4. Regressions with means for national markets

Note. This table reports OLS regression model results with variable means for each variable. The dependent variable is inflation-adjusted return in national real estate markets. Panel A reports results for the 2010-2017 period; intercept is suppressed. Panels B and C report betas on change in volatility and measures of goodness-of-fit for 2008-2009 and 1996-2007, respectively. *,** and *** indicate a p-value of 10%, 5%, and 1%, respectively.

Control variables suggest that results are plausible. Interest rates and domestic currency depreciation are negatively correlated with housing price inflation, whereas GDP growth, population increases and migration fuel price appreciation. Finally, the positive coefficient on building permits increase is in line with previously reported results – Hwang and Quigley (2006) report a positive coefficient on housing supply, whereas Case and Shiller (2003) argue that housing starts may measure supply restrictions. Overall, results in annual regressions suggest that volatility increases lowered real estate price increases in 2010-2018. Next, we examine whether

results can be replicated using data with annual frequencies and in a sample of twenty-eight capital cities using regressions with means (tables 5 and 6). To make results directly replicable, capital cities subsample includes only observations for which national-level data are available.

Table 5	. Regression	s with annu	ial data	frequency	for nationa	l markets
	0			1 2		

Panel A. Selected output for models with	th annual rates, 2	2010-2017				
	(1)	(2)	(3)	(4)	(5)	(6)
Change in volatility	-0.015***	-0.013***	-0.012***	-0.012***	-0.013***	-0.012**
	0.005	0.005	0.005	0.004	0.005	0.006
N. of observations	329	313	323	328	288	401
R-square	0.03	0.08	0.14	0.15	0.03	401
Adjusted R-square	0.03	0.07	0.13	0.14	0.03	0.057
Panel B. Betas and goodness-of-fit me	asures, 2008-200	9				
Change in volatility	-0.00	0.02	0.01	0.01	0.00	-0.00
	0.02	0.02	0.02	0.02	0.02	0.01
R-square	0.00	0.04	0.27	0.20	0.00	0.02
Panel C. Betas and goodness-of-fit me	asures, 1996-200	7				
Change in volatility	0.00	0.00	0.00	-0.00	-0.01	0.00
	0.02	0.01	0.01	0.01	0.02	0.01
R-square	0.00	0.15	0.13	0.08	0.05	0.17

Note. The table reports selected output for models with inflation-adjusted return in national markets, annual data frequencies and Newey-West standard errors. Panels A-C report results for the 2010-2017, 2008-2009 and 1996-2007, respectively. *,**,*** indicate p-values of 10%, 5%, and 1%, respectively.

Regressions with annual data frequencies in table 5 employ Newey-West standard errors, and control variables in both tables are suppressed – beta signs on them are consistent with output reported in table 4 for national real estate markets. In both tables – table 5 with annual frequency data and table 6 with means for capital cities - betas on volatility changes take on a negative sign and are statistically significant.

Table 6. Regressions with means for capital cities

Panel A. Selected output for regress	Panel A. Selected output for regression models, 2010-2017							
	(1)	(2)	(3)	(4)	(5)	(6)		
Change in volatility	-0.07***	-0.05***	-0.04**	-0.06**	-0.05**	-0.07**		
	0.02	0.02	0.02	0.02	0.02	0.03		
N. of observations	28	28	28	28	23	18		
R-square	0.29	0.51	0.54	0.43	0.38	0.34		
Adjusted R-square	0.26	0.45	0.48	0.36	0.32	0.20		
Panel B. Betas and goodness-of-fit	measures, 2008-20	009						
Change in volatility	0.04	0.02	0.04	0.04	0.06	0.04		
	0.04	0.04	0.04	0.04	0.04	0.06		
R-square	0.04	0.14	0.32	0.21	0.13	0.11		
Panel C. Betas and goodness-of-fit measures, 1996-2007								
Change in volatility	-0.09**	-0.09*	-0.06	-0.07	-0.10*	-0.04		
	0.04	0.05	0.05	0.05	0.05	0.03		
R-square	0.21	0.26	0.30	0.31	0.29	0.74		

Note. The table reports OLS regression model results with variable means for each variable. The dependent variable is inflation-adjusted return in national real estate markets. Panels A-C report results for the 2010-2017, 2008-2009 and 1996-2007, respectively. *,** and *** indicate a p-value of 10%, 5%, and 1%, respectively.

5. Robustness checks

In table 7, we confirm that earlier results are not driven by outliers. We exclude Spain and Russia – two markets with the most significant increases in the volatility of temperature in 2010-2017 – from the original sample of 50 national markets. Change in volatility variable attains significance at conventional levels in all but one model (#6), in which only 30 out of 48 observations are used due to lack of data on the increase in household credits and construction costs, none of which attains significance.

Further robustness checks augmented models with fixed-year effects, starting level of wealth (lagged GDP per capita log), and sample expansion to incorporate countries for which data on returns are available for 2011-2017 rather than 2010-2017. This increases the sample size to 54 observations, adding two large markets – China and India – to the list. None of these changes affected the conclusions (results are available upon request).

Panel A. Regression model results in models with annual frequencies, 2010-2017									
	(1)	(2)	(3)	(4)	(5)	(6)			
Change in volatility	-0.04***	-0.03**	-0.03**	-0.03**	-0.02*	-0.02			
	0.01	0.01	0.01	0.01	0.01	0.02			
R-square	0.14	0.30	0.27	0.30	0.26	0.22			
Panel B. Betas and goodness-of-f	Panel B. Betas and goodness-of-fit measures, 2008-2009								
Change in volatility	0.03	0.05**	0.01	0.01	0.03	0.02			
	0.02	0.02	0.02	0.02	0.02	0.02			
R-square	0.04	0.30	0.19	0.12	0.06	0.03			
Panel C. Betas and goodness-of-fit measures, 1996-2007									
Change in volatility	-0.08	-0.10*	-0.07	-0.07	-0.05	-0.07**			
	0.05	0.05	0.04	0.04	0.05	0.03			
R-square	0.06	0.24	0.43	0.43	0.03	0.36			

Note. The table reports OLS regression model results with variable means for each variable in 48 national markets. Data sample excludes markets with the largest increase in volatility - Spain and Russia. Panels A-C report results for the 2010-2017, 2008-2009 and 1996-2007, respectively. *,** and *** indicate a p-value of 10%, 5%, and 1%, respectively.

6. Concluding Remarks

Our results provide direct statistical evidence that weather changes affect asset prices. We test changes in weather conditions using higher moments of the distribution, deviations from optimal temperatures and climate risk index reported by Germanwatch to measure the impact of extreme weather events. In 2010-2017, residential real estate prices were inversely related to changes in temperature volatility, but not other tested metrics.

Interestingly, volatility changes are positively correlated with temperature increases in this period. Therefore, volatility may capture the impact of changes in other weather-related characteristics. This is one potential area of future research.

Given the size of the real estate market and its allocation in the households' aggregate balance sheet (Note 2), The results of this paper can be of interest to both retail investors and investment advisors. Also, they are relevant for policymakers due to the climate's impact on social dynamics and climate adaptation policies. Hsiang, Burke, and Miguel (2013) summarize sixty studies from different fields and document that one standard deviation change in climate variables is associated with a probability change of intergroup conflict and interpersonal violence by fourteen percent and four percent, respectively. Increase in intergroup tensions provides another channel through which weather changes could affect real estate prices.

One of the shortcomings of this study is that it uses a straightforward metric to gauge the influence of weather changes, whereas the effects are likely non-linear (Albuoy et al., 2016; Zivin & Neidell, 2012). Further, climate change impact may not be measured directly and immediately – among other consequences; higher temperatures lead to species extinction and ecosystem dysfunction. It is, therefore, possible that in other periods weather changes may be captured through different moments of the distribution. This study represents the first step to fill this knowledge void.

References

Adams, Z., & Füss, R. (2010), Macroeconomic determinants of international housing markets. *Journal of Housing Economics*, 19(1), 38-50. https://doi.org/10.1016/j.jhe.2009.10.005

- Albouy, D., Graf, W., Kellogg, R., & Wolff, H. (2016). Climate amenities, climate change, and American quality of life. *Journal of the Association of Environmental and Resource Economists*, 3(1), 205-246. https://doi.org/10.1086/684573
- Ballesteros-Perez, P., Smith, S. T., Lloyd-Papworth, J. G., & Cooke, P. (2018). Incorporating the effect of weather in construction scheduling and management with sine wave curves: Application in the United Kingdom. *Construction Management and Economics*, 36(12), 666-682.

https://doi.org/10.1080/01446193.2018.1478109

- Barro, R. J. (2006). Rare disasters and asset markets in the twentieth century. *The Quarterly Journal of Economics*, 121(3), 823-866. https://doi.org/10.1162/qjec.121.3.823
- Bunten, D., & Kahn, M. E. (2014). The impact of emerging climate risks on urban real estate price dynamics. *National Bureau of Economic Research*, Working Paper 20018. https://doi.org/10.3386/w20018
- Butsic, V., Hanak, E., & Valletta, R. G. (2011). Climate change and housing prices: Hedonic estimates for ski resorts in Western North America. *Land Economics*, 87(1), 75-91. https://doi.org/10.3368/le.87.1.75
- Campbell, S. D., Davis, M. A., Gallin, J., & Martin, R. F. (2009). What moves housing markets: A variance decomposition of the rent-price ratio. *Journal of Urban Economics*, 66(2), 90-102. https://doi.org/10.1016/j.jue.2009.06.002
- Case, K. E., & Shiller, R. J. (1989). The efficiency of the market for single-family homes. *American Economic Review*, 79(1), 125-137. https://doi.org/10.3386/w2506
- Case, K. E., & Shiller, R. J. (2003). Is there a bubble in the housing market? *Brookings Paper on Economic* Activity, 34(2), 299-362. https://doi.org/10.1353/eca.2004.0004
- Deryugina, T., & Hsiang, S. H. (2014). Does the environment still matter? Daily temperatures and income in the United States. *National Bureau of Economic Research*, Working Paper 20750. https://doi.org/10.3386/w20750
- Dlugolecki, A. (2008). Climate change and the insurance sector. *The Geneva Papers on Risk and Insurance Issues and Practice*, 33(1), 71-90. https://doi.org/10.1057/palgrave.gpp.2510152
- Giglio, S., Maggiori, M., Stroebel J., & Weber, A. (2015). Climate change and long-run discount rates: Evidence from real estate. *National Bureau of Economic Research, Working Paper 21767*. https://doi.org/10.3386/w21767
- Girouard, N., Kennedy, M., van den Noord, P., & Andre, C. (2006). Recent house price developments: the role of fundamentals. *OECD Economics Department Working Papers*, 475.
- Hanak, E., Butsik, V., & Valetta, R. G. (2011). Climate change and housing prices: Hedonic estimates for ski resorts in Western North America. *Land Economics*, 87(1), 75-91. https://doi.org/10.3368/le.87.1.75
- Hirshleifer, D., & Shumway, T. (2003). Good day sunshine: Stock returns and the weather. *The Journal of Finance*, 58(3), 1009-1032. https://doi.org/10.1111/1540-6261.00556
- Ho, D. K. H., Addae-Dapaah, K., & Glascock, J. L. (2015). International direct real estate risk premiums in a multi-factor estimation model. *Journal of Real Estate Finance and Economics*, 51(1), 52-85. https://doi.org/10.1007/s11146-014-9474-z
- Hsiang, S. M., Burke, M., & Miguel, E. (2013). Quantifying the influence of climate on human conflict. *Science*, 341(6151). https://doi.org/10.1126/science.1235367
- Hwang, M., & Quigley, J.M. (2006). Economic fundamentals in local housing markets: Evidence from US metropolitan regions. *Journal of Regional Science*, 46(3), 425-453. https://doi.org/10.1111/j.1467-9787.2006.00480.x
- Intergovernmental Panel on Climate Change (IPCC). (2014). Climate change 2014: synthesis report. Contribution of working groups I, II and III to the fifth assessment report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, P. K., & Meyer, L. A. (Eds.)]. IPCC, Geneva, Switzerland. https://doi.org/10.1017/CBO9781107415416
- Kahn, M. E. (2009). Urban growth and climate change. *The Annual Review of Economics*, 1(1), 333-349. https://doi.org/10.1146/annurev.resource.050708.144249
- Kishor, K. N., & Marfatia, H. A. (2017). The dynamic relationship between housing prices and the macroeconomy: Evidence from OECD countries. *Journal of Real Estate Finance and Economics*, 54(2), 237-268. https://doi.org/10.1007/s11146-015-9546-8
- Krainer, J., & Wei, C. (2004). House prices and fundamental value. FRBSF Economic Letter.
- Lai, R.N., & Van Order, R. (2017). U.S. House Prices over the last 30 years: bubbles, regime shifts and market (in)efficiency. *Real Estate Economics*, 45(2), 259-300. https://doi.org/10.1111/1540-6229.12127

Lesnikowski, A., Ford, J. D., Blesbroek, R., & Berrang-Ford, L. (2019). A policy mixes approach to

conceptualizing and measuring climate change adaptation policy. *Climatic Change*, (issue not assigned). https://doi.org/10.1007/s10584-019-02533-3

- Li, R. Y. M. (2009). The impact of climate change on residential transactions in Hong Kong. *The Built & Human Environment Review*, 2(1), 11-22. https://doi.org/10.2139/ssrn.1429727
- Li, R. Y. M., Cheng, K. Y., & Shoaib, M. (2018). Walled buildings, sustainability, and housing prices: an artificial neural network approach. *Sustainability*, 10, 1-17. https://doi.org/10.3390/su10041298
- Linneman, P. (1986). An empirical test of the efficiency of the housing market. *Journal of Urban Economics*, 20(2), 140-154. https://doi.org/10.1016/0094-1190(86)90003-3
- Mechler, R., Bouwer, L., Schinko, T., Surminski, S. & Linnerooth-Bayer, J. (Eds.) (2019). The road traveled and pathways forward: A review of Loss and Damage from Climate Change: Concepts, Methods and Policy Options. https://doi.org/10.1007/978-3-319-72026-5
- Nordhaus, W. D. (2011). The economics of tail events with an application to climate change. *Review of Environmental Economics and Policy*, 5(2), 240-257. https://doi.org/10.1093/reep/rer004
- Patt, A. G., Tadross, M., Nussbaumer, P., Asante, K., Metzger, M., Rafael, J., Goujon, A., & Brundrit, G. (2010). Estimating least-developed countries' vulnerability to climate-related extreme events over the next 50 years. *Proceedings of the National Academy of Sciences of the United States of America*, 107(4), 1333-1337. https://doi.org/10.1073/pnas.0910253107
- Roback, J. (1982) Wages, Rents, and the Quality of Life. *Journal of Political Economy*, 90(6), 1257-1278. https://doi.org/10.1086/261120
- Somanathan, E., Somanathan, R., Sudarshan, A., & Tewari, M. (2015). The impact of temperature on productivity and labor supply: evidence from Indian manufacturing. *Indian Statistical Institute, Delhi Economics and Planning Unit*, Discussion paper 14-10.
- Weitzman, M. L. (2011). Fat-tailed uncertainty in the economics of catastrophic climate change. Review of Environmental Economics and Policy, 5(2), 275-292. https://doi.org/10.1093/reep/rer006
- Zander, K., Botzen, W. J. W., Oppermann, E., Kjellstrom, T., & Garnett, S. T. (2015). Heat stress causes substantial labour productivity loss in Australia. *Nature Climate Change*, 5(7), 647-652. https://doi.org/10.1038/nclimate2623
- Zivin, G. J., & Neidell, M. (2014). Temperature and the allocation of time: implications for climate change. *Journal of Labor Economics*, 32(1), 1-26. https://doi.org/10.1086/671766

Notes

Note 1. https://home.kpmg.com/xx/en/home/services/tax/tax-tools-and-resources/tax-rates-online/individual-income-tax-rates-table.html (accessed November 1, 2019).

Note 2. see U.S. data provided by the Federal Reserve at https://fred.stlouisfed.org/series/OEHRENWBSHNO and www.federalreserve.gov/releases/z1/dataviz/z1/balance_sheet/chart/, accessed on Dec 30, 2018.

Appendix A. Sources of data for daily temperatures, interest rates and building permits

The appendix reports weather station names from National Centers for Environmental Information of National Oceanic and Atmospheric Administration, Datastream series names for interest rates and building permits. Interest rates are measured – in descending order – using yields on 10-year government bonds, instruments with shorter maturities or bank regulators' re-financing rate.

	GIS TEMP station	Building permits series	Construction costs	Interest rate series
Australia	East Sale Airport	AUYODI15G	AUWOPVCOF	TRAU10Y
Austria	Wien	OEESK1HFE	OEYOP003F	TROE10T
Belgium	Uccle	BGESK1HFG	BGESPPUZR	TRBG10T
Brazil	Sao Paolo Aeroport	n.a.	BRCPCIM.F	BRSELIC prior to 2006;
				TRBR10T starting 2006
Canada	L'Assomption, QC	CNYODI15Q	CNYOP003F	TRCN10T
Chile	Arturo Menino Benitzz International	CLYOD008Q	n.a.	TRCL10T
Colombia	Bogota Eldorado	CBYODI15G	CBHOUSE%R	CBBCBPR before 2002;
				TRCO10T starting 2002
Croatia	Zagreb Gric	CTESUM8SF	CTAPWC4.	CTPRATE. before 2008;
				TRHR10T starting 2008

CyponsGeneral Bernardo O HigginsCPESUMSHCPESUMSHCPCONSTRFCPT61Cacch RegubinPenha LinusCZYOD115HCZESNY7DRCZEGEPR prior to 2000; TRC210T starting 2000DemmarkKochenhava Landschojskolen IDKYOD115QDKESNY7DRTRIN10TEstoniaTallinnEOYOD115PDKESNY7DRTRIN10TFinlandHelsinki Kaisaniemi AWSPNYOD115GBIYOP005FTRIN10TFranceParis Le JoargetPRYOD115GBIYOP005FTRIN10TGenemayBerlin TegelBIYOP015GBIYOP005FTRIN10TGreeceLarissaGRYOD115GHINESN77DRHINBASE prior to 1999; TRIN10T starting 2003IndonesiaZamboangan.a.n.a.TRIN10T starting 2003IndonesiaZamboangan.a.n.a.TRIN10T starting 2003IrelandDubin Phoenis ParkIRYOD15QRESTICKRTRIE10TStarelElatISYOD151ISIDLPRCFKIR600RItalyaRoardRYOD15QRESTICKRTRIF10TKorakistanAlmatyKZCONRESAKZCISTRCFKZGBOND, KOOR803R prior to 2000; KOOR803R prior to 2000; MASSATTR </th <th></th> <th></th> <th></th> <th></th> <th></th>					
Czeb Republic Paha Libus CZYOD15H CZESN77DR CZESN77DR CZESCBPE prior 0.000; TRC2UT starting 2000 Dennark Kocbenhavn Landbohojskolen I DKYOD115Q DKESNY7DR TRDK 107 Estonia Tallian DKYOD115Q DKESNY7DR TRDK 107 Estonia Tallian DKYOD115G PKESNY7DR TRR 107 Finland Helin Kiaisanieni AWS PNYOD115G PKESNY7DR TRR 107 Germany Berlin Tegel BDYOD115G PKENSY7DR TRR 107 Gereece Larissa GRYOD1151 GRCCRERF TRR 107 Hingary Debreen HNYOD115G HNESNY7DR TRIB107 Indonesia Zambaanga n.a. n.a. HDY1R076k in 1998-2002; TRIB107 TRIB107 TRTB107 TRB107 TRB107 Indonesia Zambaanga n.a. IDY1R076k in 1998-2002; TRB107 Israel Blat SYOD15H ISSLD1PRCF ISMIR08R TRB107 Israel Pata ISYOD15A ISSLD1PRCF	Cyprus	General Bernardo O Higgins	CPESUM8SH	CPCONSTRF	CPY61
TRC2107 sarring 2000TRC2107 sarring 2000EstoniaTallinnEVYODI15PDKESXY7DRROK107EstoniaTallinnEOYODI15PEOBK1 Vin 1999-2011; EOORO76 otherwiseFinlandHelsinki Kaisaniemi AWSFNYODI15GBYYOP005FTRFN107FranceParis Le BoargetFRYODI15GBYYOP003FTRR1017GreeceLarisaGRYOD115GHNESXY7DRHNBASE FORO15GTRGR107GreeceLarisaGRYOD115GHNESXY7DRHNBASE FORO15GTRGR107HugaryDebrecenTRIN107 sarring 2003TRIN107 sarring 2003LeelandReykjavikCHOUSCNLYOP003FTREIOT 	Czech Republic	Praha Libus	CZYODI15H	CZESXY7DR	CZBCBPR prior to 2000;
Denmark IsomiaKoebenhava Landbohojskolen 1DKTQDKESXYT0R DKESXYT0RTEDK107EdomiaTallinnEOYOD115PDKESXYT0REOIRK1Y in 1999-2011; EOQR0760 roberviseFinanceParis Le BourgetFNYOD115GFRVOP005FTRRN107GrenanyBerlin TegelBDYOD115GFRVOP005FTRRD107GrenceLarissaGRYOD115GBDYOP03FTRRD107GrenceLarissaGRYOD115GFRCCRESFTRGR107HungaryDebrecenCrUCUSCNICYOP003FTRR10107 starting 2003IndonesiaZamboangan.a.n.a.INTR10107 starting 2003IndonesiaZamboangan.a.n.a.INTR10107 starting 2003IrelandDublin Phoenix ParkIRYOD115QIRESTICKRTRR10107 starting 2003IrelandDublin Phoenix ParkIRYOD115HISBLDPRCFISMIR080RIalyRoma ClampinoITESUMSR5TYOP003FTRR1107JapanTokyoJPYWSH1QJPCSRNDLFTRP1017KazabkataAlmatyKZZONRESAKZCBNCDFKOQIR068R starting 2000LatviaDaugavpilsLVYOD0008QKOPSMCTFAKOQIR068R starting 2000LatviaDaugavpilsLVYOD15GLXESX7TDRKLWGBNS starting 2003LatviaDaugavpilsLNQOD15HLNESX7TDRKLWGBNS starting 2002LatviaLaugaNaCBOPCONCMYGGBNDDMACBUNGRMaltaLaugan.a.n.a.n.a.LavembourgLaxembourgNGBSFCRAMX					TRCZ10T starting 2000
EatoniaTallianEOYOD15PDKESXY7DREOQIRU76R otherwiseFinlandHelsinki Kaisaniemi AWSFNYOD15HFNYOP005FTRENIOTFranceParis Le BourgetRDYOD15GRESXY7DRTRRIOTGermanyBerlin TegelBDYOD115GRESXY7DRTRRIOTGreeceLarissaGRYOD115HGRCCIRESFTRGRIOTImogaryDebrecenHNYOD115GHNESXY7DRHNBASE froir to 1999; TRRINOT starting 1999HelandReykjavikCHOUSCNKYOP003FICEGCBPR prior to 2003; TRRINOT starting 2003IndonesiaZamboangan.a.n.a.ITRU10T starting 2003IrelandDublin Phoenix ParkIRYOD115QIRESTICKRTRREIOTIsraelElatISYOD115HISYOD15TISRIORS TRREIOTIsraelElatISYOD15HIYOP003FITRITOTJapanTokyoJPYWS14QJPCSINDLFTRRITOTKarakhamAlmatyKZONRESAKZCSTPRCFKZGROND.Korea, SoutSeoul CityVY00008QKOPPSMCTFAKOG0008G starting 2000LatviaDaugaypilsLVY00115HLVSEXY7DRLVYR076 in 1998-1999; LOXGBD7 starting 2003LithuaniaVilnissLNQ0015HLNESXY7DRLXRENCHMalaysiaKuala Lampur Internationaln.a.n.a.MXGB0ND.LavembourgLusephorgMXGBSFCRAMXYEGDVD.MXGB0ND.MalaysiaLaupur Internationaln.a.n.a.MXYEGBONR starting 2007MarciaLusephorgNX	Denmark	Koebenhavn Landbohojskolen 1	DKYODI15Q	DKESXY7DR	TRDK10T
Finand Heshinki Kaisaniemi AWS FNYOD15G FNYOP005F TRRN107 France Paris Le Dourget FNYOD115G FRSSXY7DR TRRD107 Germany Berlin Tegel BDYOD115G BDYOP03F TRRD107 Greece Larissa GRYOD115G HNESXY7DR TRRD107 Greece Larissa GRYOD115G HNESXY7DR TRRD107 Greece Larissa GRYOD115G HNESXY7DR TRRD107 Indonesia Reykjavik ICHOUSCN ICYOP003F TRR107 starting 2003 Indonesia Cambianga n.a. n.a. IDYR076R in 1998-2002; Ireland Dublin Phoenix Park IRYOD15Q IRESTICKR TRR107 Ireland Damino ITSUM85F TSR0070003F TRR107 Ireland Namay KOYOD003C KOPRSMCTFA KOOIR06R starting 2003 Lavia Daugavpils LVYOD15G LVSSN7DR LVSGBOND. Lavia Daugavpils LVYOD15G LVSSX7DR LVSGBOND. Lavia Dau	Estonia	Tallinn	EOYODI15P	DKESXY7DR	EOIBK1Y in 1999-2011;
FinlandHelsinkl Kaisaniemi AWSFNY OD15HFNY OP005FTRFN ITFanceParis Le BourgetsFNY OD15GBDX OP003FTRFN ITGermanyBerlin TegelBOY OD15GBDX OP003FTRSD ITGreeceLarissGR YOD15GHESS XY DRTRSB ADS For to 1999; TRFN ITHungaryDebrecenHYY OD15GHESS XY DRHNSB ASE prior to 1999; TRFN ITLealadReykjavikCHOUSCNKYOP003FICECBPR prior to 2003; TRFN ITReindingAmboangan.a.n.a.IDY BR/07G Rin 1998-2002; TRFN ITIrelandDubin Phoenix ParkIRY OD15QIRESTICKRTREDUT starting 2003IrelandDubin Phoenix ParkISY OD115HISL DEPRCFISM R080RIavaRoma CampinoITSU MASSFITY OP003FTRT 10TJapanToky oJPY WS141QJPCSBNDLFTRP 10TJapanSeoul CityKZ 200 NRESAKZ COTRESAKZ ORNESAKazabastaAlmatyKZ 200 NRESAKZ ST PKCFKZ 00R00, Brio 76 2000; KOOR080 starting 2000LatviaDangavpilsLVY OD115GLVESX YTDRLVY R076 Na 1998-1999; LVG BD5Y starting 2003LithuaniaVininiaLNQ DI15FLNESX YTDRLNG RNA 1998-1999; LVG BD5Y starting 2003LithuaniaVininiaLavenbourgAnan.a.NA 600 R0 ADSMariaLavenbourgAirportLXY OD115GLXESX YTDRLXY R076 Na 1998-1999; LVG BD5Y starting 2007MariaLavenbourgLavenbourgMA 6					EOQIR076R otherwise
FranceParis LeourgetFKY ODI15GFKESXY7DRTKFR10TGeenaaryBerin TegelBDYOD15GBDYON03FTKBD10TGeeceLarisaGRYOD15HGRCCRESFTRGD10THungaryDebrecenHNYOD15GHNESXY7DRHNBBASE prior to 1999; TKHN10T starting 1999LedandReykavikICHOUSCNICYOP003FTKES10T starting 2003; TKIS10T starting 2003IndonesiaZamboungan.a.n.a.TRUID17 starting 2003; TKIS10T starting 2003IrelandDublin Phoenix ParkIKYOD15QIRESTICKRTKEL10TIsraelGeno CampinoITESUMSFTSP00057TKIT10TJapanTokyoJPYWSH1QJPCSENDLFTKIT10TJapanTokyoJPYWSH2QJPCSENDLFKCGB0ND.KrazhstanAlmatyKZCONRESAKZCSTPRCFKZGBNND.KrazhstanViniusLVYOD15HLVESXY7DRLVFR07R In 1998-1999; LVYOD15HLitwiaDaugavpilsLYYOD15HLNESXY7DRLNRPAON prior to 2003; LNRBAON prior to 2003; LNGBON starting 2003LataenbourgLuxembourg AirportLXQOD15HLNESXY7DRLNRPAON prior to 2003; MACBD10 starting 2003LataenbourgLuxembourg AirportLXQOD15HLNESXY7DRLNRBAON prior to 2003; MACBD10 starting 2003LataenbourgLuxembourg AirportLXQOD15HLNESXY7DRLNRBAON prior to 2003; MACBD10 starting 2003MaisaKaala Lampor Internationaln.a.MXCBBON starting 2003MaisaKaala Lampor Internationaln.a.<	Finland	Helsinki Kaisaniemi AWS	FNYODI15H	FNYOP005F	TRFN10T
Gernany GernanyBerlin TegelBD YODD15GBD YOP005FTRBIOTGreece HungaryLarissaCRYODL15HGRCCRESFTRGR10THungary LeclandReykjavikCHOUSCNLCYOP003FTRBIOT starting 1999IcelandReykjavikCHOUSCNLCYOP003FICBCBPR prior to 2003; TRBIOT starting 2003Indonesia IandonesiaZamboangan.a.n.a.DVIR076k in 1998-2002; TRBIOT starting 2003IrelandDubin Phoenix ParkIRYOD115QIRESTICKRTREIOTIsraelElatISYOD115HISBLDPRCFISMIR080RIajapaTokyoJPYWSH1QJPCCSBNDLFTRP10TKazakhstanAlmatyKZCONRESAKZCSTPRCFKZGBNOD; KORR080R starting 2000LatviaDaugavpilsLVQOD15HLVESXYDRLVRBCNS starting 2000LatviaDaugavpilsLNQOD15HLNESXY7DRLNRBAON prior to 2003; LOGBOND starting 2000LithuaniaViniusLNQOD15HLNESXY7DRLNRBAON prior to 2003; LOGBOND starting 2000LithuaniaViniusLNQOD15HLNESXY7DRLNRBAON prior to 2003; LOGBOND starting 2000LithuaniaViniusLNQOB15GNAFESXY7DRLNRBAON prior to 2003; LOGBOND starting 2000LithuaniaViniusLNQOB15GNAFESXY7DRNAGBONDMalaLuqan.a.n.a.MAGBONDMalaLuqaNAGBEYCRAMAESXY7DRNAGBOND, MAYG1prior to 2007; MAGBONDMalaLuqaNCGBONDMAYG1prior to 2007; MAGBO	France	Paris Le Bourget	FRYODI15G	FRESXY7DR	TRFR10T
GreeceLarisaGR VDD115HGR CCIRESFTRGNIDTHungaryDebracenHNYOD115GHNESXY7DRHNBASE prior to 1999; TRHN10T starting 1999LeclandReykjavikLCHOUSCNLCYOP003FICRCERP prior to 2003; TRIS10T starting 2003IndonesiaZamboangan.a.DVIRORK in 1998-2002; TRIS10T starting 2003IrelandDublin Phoenix ParkIRYOD115QIRESTICKRTRIE10TIsraelElatISYOD15HISBLDPRCFISMR080RIadyRoma CiampinoITESUMSSFTYOP003FTRT110TJapanTokyoJPYWSI41QJPCSBNDLFTRT10TJapanTokyoKOYOD08QKCZGBOND.Korea, SouthKOQIR063R prior to 2000; KOUR080R starting 2000LatviaDaugavpilsLVYOD115HLVESXY7DRLVRR076R in 1998-1999; LVSR076R IN 1998-1999; LVSR076R IN 1998-1999; LVSR076R IN 1998-1999; LUSR05Y starting 2000LithuaniaVinusLVYOD115GLXESXY7DRLNRCNON prior to 2003; LORGDND, KOUR080R starting 2003LithuaniaVinusLXCYOD115GLXESXY7DRLNRCNON prior to 2003; MAGID 10 starting 2003LithuaniaLungur Internationaln.a.NAGCBOND, MAGID 10 starting 2003MataLuagNAESUMSFMAESXY7DRLNRGNN, MAYIR066R prior to 2002; MXYIR066R prior to 2002; MXYIR066R prior to 2002; MAYIR066R prior to 2002; MAYIR066R prior to 2003; MAYIR066R prior t	Germany	Berlin Tegel	BDYODI15G	BDYOP003F	TRBD10T
HungaryDebrecenHNYDD115GHNESXY7DRHNBASE prior to 1999; TRHN10T starting 1999leclandReykjavikICHOUSCNICYOP003FICBCBPR prior to 2003; TRIS10T starting 2003ladonesiaZamboangan.a.n.a.DVIR076k in 1998-2002; TRID10T starting 2003leclandDublin Phoenix ParkIRYOD115QIRSTTCK RTRE10TIsraelElatISYOD15HISBLDPRCFISMR080RIapanTokyoJPYWSH1QJPCSBNDLFTRP10TKazakhstanAlmayKZCONRESAKZCSTPRCFKZORNON.Korea, SouthScoul CityKYOD115HLVESXY7DRLVTR076k in 1999; LVTR076k in 1999; 1000LatviaDagaspilsLVYOD115HLNESXY7DRLNEROND prior 0 2003; LNGBOND starting 2000LithaniaVilnuisLXQOD115HLNESXY7DRLNEROND, MOROND starting 2003LatvembourgLaxembourg AirportLXYOD115GLXESXY7DRLXBENCHMalataLuqan.a.n.a.N.GEOND, MAESYT7DRMCBOND, MATIG 2002; MYIR060R starting 2002Morocorager Cityn.a.n.a.MCESYT7DRLXBENCHMalataLuqaMAESWTREMXCBOND, MAY61prior to 2007; MAGEOND, MATIG 2002; MYIR060R starting 2002MYIR060R prior to 2002; MYIR060R starting 2002NorwayOslo BindemMXOD015GNZPDLONFAC MYIR060R starting 2002NorwayOslo BindemMXOD015GNZPDLONFAC MYIR060R Starting 2002SerbiaBelgrado Dservatoryn.a.n.a. <t< td=""><td>Greece</td><td>Larissa</td><td>GRYODI15H</td><td>GRCCIRESF</td><td>TRGR10T</td></t<>	Greece	Larissa	GRYODI15H	GRCCIRESF	TRGR10T
Indensize Reykjavik ICHOUSCN ICYOP003F ICBCNEP proto 2003; TRIS10T starting 2003 Indonesia Zamboanga n.a. n.a. TRIS10T starting 2003 Indonesia Zamboanga n.a. TRID10T starting 2003 Ieland Dubin Phoenix Park IRYOD115Q RESTICKR TREIOT Israel Elat ISYOD115H ISBLDPRCF ISMR080R Israel Band Campino ITTSUM88F ITYOP003F TRIT10T Japan Tokyo PWWSIAIQ PCSBNDLF TRP10T Japan New Olity KOYOD008Q KOPSMCTFA KOQIR063R prior to 2000; Kazakhstan Almay KZCONRESA KZCSTPRCF KZCBOND Latvia Daugavpils LVYOD115H LVESXY7DR LVEBDSY starting 2003 Lithuania Vinius LVYOD115G LXESXY7DR LXEBCNP Malaysia Kuala Lampur International n.a. MAYGBOND Malaysia Kuala Lampur International n.a. MAYGBOND Malata Laqa MAYGBOS	Hungary	Debrecen	HNYODI15G	HNESXY7DR	HNBBASE prior to 1999;
Iceland Reykjavik ICHOUSCN ICYOP003F ICEGPRP prior to 2003; TRIS IOT starting 2003 Indonesia Zamboanga n.a. n.a. ITRIS IOT starting 2003 Indonesia Zamboanga n.a. n.a. ITRIS IOT starting 2003 Ireland Dublin Phoenix Park IRYODI 5Q IRESTICKR TRIEIOT Irady Roma Ciampino ITESUMSSF ITNPO03F TRITIOT Japan Tokyo JPYWSM1Q JPCSBNDLF TRIPIOT Kazakhstan Almaty KZCONRESA KZCSTPRCF KZGBOND, Korea, South Soul City KOYOD008Q KOPPSMCTFA KOORROSR starting 2000 Latvia Daugavpils LVYODI15H LVESXY7DR LVRBOND starting 2003 Latvia Laxembourg Airport LXYODI15G LXESXY7DR LNRBOND, Malay Lag MAESUMSF MAESUNFA MAGBOND, Malay Lag n.a. n.a. MAGBOND, Marco Cuernavaca MXESUHFE MLESKVTR MXCBORN city 1007(150) <t< td=""><td></td><td></td><td></td><td></td><td>TRHN10T starting 1999</td></t<>					TRHN10T starting 1999
Indonesia Jamboanga n.a. INFIGUT starting 2003 Indonesia Jubin Phoenix Park IRYODI15Q IRESTICKR TRID10T starting 2003 Ireland Dubin Phoenix Park IRYOD115H ISRLDPRCF ISMIR080R Israel Elat ISYOD15H ISRLDPRCF ISMIR080R Iay Roma Ciampino ITESUMSSF ITYOP003F TRIT10T Japan Tokyo JPWSI81Q JPCSBNDLF TRJP10T Kazakhsta Almaty KZCORNESA KZCSTRCF KZOBND. Korea, South Seoul City KZOND008Q KOPESMCTFA KZOBND. Latvia Daugavpils LVYOD115H LVESXY7DR LVRPAON Prior to 2003; Lithuania Luxembourg Airport LXYOD115G LXESXY7DR LXBENCH Malaysia Kuala Lumpur International n.a. n.a. MCGBOND starting 2002 Marico Larembourg Airport MLSSUHSE MCGBOND starting 2002 MCGBOND starting 2002 Marico Larembourg Airport NLSYODI15G NZPIECON NAGEDIO starting 2002 <	Iceland	Reykjavik	ICHOUSCN	ICYOP003F	ICBCBPR prior to 2003;
IndonesiaZamboangan.a.n.a.TRID10T starting 2003 TRID10T starting 2003IrelandDublin Phoenix ParkIRYOD115QIRESTICKRTRIE10TIsraelElatISYOD115HISBLDPRCFISRIR080RIsraelRoma CiampinoITSUMSSFITYOP003FTRIT10TJapanTokyoJPYWSI41QJPCSBNDLFTRID10TKazakhstanAlmatyKZCONRESAKZCORRESKZCORRORKorea. SoudSeoul CityKCYOD008QKOPPSMCTFAKOQIR063R prior to 2000; to 2000; to 2000; to 2000; to 2000; to 2003; 					TRIS10T starting 2003
TerlandDublin Poenix ParkIRVOD115QIRESTICTERLE10TIsraelElatISYOD115HISBLDPRCFISMIR080RItalyRoma CiampinoITESUM8SFITYOP003FTRIF10TJapanTokyoJPWSHQJPCSBNDLFTRIF10TJapanSoul CityKZCONRESAKZCORFCFKZGBOND.Korea, SouthSoul CityKOYOD008QKOPPSMCTFAKOQIR063R prior to 2000; KOR068 starting 2000LatviaDagavpilsLVYOD115HLVESXY7DRLVTR076R in 198-1999; LVGBDSY starting 2003LithuaniaVilniusLNQOD115HLNESXY7DRLNRBAON prior to 2003; LINGBOND starting 2003LuxembourgLuxembourg AirportLXYOD115GLXESXY7DRLNRBAON prior to 2007; MAGBD10 starting 2007LuxenhourgLuxennbourg AirportLXYOD115GLXESXY7DRLXBENCHMalaysiaKuala Lumpur Internationaln.a.n.a.MGGBOND.MalaysiaGarnavacaMXGD8FCRAMXPPDCONFACMYPR080R starting 2007MexicoCaernavacaMXGD8FCRAMXPPDCONFACMYPR080R starting 2002New calainNucceragil AirporNZYOD115GNUESTICKRNCGBOND.New calainIncereagil AirporNZYOD115HNUESTICKRNCGBOND.New calainSigapore Changi InternationalNYEONISHNUESTICKRNCGBOND.New calainSigapore Changi InternationalSPPKUPIPNUESTICKRNCGBOND.New calainSigapore Changi InternationalSPPKUPIPNuESTICKRNCGBOND.<	Indonesia	Zamboanga	n.a.	n.a.	IDYIR076R in 1998-2002;
ItelandDubli Phoenix ParkIKYOD115QIRESTICKRTRETIOTIsraelElatISYOD15DISSOD15FISBLDPRCFISMIR080RItalyRoma CiampinoITSUMSSFITYOP005FTRTIOTJapanTokyoJPYWSI41QJPCSBNDLFTRP10TKazakhstanAlmatyKZCONRESAKZCSTPRCFAKZGBOND.Korea, SouthSeoul CityKVYOD008QKOPPSWCFAKQGIR063R prior to 2000; LVGBDSY starting 2000LatviaDaugavpilsLVYOD115HLVESXY7DRLVRBON prior to 2003; LVGBDSY starting 2003LixtembourgLuxembourg AirportLXYOD115GLXESXY7DRLXEBNCHMalaysiaKuala Lumpur Internationaln.a.n.a.MXGBOND.MaticoLuqaMAESUM8SFMAESXY7DRMXFIR060R prior to 2003; LXEBNCHMaticoLuremavacaMXGD8FCRAMXPPDCONFACMXYIR060R prior to 2002; MXYIR060R prior to 2002; MATIO1 Starting 2007MexicoCuernavacaMXGD8FCRAMXPPDCONFACMXYIR060R prior to 2002; MXYIR080R starting 2007MexicoDen Helder 1NLESK1HFENLESXY7DRNLGBOND.New ZealandInvercargil AirporNZYOD115GNZPBUCOFNZYIR080New ZealandInvercargil AirporNZYOD115GNZPBUCOFNZYIR080New ZealandInvercargil AirporNWYOD115GNZPBUCOFNZYBON0New ZealandInvercargil AirporSXOAJ32XASZESY7DRNLGBOND.NorwayOlso BindernNuNUNUSUG10T <t< td=""><td></td><td></td><td></td><td></td><td>TRID10T starting 2003</td></t<>					TRID10T starting 2003
IsraelEst of ISYODIISHISYODIISHISUDPRCFISMIR080RItalyRoma CiampinoITESUM8SFITYOP003FTRUTIOTJapanTokyoJYWSI4IQPCSBNDFTRUTIOTKazakhstanAlmatyKZCONRESAKZCSTPRCFKZGBOND.Korea, SoulSoul CityKZCONRESAKZCSTPRCFKZGBOND.LatviaDagavpilsLYYODII5HLVESXY7DRLVYB0768 in 1998-1999; LVBBDST starting 2000LatviaVilninsLNQODI15HLNESXY7DRLNRPAON prior to 2003; LNRBOND starting 2003Luxembourg AirportLXYODII5GLXESXY7DRLNRBOND starting 2003MalaysiaKuala Lumpur Internationaln.a.n.a.MCGBOND.MalaysiaKuala Lumpur Internationaln.a.n.a.MCGBOND.MalaysiaCaemavacaMXGD8FCRAMXPPDCONFACMYIR066R prior to 2002; MYIR060R prior to 2002; MY	Ireland	Dublin Phoenix Park	IRYODI15Q	IRESTICKR	TRIE10T
Italy JapanRona CiampinoITESUM8SFITYOP003FTRTI/IOTJapanTokyoJPYWSI41QJPCSBNDLFTRJ0TKazakhstanAlmatyKZCONRESAKZCSTRCFKZGBOND.Korea, SouthScoul CityKOYOD008QKOPPSMCTFAKOQIR063R prior to 2000; KOOIR080R starting 2000LatviaDaugavpilsLYYOD115HLVESXY7DRLYIR076 in 1998-1999; LVGBDSY starting 2000LithuaniaVilniusLNQOD115HLNESXY7DRLNRPAON prior to 2003; LUGBOND starting 2003LuxembourgLuxembourg AirportLXYOD115GLXESXY7DRLXBENCHMalaysiaKulal Lumpur Internationaln.a.n.a.MYGBOND.MaltaLuqan.a.n.a.MAESXY7DRMXYR06R prior to 2007; MAGBD10 starting 2007MexicoCurenavacaMXCD8FCRAMXPPDCONFACMXYR06RR prior to 2002; MXYR06R starting 2002MoroccoTangier Cityn.a.n.a.MCGBOND.NetherlandsDen Helder 1NLESK1HFENLESKY7DRNLGBND.New ZealandInvercargill AirporNZYR0115GNZVR1K06RNZVR080RNorwayOslo BlindemNWYOD115GNWESTICKRNWGBOND.NorwayOslo BlindemSCONBRNRSCRPTOTRSQIR080R starting 1999; RSQIR080R starting 1999; RSQIR080RSCNOT32XT	Israel	Elat	ISYODI15H	ISBLDPRCF	ISMIR080R
JapanTokyoJPYWSI41QJPCSBNDLFTRJP10TKazakhstanAlmatyKZCONRESAKZCSTPRCFKZGBOND.Korea, SouthSeoul CityKOYOD008QKOPPSMCTFAKOQIR063R prior to 2000; KOOIR080R starting 2000LatviaDaugavpilsLVYOD115HLVESXY7DRLVYIR076R in 1998-1999; LVGBDSY starting 2000LithuaniaVilniusLNQOD115HLNESXY7DRLNRPAON prior to 2003; LNGBOND starting 2003LaxembourgLuxembourg AirportLXYOD115GLXESXY7DRLXBENCHMalaysiaKuala Lumpur Internationaln.a.n.a.MAESUM8SFMAESUX7DRMAGBOIDMalaysiaKuala Lumpur Internationaln.a.n.a.MAESUX7DRMYRI060R prior to 2007; MAGBD10 starting 2007MexicoCuernavacaMXGD8FCRAMXPPDCONFACMXYIR060R prior to 2002; MXYIR060R prior to 2002; MXYIR060R prior to 2002; MXYIR060R starting 2002NorveaTanjer Cityn.a.n.a.m.a.NetherlandsDen Helder 1NLESK1HFENLESXY7DRNLGBOND.NorwayOslo BindernNZYOD15GNZPIBUCOFNZYIR060R prior to 2002; MXYIR060R prior to 2002; MXYIR060	Italy	Roma Ciampino	ITESUM8SF	ITYOP003F	TRIT10T
KazakhstanAlmatyKZCONRESAKZCOSTRECAKZCBOND.Korea, SouthSoul CityKOYOD08QKOPPSMCTEAKZGBOND.LatviaDaugavpilsLVYOD115HLVESXY7DRLVYIR076R in 1998-1999; LVGBD5Y starting 2000LithuaniaVilniusLNQOD115HLNESXY7DRLVYRR076R in 1998-1999; LVGBD5Y starting 2000LithuaniaVilniusLNQOD115HLNESXY7DRLVRRAON priot 0 2003; LNGBOND starting 2003LuxembourgLuxembourg AirportLXYOD115GLXESXY7DRLXBENCHMalaysiaKuala Lumpur Internationaln.a.n.a.MYGBOND.MaltaLuqaMAESUM8SFMAESXY7DRMYGBOND.MarcioCuernavacaMXGD8FCRAMXPPDCONFACMXGBOND; MXYIR060R starting 2007MoroccoTangier Cityn.a.n.a.MCGBOND; MYYIR080R starting 2007NorwayOlo BlindernNLESK1HFENLESXY7DRNLCBOND.NorwayOlo BlindernNUYOD115GNZYIR080RMYR080RNorwayOlo BlindernNUYOD115GNWESTICKRNWGBOND.NorwaySlosoforia cofosicaRMESUM8SHRMES3W6JQTRR010TRussiaMocowRSCONBRNRSCRPTOTRRS0R0RStribiaBelgrade Observatoryn.a.n.a.SSQIR080RSingaporeSingapore Changi InternationalSPPKSUPPn.a.RSG10TSingaporeSingapore Changi InternationalSYPOD15NSIESXY7DRSIESSFUB after 2002; STFL3M in 1998-2002SindakiaHurbanovo<	Japan	Tokyo	JPYWSI41Q	JPCSBNDLF	TRJP10T
Korea, South Scoul City KOYOD008Q KOPPSMCTFA KOQIR063R prior to 2000; KOOIR0808 starting 2000 Latvia Daugavpils LVYODI15H LVESXY7DR LVYR0768 (in 1998-1999; LVGBD5Y starting 2000 Lithuania Vilnius LNQODI15H LNESXY7DR LNRPAON prior to 2003; LOGBDON starting 2003 Luxembourg Luxembourg Airport LXYODI15G LXESXY7DR LXBENCH Malaysia Kuala Lumpur International n.a. n.a. MACBD10 starting 2007 Matia Luqa MAESUMSF MAESXY7DR LXBENCH Malta Luqa n.a. n.a. MACBD10 starting 2007 Mexico Cuernavaca MXGD8FCRA MXPPDCONFAC MXYIR066R prior to 2002; MYIR080R starting 2007 Morocco Tangier City n.a. n.a. MCGBOND; WAYIR080R starting 2002 New Zealand Invercagill Airpor N.ZESK1HFE NLESKY7DR NLGBOND. Norway Osh Bindern NUYOD115G NWESTICKR NWGBOND. Norway Osho Bindern NUYOD115G NWESTICKR NWGBOND. Noruga Lisboa Geofisica PTYOD15H PTYOP005F TRPT10T Russia Bucuresti Baneasa RMESUM8SH RMES3WGJQ TRRS601T Stonakia Hurb	Kazakhstan	Almaty	KZCONRESA	KZCSTPRCF	KZGBOND.
Latvia Negavpils LVYODI15H LVESXY7DR LVYIR076K in 1998-1999; LVYIR076K in 1998-1999; LVXIR07K in 2003; LVXIR07K in 2004; LVXIR07K	Korea, South	Seoul City	KOYOD008Q	KOPPSMCTFA	KOQIR063R prior to 2000;
LatviaDaugavpilsLVYODI15HLVESXY7DRLVVR076R in 1998-1999; LVGBDSY starting 2000LithuaniaVilniusLNQODI15HLNESXY7DRLNRPAON prior to 2003; LNGBOND starting 2003LuxembourgLuxembourg AirportLXYODI15GLXESXY7DRLNRENCHMalaysiaKuala Lumpur Internationaln.a.n.a.MYGBONDMaltaLuqaMAESUM8SFMAESXY7DRMYGBONDMexicoCuernavacaMXGD8FCRAMXPDCONFACMXYR066R prior to 2007; MXIR080R starting 2007MoroccoTagier Cityn.a.n.a.MXGBOND; when not available, MCPRATE.NetherlandsDen Helder 1NLESK1HFENLESKY7DRNGGBOND; when not available, MCPRATE.New ZealandInvercargil AirporNZYQDD15GNZPIBUCOFNZYR080RNorwayOslo BlindernNWYOD115GNWESTICKRNWGBOND.NorwayOslo BlindernNWYOD115GNWESTICKRNGGBOND; when not available, MCPRATE.New ZealandInvercargil AirporNZYR080RRRC10TRussiaMoscowRYGONBRNSCCRPTOTRRS6MT prior to 1999; RSUIR08Solo BindernSXOLMSSTASSCRPTOTRRS60TSolovakiaHurbanovoSXOAJ32XASXESXY7DRSSCI0808RSingaporeSingapore Changi InternationalSPYOLI5PSIESXY7DRSSCIFTOTSlovakiaHurbanovoSXOAJ32XASXESXY7DRTRS10TSolovakiaHurbanovoSXOAJ32XASXESXY7DRTRS10TSolovakiaHurbanovo<					KOOIR080R starting 2000
Lithuania Vilnius LNQODI15H LNESXY7DR LNRPAON prior to 2003; LNRPAON prior to 2003; LNGBOND starting 2003 Lixembourg Luxembourg Airport LXYODI15G LXESXY7DR LXBENCH Malaysia Kuala Lumpur International n.a. n.a. MYGBOND. Malta Luqa MAESUM8SF MAESXY7DR MYGBOND. Merico Cuernavaca MXGD8FCRA MXPPDCONFAC MXYIR066R prior to 2002; MXYIR066R prior to 2002; MYIR066R prior to 2002; Morocco Ragier City n.a. n.a. MCGBOND.; Weno ta vailable, MCPRATE. Netherlands Den Helder 1 NLESK1HFE NLESXY7DR NLGBOND. New Zealand Invercargill Airpor NZYODI15G NZYIR080R starting 2002 Norway Oslo Bindern NWYODI15G NWESTICKR NUGBOND. New Zealand Invercargill Airpor NZYODI15G NWESTICKR NUGBOND. Norway Oslo Bindern NWYODI15G NWESTICKR NUGBOND. Romania Bucresti Baneasa RMESUM8SH RMES3W61Q TRR010T Russia Hurbanovo SCONBRN RSCRPTOT TRRS6MT prior to 1999; RZ0R080R starting 1999 Striba Blegrade Observatory n.a n.a SSBCBEN Singapore Sin	Latvia	Daugavpils	LVYODI15H	LVESXY7DR	LVYIR076R in 1998-1999;
LithuaniaVilniusLNQODI15HLNESXY7DRLNRPAON prior to 2003; LNGBOND starting 2003LuxembourgLuxembourg AirportLXYODI15GLXESXY7DRLXBENCHMalaysiaKuala Lumpur Internationaln.a.n.a.MCGOND.MaltaLuqaMAESUM8SFMAESXY7DRMAY61 prior to 2007; MACBD10 starting 2007MexicoCuernavacaMXGD8FCRAMXPPDCONFACMXYIR066R prior to 2002; MXYIR060R prior to 2002; MXYIR060R prior to 2002; MXYIR080R starting 2007MoroccoTangier Cityn.a.n.a.MCGBOND; MXYIR080R starting 2002MoroccoTangier Cityn.a.n.a.MCGBOND; MXYIR080R starting 2002NetherlandsDen Helder 1NLESK1HFENLESXY7DRNLGGOND; MXYIR080R starting 2002NorwayOslo BlindernNZYOD115GNZPIBUCOFNZYIR080RNorwayOslo BlindernNYYOD115GNWESTICKRNWGBOND.NorwayOslo BlindernNYYOD115HPTOYO005FTRPT10TRussiaMoscowRSCONBRNRSCRPTOTRRSGMT prior to 1999; RSQIR080R starting 1999SerbiaBelgrade Observatoryn.a.n.a.RSQIR080RSingaporeSingapore Changi InternationalSPRSUPIPn.a.RSCNTORSlovakiaHurbanovoSAOJ32XASXESXY7DRSISESTUB after 2002; SUTBL3M in 1998-2002; SUTBL3M in 1998-2002; <b< td=""><td></td><td></td><td></td><td></td><td>LVGBD5Y starting 2000</td></b<>					LVGBD5Y starting 2000
LuxembourgLuxembourg AirportLXYODI15GLXESXY7DRLXBENCHMalaysiaKuala Lumpur Internationaln.a.n.a.n.a.MYGBOND.MaltaLuqaMAESUM8SFMAESXY7DRMYGBOND.MexicoCuernavacaMXGD8FCRAMXPPDCONFACMXYIR066R prior to 2007; MAGBD10 starting 2007MoroccoTangier Cityn.a.n.a.MXCGBOND; wenn ot available, MCPRATE.NetherlandsDen Helder 1NLESK1HFENLESXY7DRNLGBOND.Netwergill AirporNZYODI15GNZPBUCOFNZYIR080R starting 2002NorwayOko BindernNWYODI15GNWESTICKRNWGBOND.NorwayOko GeofisicaPTYOD115HPTYOP005FTRPT10TNeussiaMoscowRSCONBRNRSCRPTOTTRRS6MT prior to 1999; TRPT10TRussiaBelgrade Observatoryn.a.n.a.n.a.SerbiaBelgrade Observatoryn.a.n.a.SSESXY7DRSSUR080R starting 1999SlovakiaHurbanovoSXOAJ32XASZESXY7DRSSUR980RSlovakiaHurbanovoSXOAJ32XASZESXY7DRTRS10TSouth AfricaUjington Agr.SAYOD115DSAAVMCONATRES10TSpainMadrid BarajasESYOD115HESESXY7DRTRS10TSwitzerlandZuerich FlunternSWAOD08QSWESXY7DRTRS10TSwitzerlandZuerich FlunternSWAOD08QSWESXY7DRTRS10TSwitzerlandZuerich FlunternSWAOD08QSWESXY7DRTRS10TSwitzerland </td <td>Lithuania</td> <td>Vilnius</td> <td>LNQODI15H</td> <td>LNESXY7DR</td> <td>LNRPAON prior to 2003;</td>	Lithuania	Vilnius	LNQODI15H	LNESXY7DR	LNRPAON prior to 2003;
LuxembourgLuxembourg AirportLXYODI15GLXESXY7DRLXBENCHMalaysiaKuala Lumpur Internationaln.a.n.a.n.a.MAESUMBSFMAESUMBSFMAESUMBSFMatiaLuqaMAESUMBSFMAESXY7DRMAYGD.DD.MexicoCuernavacaMXGD8FCRAMXPPDCONFACMXYIR066R prior to 2002; MXYIR080R starting 2002MoroccoTangier Cityn.a.n.a.MCGB0ND.; when not available, MCPRATE.NetherlandsDen Helder 1NLESK1HFENLESXY7DRNLGB0ND.; when not available, MCPRATE.NetherlandsDen Helder 1NLESK1HFENLESXY7DRNLGB0ND.New ZealandInvercargill AirporNZYOD115GNZPIBUCOFNZYIR080RNorwayOslo BlindernNWYOD115GNWESTICKRNWGBOND.PortugalLisboa GeofisicaPTYOD115HPTYOP005FTRPT10TRomaniaBucuresti BaneasaRMESUM8SHRMES3W6JQTRR50HT prior to 1999; RSQIR080R starting 1999SerbiaBelgrade Observatoryn.a.n.a.RSCRPTOTRSG0R0RSlovakiaHurbanovoSXOAJ32XASXESXY7DRSIESSFUB after 2002; SJTBL3M in 1998-2002South AfricaUpington Agr.SAYOD115DSAAVMCONATRSA10TSpainMadrid BarajasESYOD115HSDESXY7DRTRS10TSwedenStockholmSDYOD15HSDESXY7DRTRS10TSwitzerlandZuerch FlunternSWAOD008QSWESXY7DRTRS10TSwitzerlandZuerch FlunternSWAOD008QSWESXY7DR<					LNGBOND starting 2003
MalaysiaKuala Lumpur Internationaln.a.n.a.MAESUM8SFMAESXY7DRMAYGBOND.MatiaLuqaMAESUM8SFMAESXY7DRMAYGB10 starting 2007MexicoCuernavacaMXGD8FCRAMXPPDCONFACMXYIR066 prior to 2002; MXYIR080R starting 2002MoroccoTangier Cityn.a.n.a.MCGBOND.; when not available, MCPRATE.NetherlandsDen Helder 1NLESK1HFENLESXY7DRNLGBOND.New ZealadInvercargill AirporNZYOD115GNZPIBUCOFNZYIR080RNorwayOslo BlindernNWYOD115GNWESTICKRNWGBOND.NormaniaBucuresti BaneasaRMESUM8SHRMES3W6JQTRR101TRussiaMoscowRSCONBRNRSCRPTOTRRS6MT prior to 1999; RSQIR080R starting 1999SerbiaBelgrade Observatoryn.a.n.a.SBBCBPRSlovakiaHurbanovoSAOAJ32XASXESXY7DRSISSSFUB after 2002; SJTBL3M in 1998-2002South AfricaUpington Agr.SAYOD115DSAAVMCONATRSA10TSpainMadrid BarajasSTYOD115FSIESSY7DRTRS10TSwedenStockholmSDYOD115HSDESXY7DRTRS510TSouth AfricaLupington Agr.SYOAJ32XASASSYTDRTRS510TSubariaJupigton Agr.SYOD115FSESSY7DRTRS510TSwedenStockholmSDYOD115HSDESXY7DRTRS510TSwitzerlandLupiton Agr.SAYOD115DSAAVMCONATRS510TSubariaLupiton Agr.SAYOD115D	Luxembourg	Luxembourg Airport	LXYODI15G	LXESXY7DR	LXBENCH
MaltaLuqaMAESUM8SFMAESXY7DRMAY61 prior to 2007; MAGBD10 starting 2007MexicoCuernavacaMXGD8FCRAMXPPDCONFACMXYIR066R prior to 2002; MXYIR080R starting 2002MoroccoTangier Cityn.a.n.a.MCGBOND; when not available, MCPRATE.NetherlandsDen Helder 1NLESK1HFENLESXY7DRNLGBOND, when not available, MCPRATE.NetherlandsInvercargill AirporNZYOD115GNZPIBUCOFNZYR080RNorwayOslo BlindernNWYOD115GNWESTICKRNWGBOND.PortugalLisboa GeofisicaPTYOD115HPTYOP005FTRPT10TRomaniaBucuresti BaneasaRMESUM8SHRMES3W6JQTRR010TRussiaMoscowRSCONBRNRSCRPTOTRRS06M prior to 1999; RSQIR080R starting 1999SerbiaBelgrade Observatoryn.a.n.a.sBBCBPRSingaporeSingapore Changi InternationalSPRSUPIPn.a.SXDIR080RSlovakiaHurbanovoSXDAJ32XASXESXY7DRSXDIR080RSlovakiaLipuljana BezigradSJYOD115PSJESXY7DRSIESSFUB after 2002; SJTBL3M in 1998-2002South AfricaUpington Agr.SAYOD115DSAAVMCONATRSL10TSpainMadrid BarajasESYOD115HSDESXY7DRTRSL10TSwedenStockholmSDYOD115HSDESXY7DRTRSL10TSwedenStockholmSDYOD115HSDESXY7DRTRSU10TSwitzerlandJagakiTWBPNUHHPTWCONCSTFTRW10TTaiwanIsig	Malaysia	Kuala Lumpur International	n.a.	n.a.	MYGBOND.
Macha MexicoCuernavacaMXGD8FCRAMXPPDCONFACMXYIR066R prior to 2002; MXYIR080R starting 2002MorocoTangier Cityn.a.n.a.MCGBOND.; when not available, MCPRATE.NetherlandsDen Helder 1NLESK1HFENLESXY7DRNLGBOND.New ZealandInvercargill AirporNZYOD115GNZPIBUCOFNZYIR080RNorwayOslo BlindernNWYOD115GNWESTICKRNWGBOND.PortugalLisboa GeofisicaPTYOD115HPTYOP005FTRPT10TRomaniaBucuresti BaneasaRMESUM8SHRMES3W6JQTRR010TRussiaMoscowRSCONBRNRSCRPTOTTRRS6MT prior to 1999; RSUR08R starting 1999SerbiaBelgrade Observatoryn.a.n.a.SBBCBPRSlogaporeSingapore Changi InternationalSPPSUPIPn.a.RSCIN800RSloveniaLjubljana BezigradSJYOD115PSJESXY7DRSJESSFUB after 2002; SJESXY7DRSJESSFUB after 2002; SJESSTUB after 2002; SJESL3M in 1998-2002South AfricaUpington Agr.SAYOD115PSJESXY7DRTRES110TSwedenStockholmSDYOD115HSDESXY7DRTRES110TSwedenStockholmSDYOD115HSDESXY7DRTRES110TSwitzerlandZuerich FlunternSWAOD008QSWESXY7DRTRS010TSwitzerlandLieki KindomTMENONESPTHEAAVCOATHGBOND.United StateLacuria AirrowUKAOD008QWESXY7DRTRSU10TThaiandHathrowUKAOD008QWESXY7DRTRUK10T	Malta	Luqa	MAESUM8SF	MAESXY7DR	MAY61 prior to 2007;
MexicoCuernavacaMXGD8FCRAMXPPDCONFACMXYIR066R prior to 2002; MXYIR080R starting 2002MoroccoTangier Cityn.a.n.a.MCGBOND.; when not available, MCPRATE.NetherlandsDen Helder 1NLESK1HFENLESXY7DRNLGBOND.New ZealandInvercargill AirporNZYOD115GNZPIBUCOFNZYIR080RNorwayOslo BlindernNWYOD115GNWESTICKRNWGBOND.PortugalLisboa GeofisicaPTYOD115HPTYOP005FTRPT10TRomaniaBucuresti BaneasaRMESUM8SHRMES3W6JQTRR010TRussiaMoscowRSCONBRNRSCRPTOTTRS6MT prior to 1999; RSUR08R starting 1999SerbiaBelgrade Observatoryn.a.n.a.sBBCBPRSingaporeSingapore Changi InternationalSPPRSUPIPn.a.RSCIN80RSlovakiaHurbanovoSXOAJ32XASXESXY7DRSIESSFUB after 2002; SIESSFUB aft					MAGBD10 starting 2007
MoroccoMary Index ParticleMary Index ParticleMary Mary ParticleMoroccoTangier Cityn.a.MCGBOND.; when not available, MCPRATE.NetherlandsDen Helder 1NLESK1HFENLESXY7DRNLGBOND.New ZealandInvercargill AirporNZYOD115GNZPIBUCOFNZYIR080RNorwayOslo BlindernNWYOD115GNWESTICKRNWGBOND.PortugalLisboa GeofisicaPTYOD115HPTYOP005FTRPT10TRomaniaBucuresti BaneasaRMESUM8SHRMES3W6JQTRRO10TRussiaMoscowRSCONBRNRSCRPTOTTRRS6MT prior to 1999; RSQIR080R starting 1999SerbiaBelgrade Observatoryn.a.n.a.SBBCBPRSlovaniaLipuljana BezigradSPPRSUPIPn.a.RSG10TSlovaniaLipuljana BezigradSYOD115PSJESXY7DRSJESSFUB after 2002; SUTBL3M in 1998-2002South AfricaUpington Agr.SAYOD115OSAAVMCONATRSA10TSpainMadrid BarajasESYOD115HSDESXY7DRTRES10TSwitzerlandZuerich FlunternSWAOD008QSWESXY7DRTRSD10TSwitzerlandLiech FlunternSWAOD008QSWESXY7DRTRSD10TTaiwanIshigakiTWBPNUHHPTWCONCSTFTRTW10TThaidandChanthaburitTHCONRESPTHEAAVCOATHGBNDL.United StatesLa Guardia AirportUKAOD008QUKESXY7DRTRUK10TUnited StatesLa Guardia AirportUKAOD008QUKESXY7DRTRUK10T	Mexico	Cuernavaca	MXGD8FCRA	MXPPDCONFAC	MXYIR066R prior to 2002;
MoroccoTangier Cityn.a.n.a.MCGBOND.; when not available, MCPRATE.NetherlandsDen Helder 1NLESK1HFENLESXY7DRNLGBOND.New ZealandInvercargill AirporNZYODI15GNZPIBUCOFNZYIR080RNorwayOslo BlindernNWYODI15GNWESTICKRNWGBOND.PortugalLisboa GeofisicaPTYOD115HPTYOP005FTRP110TRomaniaBucuresti BaneasaRMESUM8SHRMES3W6JQTRR010TRussiaMoscowRSCONBRNRSCRPTOTTRRS6MT prior to 1999; RSQIR080R starting 1999SerbiaBelgrade Observatoryn.a.n.a.RSQIR080R starting 1999SerbiaBelgrade Observatoryn.a.n.a.RSGI0TSlovakiaHurbanovoSXOAJ32XASXESXY7DRSXOIR080RSlovakiaHurbanovoSAYOD115PSJESXY7DRSJESSFUB after 2002; SJTBL3M in 1998-2002South AfricaUpington Agr.SAYOD115DSAAVMCONATRRS10TSpainMadrid BarajasESYOD115HSDESXY7DRTRS10TSwitzerlandZuerich FlunternSWAOD008QSWESXY7DRTRS10TSwitzerlandZuerich FlunternSWAOD008QSWESXY7DRTRS10TTaiwanIshigakiTWBPNUHHPTWCONCSTFTRTW10TThaiandChanthaburiTHCONRESPTHEAAVCOATHGBOND.United KingdomHeathrowUKAOD0008QWESXY7DRTRUK10TUnited KingdomHeathrowUKAOD008QWESXY7DRTRUK10T					MXYIR080R starting 2002
NetherlandsDen Helder 1NLESK1HFENLESXY7DRNLGBOND.New ZealandInvercargill AirporNZYODI15GNZPIBUCOFNZYIR080RNorwayOslo BlindernNWYODI15GNWESTICKRNWGBOND.PortugalLisboa GeofisicaPTYODI15HPTYOP005FTRPT10TRomaniaBucuresti BaneasaRMESUM8SHRMES3W6JQTRRO10TRussiaMoscowRSCONBRNRSCRPTOTRSQIR080R starting 1999; RSQIR080R starting 1999SerbiaBelgrade Observatoryn.a.n.a.SBBCBPRSingaporeSingapore Changi InternationalSPPRSUPIPn.a.TRSG10TSlovakiaHurbanovoSXOAJ32XASXESXY7DRSJESSFUB after 2002; SJTBL3M in 1998-2002South AfricaUpington Agr.SAYOD115PSJESXY7DRTRSA10TSpainMadrid BarajasESYOD115HESESXY7DRTRSD10TSwitzerlandZuerich FlunternSWAOD008QSWESXY7DRTRSW10TSwitzerlandChanthaburiTHCONRESPTHEAAVCOATHGBOND.United KingdomHeathrowUKAOD008QUKESXY7DRTRUK10TUnited KingdomHeathrowUKAOD008QUKESXY7DRTRUK10T	Morocco	Tangier City	n.a.	n.a.	MCGBOND.;
NetherlandsDen Helder 1NLESK1HFENLESXY7DRNLGBOND.New ZealandInvercargill AirporNZYODI15GNZPIBUCOFNZYIR080RNorwayOslo BlindernNWYODI15GNWESTICKRNWGBOND.PortugalLisboa GeofisicaPTYODI15HPTYOP005FTRPT10TRomaniaBucuresti BaneasaRMESUM8SHRMES3W6JQTRR010TRussiaMoscowRSCONBRNRSCRPTOTTRRS6MT prior to 1999; RSQIR080R starting 1999SerbiaBelgrade Observatoryn.a.n.a.SBBCBPRSingaporeSingapore Changi InternationalSPPSUPIPn.a.TRSG10TSlovakiaHurbanovoSXOAJ32XASXESXY7DRSXOR080RSlovakiaHurbanovoSAOVD115PSJESXY7DRSJESSFUB after 2002; SJTBL3M in 1998-2002South AfricaUpington Agr.SAYODI15DSAAVMCONATRSA10TSpainMadrid BarajasESYODI15HSDESXY7DRTRSD10TSwitzerlandZuerich FlunternSWAOD008QSWESXY7DRTRSW10TSwitzerlandLateich FlunternSWAOD008QSWESXY7DRTRSW10TTaiwanIshigakiTWBPNUHHPTWCONCSTFTRTW10TThailandChantaburiTHCONRESPTHEAAVCOATHGBOND.United KingdomHeatnowUKAOD008QUKESXY7DRTRUK10TUnited KingdomHeatnowUSAD008QUKESXY7DRTRUK10T					when not available, MCPRATE.
New ZealandInvercargill AirporNZYODI15GNZPIBUCOFNZYIR080RNorwayOslo BlindernNWYODI15GNWESTICKRNWGBOND.PortugalLisboa GeofisicaPTYODI15HPTYOP005FTRP110TRomaniaBucuresti BaneasaRMESUM8SHRMES3W6JQTRR010TRussiaMoscowRSCONBRNRSCRPTOTTRR56MT prior to 1999; RSQIR080R starting 1999SerbiaBelgrade Observatoryn.a.n.a.SBBCBPRSingaporeSingapore Changi InternationalSPPRSUPIPn.a.TRSG10TSlovakiaHurbanovoSXOAJ32XASXESXY7DRSJESSFUB after 2002; SJTBL3M in 1998-2002South AfricaUpington Agr.SAYOD115PSJESXY7DRTRES10TSwatenStockholmSDYOD115HESESXY7DRTRES10TSwitzerlandZuerich FlunternSWAOD008QSWESXY7DRTRSD10TSwitzerlandLingakiTWBPNUHHPTWCONCSTFTRTW10TThailandChanthaburiTHCONRESPTHEAAVCOATHGBOND.United KingdomHeathrowUKAOD008QUKESXY7DRTRUK10TUnited KitatesLa Guardia AirportUSBCIPEHOUSPMTCFCETRUS10T	Netherlands	Den Helder 1	NLESK1HFE	NLESXY7DR	NLGBOND.
NorwayOslo BindernNWYODI15GNWESTICKRNWGBOND.PortugalLisboa GeofisicaPTYODI15HPTYOP005FTRPT10TRomaniaBucuresti BaneasaRMESUM8SHRMES3W6JQTRR010TRussiaMoscowRSCONBRNRSCRPTOTTRR56MT prior to 1999; RSQIR080R starting 1999SerbiaBelgrade Observatoryn.a.n.a.SBBCBPRSingaporeSingapore Changi InternationalSPPRSUPIPn.a.TRSG10TSlovakiaHurbanovoSXOAJ32XASXESXY7DRSXOIR080RSlovakiaLjubljana BezigradSJYODI15PSJESXY7DRSJESSFUB after 2002; SJTBL3M in 1998-2002South AfricaUpington Agr.SAYODI15OSAAVMCONATRSA10TSpainMadrid BarajasESYODI15HSDESXY7DRTRES10TSwedenStockholmSDYODI15HSDESXY7DRTRSD10TSwitzerlandZuerich FlunternSWAOD008QSWESXY7DRTRSM10TTaiwanIshigakiTWBPNUHHPTWCONCSTFTRTW10TThailandChanthaburiTHCONRESPTHEAAVCOATHGBOND.United KingdomHeathrowUKAOD008QUKESXY7DRTRUK10TUnited KatesLa Guardia AirportUSBCIPEHOUSPMTCFCETRUS10T	New Zealand	Invercargill Airpor	NZYODI15G	NZPIBUCOF	NZYIR080R
PortugiLisboa GeofisicaPTYOD115HPTYOP005FTRPT10TRomaniaBucuresti BaneasaRMESUM8SHRMES3W6JQTRR010TRussiaMoscowRSCONBRNRSCRPTOTTRR56MT prior to 1999; RSQIR080R starting 1999SerbiaBelgrade Observatoryn.a.n.a.SBBCBPRSingaporeSingapore Changi InternationalSPPRSUPIPn.a.TRSG10TSlovakiaHurbanovoSXOAJ32XASXESXY7DRSXOIR080RSloveniaLjubijana BezigradSJYOD115PSJESXY7DRSJESSFUB after 2002; SJTBL3M in 1998-2002South AfricaUpington Agr.SAYOD115DSAAVMCONATRSA10TSpainMadrid BarajasESYOD115HESESXY7DRTRES10TSwedenStockholmSDYOD115HSDESXY7DRTRSU10TSwitzerlandZuerich FlunternSWAOD008QSWESXY7DRTRSV10TTaiwanIshigakiTWBPNUHHPTWCONCSTFTRTW10TThailandChanthaburiTHCONRESPTHEAAVCOATHGBOND.United KingdomHeathrowUKAOD008QUKESXY7DRTRUS10T	Norway	Oslo Blindern	NWYODI15G	NWESTICKR	NWGBOND.
RomaniaBucuresti BaneasaRMESUM8SHRMES3W6JQTRR010TRussiaMoscowRSCONBRNRSCRPTOTTRRS6MT prior to 1999; RSQIR080R starting 1999SerbiaBelgrade Observatoryn.a.n.a.SBBCBPRSingaporeSingapore Changi InternationalSPPRSUPIPn.a.TRSG10TSlovakiaHurbanovoSXOAJ32XASXESXY7DRSXOIR080RSloveniaLjubijana BezigradSJYOD115PSJESXY7DRSJESSFUB after 2002; SJTBL3M in 1998-2002South AfricaUpington Agr.SAYOD115OSAAVMCONATRSA10TSpainMadrid BarajasESYOD115HESESXY7DRTRES10TSwedenStockholmSDYOD115HSDESXY7DRTRSD10TSwitzerlandZuerich FlunternSWAOD008QSWESXY7DRTRSW10TTaiwanIshigakiTWBPNUHHPTWCONCSTFTRTW10TThailandChanthaburiTHCONRESPTHEAAVCOATHGBOND.United KingdomHeathrowUKAOD008QUKESXY7DRTRUK10TUnited StatesLa Guardia AirportUSBCIPEHOUSPMTCFCETRUS10T	Portugal	Lisboa Geofisica	PTYODI15H	PTYOP005F	TRPT10T
RussiaMoscowRSCONBRNRSCRPTOTTRRS6MT prior to 1999; RSQIR080R starting 1999SerbiaBelgrade Observatoryn.a.n.a.RSQIR080R starting 1999SingaporeSingapore Changi InternationalSPPRSUPIPn.a.TRSG10TSlovakiaHurbanovoSXOAJ32XASXESXY7DRSXOIR080RSloveniaLjubljana BezigradSJYODI15PSJESXY7DRSJESSFUB after 2002; SJTBL3M in 1998-2002South AfricaUpington Agr.SAYODI15DSAAVMCONATRSA10TSpainMadrid BarajasESYODI15HESESXY7DRTRES10TSwedenStockholmSDYOD115HSDESXY7DRTRSD10TSwitzerlandZuerich FlunternSWAOD008QSWESXY7DRTRSW10TTaiwanIshigakiTWBPNUHHPTWCONCSTFTRTW10TThailandChanthaburiTHCONRESPTHEAAVCOATHGBOND.United KingdomHeathrowUKAOD008QUKESXY7DRTRUK10TUnited StatesLa Guardia AirportUSBCIPEHOUSPMTCFCETRUS10T	Romania	Bucuresti Baneasa	RMESUM8SH	RMES3W6JQ	TRRO10T
SerbiaBelgrade Observatoryn.a.n.a.n.a.SBBCBPRSingaporeSingapore Changi InternationalSPPRSUPIPn.a.TRSG10TSlovakiaHurbanovoSXOAJ32XASXESXY7DRSXOIR080RSloveniaLjubljana BezigradSJYOD115PSJESXY7DRSJESSFUB after 2002; SJTBL3M in 1998-2002South AfricaUpington Agr.SAYOD115OSAAVMCONATRSA10TSpainMadrid BarajasESYOD115HESESXY7DRTRES10TSwedenStockholmSDYOD115HSDESXY7DRTRSD10TSwitzerlandZuerich FlunternSWAOD008QSWESXY7DRTRSV10TTaiwanIshigakiTWBPNUHHPTWCONCSTFTRTW10TThailandChanthaburiTHCONRESPTHEAAVCOATHGBOND.United KingdomHeathrowUKAOD008QUKESXY7DRTRUK10TUnited StatesLa Guardia AirportUSBCIPEHOUSPMTCFCETRUS10T	Russia	Moscow	RSCONBRN	RSCRPTOT	TRRS6MT prior to 1999;
SerbiaBelgrade Observatoryn.a.n.a.n.a.SBBCBPRSingaporeSingapore Changi InternationalSPPRSUPIPn.a.TRSG10TSlovakiaHurbanovoSXOAJ32XASXESXY7DRSXOIR080RSloveniaLjubljana BezigradSJYOD115PSJESXY7DRSJESSFUB after 2002; SJTBL3M in 1998-2002South AfricaUpington Agr.SAYOD115OSAAVMCONATRSA10TSpainMadrid BarajasESYOD115HESESXY7DRTRES10TSwedenStockholmSDYOD115HSDESXY7DRTRSD10TSwitzerlandZuerich FlunternSWAOD008QSWESXY7DRTRSW10TTaiwanIshigakiTWBPNUHHPTWCONCSTFTRTW10TThailandChanthaburiTHCONRESPTHEAAVCOATHGBOND.United KingdomHeathrowUKAOD008QUKESXY7DRTRUK10TUnited StatesLa Guardia AirportUSBCIPEHOUSPMTCFCETRUS10T					RSQIR080R starting 1999
SingaporeSingapore Changi InternationalSPPRSUPIPn.a.TRSG10TSlovakiaHurbanovoSXOAJ32XASXESXY7DRSXOIR080RSloveniaLjubljana BezigradSJYOD115PSJESXY7DRSJESSFUB after 2002; SJTBL3M in 1998-2002South AfricaUpington Agr.SAYOD115OSAAVMCONATRSA10TSpainMadrid BarajasESYOD115HESESXY7DRTRES10TSwedenStockholmSDYOD115HSDESXY7DRTRSD10TSwitzerlandZuerich FlunternSWAOD008QSWESXY7DRTRSW10TTaiwanIshigakiTWBPNUHHPTWCONCSTFTRTW10TThailandChanthaburiTHCONRESPTHEAAVCOATHGBOND.United KingdomHeathrowUKAOD008QUKESXY7DRTRUK10TUnited StatesLa Guardia AirportUSBCIPEHOUSPMTCFCETRUS10T	Serbia	Belgrade Observatory	n.a.	n.a.	SBBCBPR
SlovakiaHurbanovoSXOAJ32XASXESXY7DRSXOIR080RSlovakiaLjubljana BezigradSJYODI15PSJESXY7DRSJESSFUB after 2002; SJTBL3M in 1998-2002South AfricaUpington Agr.SAYODI15OSAAVMCONATRSA10TSpainMadrid BarajasESYODI15HESESXY7DRTRES10TSwedenStockholmSDYODI15HSDESXY7DRTRSD10TSwitzerlandZuerich FlunternSWAOD008QSWESXY7DRTRSW10TTaiwanIshigakiTWBPNUHHPTWCONCSTFTRTW10TThailandChanthaburiTHCONRESPTHEAAVCOATHGBOND.United KingdomHeathrowUKAOD008QUKESXY7DRTRUK10TUnited StatesLa Guardia AirportUSBCIPEHOUSPMTCFCETRUS10T	Singapore	Singapore Changi International	SPPRSUPIP	n.a.	TRSG10T
SloveniaLjubljana BezigradSJYODI15PSJESXY7DRSJESSFUB after 2002; SJTBL3M in 1998-2002South AfricaUpington Agr.SAYODI15OSAAVMCONATRSA10TSpainMadrid BarajasESYODI15HESESXY7DRTRES10TSwedenStockholmSDYODI15HSDESXY7DRTRSD10TSwitzerlandZuerich FlunternSWAOD008QSWESXY7DRTRSW10TTaiwanIshigakiTWBPNUHHPTWCONCSTFTRTW10TThailandChanthaburiTHCONRESPTHEAAVCOATHGBOND.United KingdomHeathrowUKAOD008QUKESXY7DRTRUK10TUnited StatesLa Guardia AirportUSBCIPEHOUSPMTCFCETRUS10T	Slovakia	Hurbanovo	SXOAJ32XA	SXESXY7DR	SXOIR080R
South AfricaUpington Agr.SAYODI150SAAVMCONATRSA10TSpainMadrid BarajasESYODI15HESESXY7DRTRES10TSwedenStockholmSDYODI15HSDESXY7DRTRSD10TSwitzerlandZuerich FlunternSWAOD008QSWESXY7DRTRSW10TTaiwanIshigakiTWBPNUHHPTWCONCSTFTRTW10TThailandChanthaburiTHCONRESPTHEAAVCOATHGBOND.United KingdomHeathrowUKAOD008QUKESXY7DRTRUK10TUnited StatesLa Guardia AirportUSBCIPEHOUSPMTCFCETRUS10T	Slovenia	Liubliana Bezigrad	SJYODI15P	SJESXY7DR	SJESSFUB after 2002:
South AfricaUpington Agr.SAYODI150SAAVMCONATRSA10TSpainMadrid BarajasESYODI15HESESXY7DRTRES10TSwedenStockholmSDYODI15HSDESXY7DRTRSD10TSwitzerlandZuerich FlunternSWAOD008QSWESXY7DRTRSW10TTaiwanIshigakiTWBPNUHHPTWCONCSTFTRTW10TThailandChanthaburiTHCONRESPTHEAAVCOATHGBOND.United KingdomHeathrowUKAOD008QUKESXY7DRTRUK10TUnited StatesLa Guardia AirportUSBCIPEHOUSPMTCFCETRUS10T					SITBL 3M in 1998-2002
SpainMadrid BarajasESYODI15HESESXY7DRTRES10TSwedenStockholmSDYODI15HSDESXY7DRTRSD10TSwitzerlandZuerich FlunternSWAOD008QSWESXY7DRTRSW10TTaiwanIshigakiTWBPNUHHPTWCONCSTFTRTW10TThailandChanthaburiTHCONRESPTHEAAVCOATHGBOND.United KingdomHeathrowUKAOD008QUKESXY7DRTRUK10TUnited StatesLa Guardia AirportUSBCIPEHOUSPMTCFCETRUS10T	South Africa	Upington Agr.	SAYODI150	SAAVMCONA	TRSA10T
SynchIndexts DarkgabDis FODERTDis DestructionSwedenStockholmSDYODI15HSDESXY7DRTRSD10TSwitzerlandZuerich FlunternSWAOD008QSWESXY7DRTRSW10TTaiwanIshigakiTWBPNUHHPTWCONCSTFTRTW10TThailandChanthaburiTHCONRESPTHEAAVCOATHGBOND.United KingdomHeathrowUKAOD008QUKESXY7DRTRUK10TUnited StatesLa Guardia AirportUSBCIPEHOUSPMTCFCETRUS10T	Spain	Madrid Baraias	ESYODI15H	ESESXY7DR	TRES10T
SweedenSubtroblemSubtroblemSubtroblemSubtroblemSwitzerlandZuerich FlunternSWAOD008QSWESXY7DRTRSW10TTaiwanIshigakiTWBPNUHHPTWCONCSTFTRTW10TThailandChanthaburiTHCONRESPTHEAAVCOATHGBOND.United KingdomHeathrowUKAOD008QUKESXY7DRTRUK10TUnited StatesLa Guardia AirportUSBCIPEHOUSPMTCFCETRUS10T	Sweden	Stockholm	SDYODI15H	SDESXY7DR	TRSD10T
TaiwanIshigakiTWBPNUHHPTWCONCSTFTRTW10TThailandChanthaburiTHCONRESPTHEAAVCOATHGBOND.United KingdomHeathrowUKAOD008QUKESXY7DRTRUK10TUnited StatesLa Guardia AirportUSBCIPEHOUSPMTCFCETRUS10T	Switzerland	Zuerich Fluntern	SWAOD0080	SWESXY7DR	TRSW10T
Thailand Chanthaburi THCONRESP THEAAVCOA THGBOND. United Kingdom Heathrow UKAOD008Q UKESXY7DR TRUK10T United States La Guardia Airport USBCIPEHO USPMTCFCE TRUS10T	Taiwan	Ishigaki	TWBPNIIHHP	TWCONCSTF	TRTW10T
United Kingdom Heathrow UKAOD008Q UKESXY7DR TRUK10T United States La Guardia Airport USBCIPEHO USPMTCFCE TRUS10T	Thailand	Chanthaburi	THCONRESP	THEAAVCOA	THGBOND
United States La Guardia Airport USBCIPEHO USPMTCFCE TRUSIOT	United Kingdom	Heathrow	UKAOD0080	UKESXY7DR	TRUK10T
CHIER DRIVE CODOLLATO CALUTATATA TRADUT	United States	La Guardia Airport	USBCIPEHO	USPMTCECE	TRUSIOT

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (http://creativecommons.org/licenses/by/4.0/).