

# A Road State Climatology from the Global Weather Corporation Road Weather Forecasts

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# Introduction

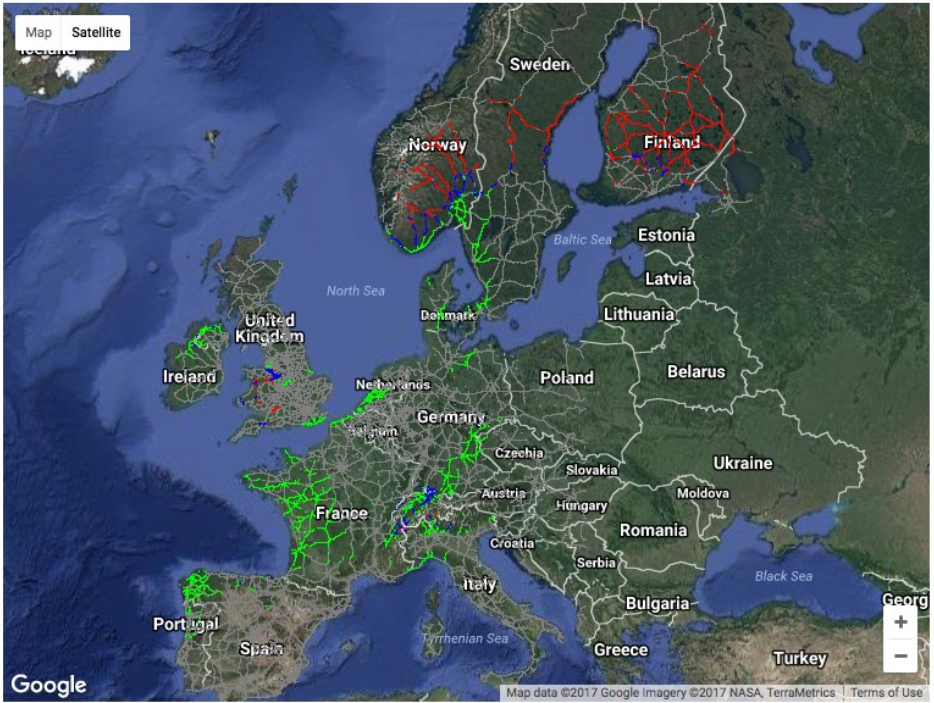
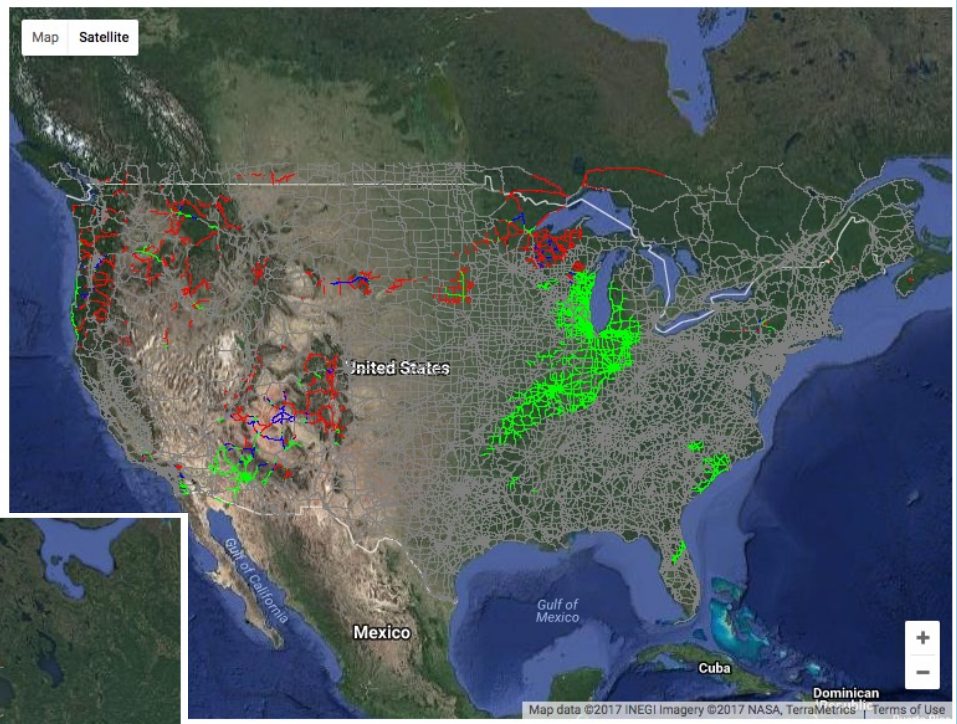
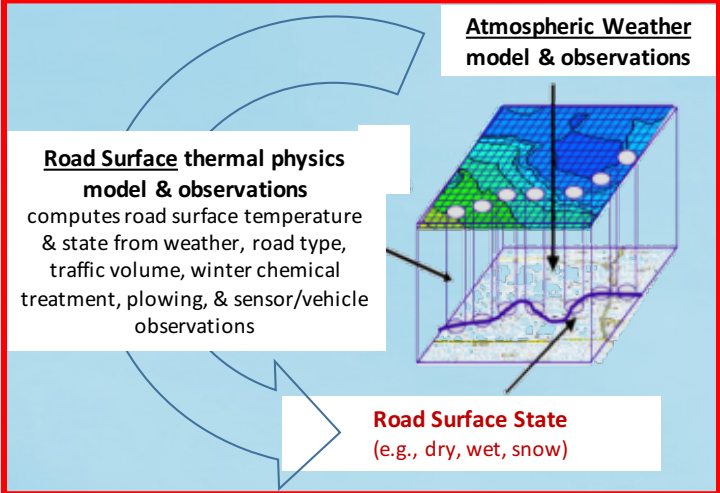
- Road condition is difficult to both observe and forecast across a large domain.
- What are typical conditions?
- How often can certain road conditions be expected?
- Can there be a climatology?
  - Yes, there can be! Or at least a good approximation for far more roads than can actually be observed.
- How?
  - GWC RoadWX archives

# Methodology

- Use the GWC RoadWX archive for points along all primary roads in Western Europe.
  - A standard set of road physics.
  - 12 months of data (March 2017-Feb 2018; some September data is missing)
  - Recalculations of conditions every 0.5 km along roads
  - GWC PointWX atmospheric forecast data
- Calculate how often different situations occur along roads

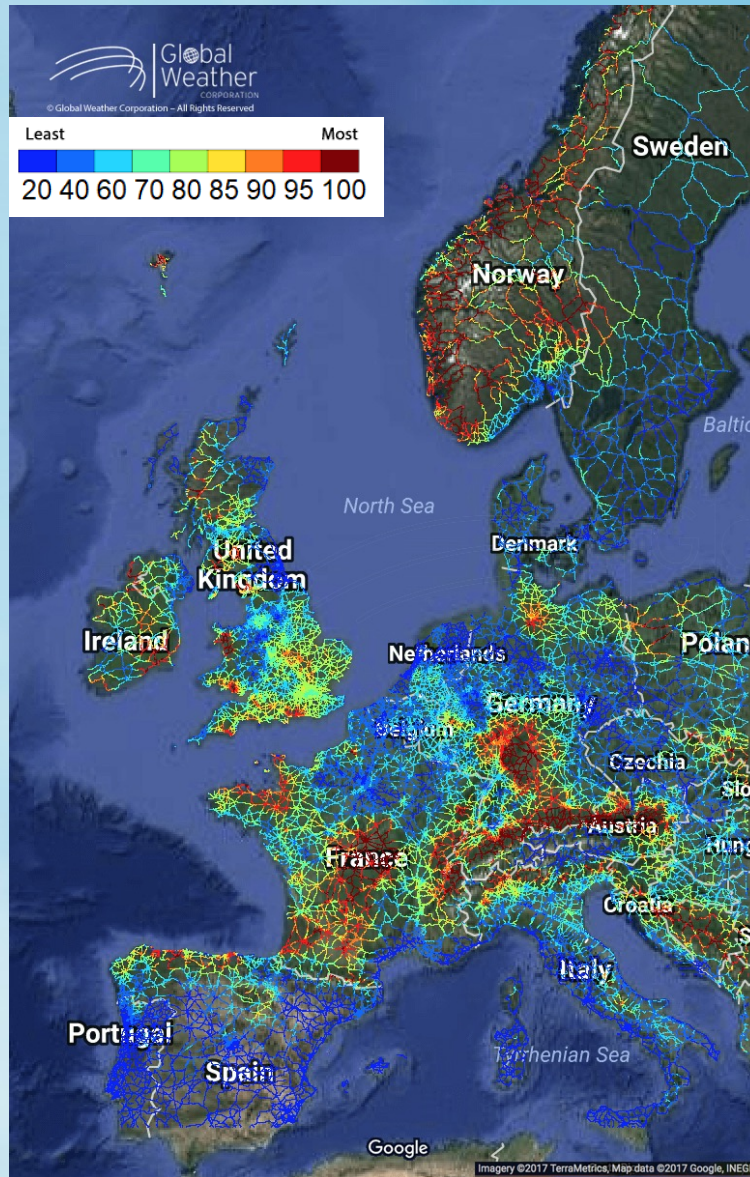


# RoadWX Overview



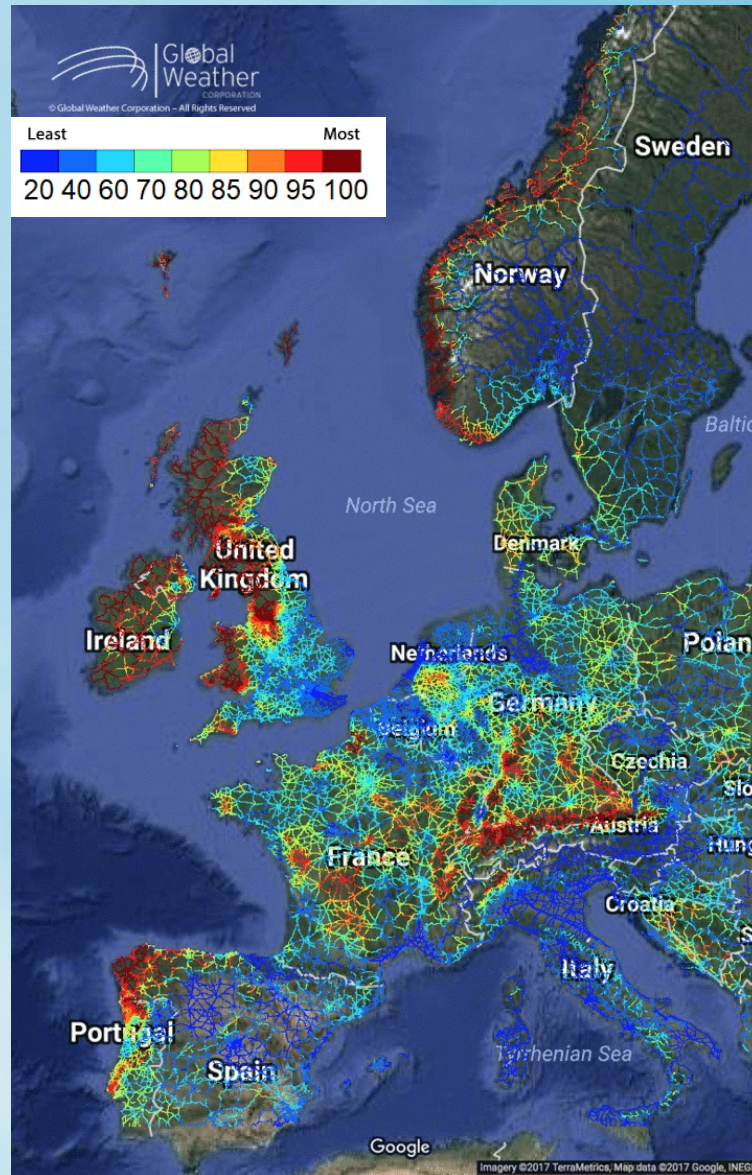


# Case 1: Wet Roads



July 2017

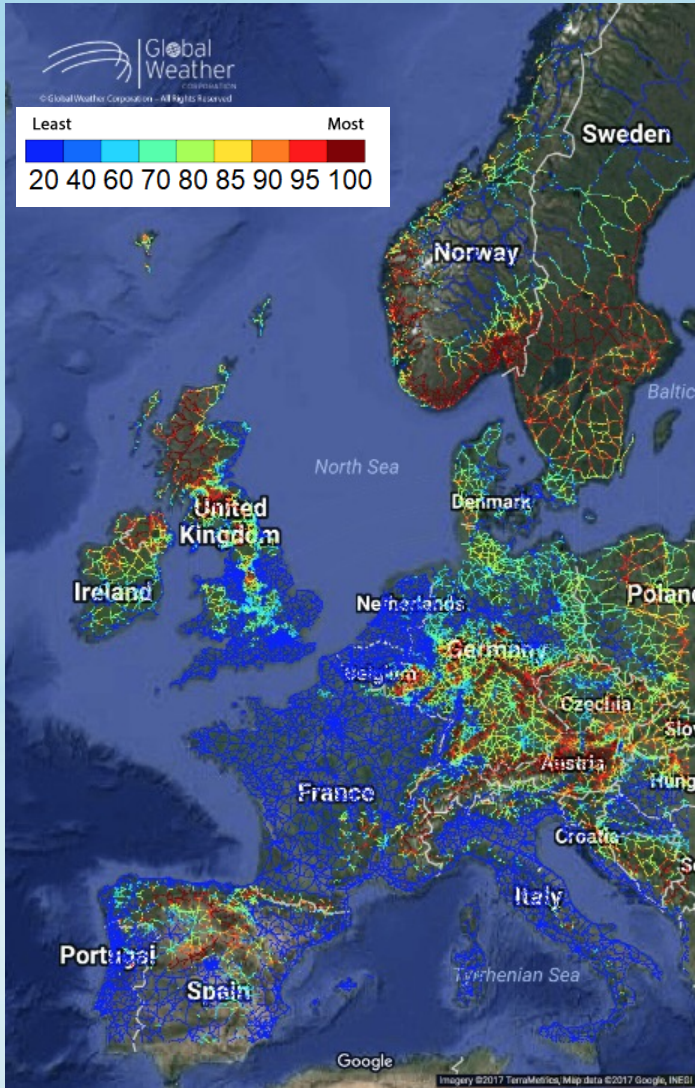
# Case 1: Wet Roads



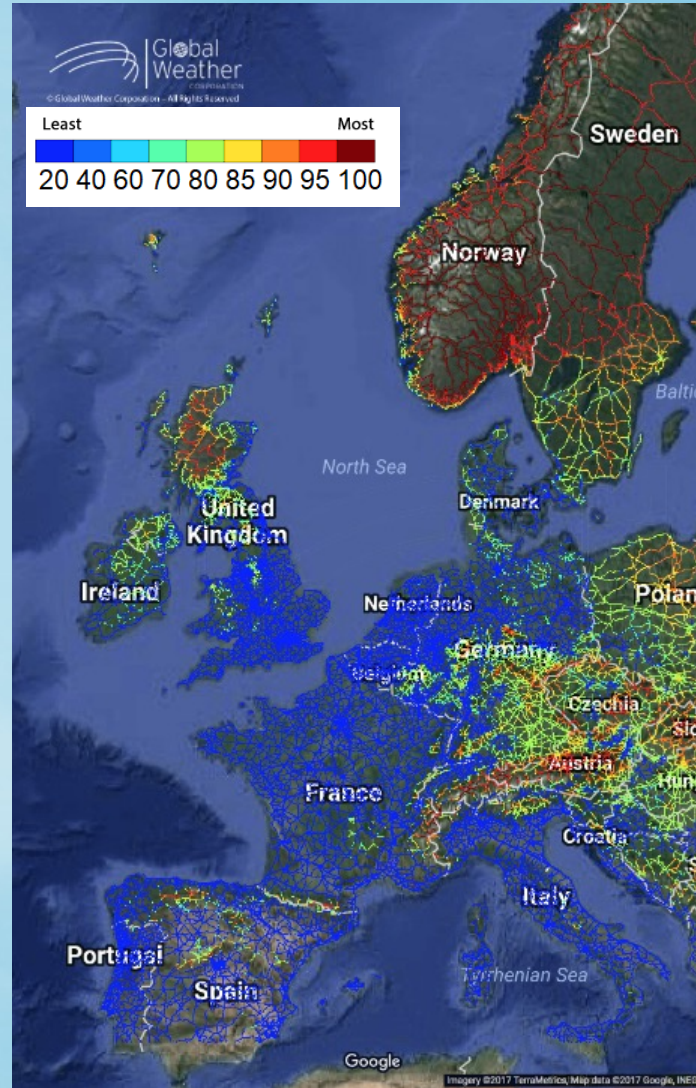
March 2017 –  
February 2018



# Case 2: Wet/Slush Roads with Air T < 0C when QPE > 0 versus Snow/Ice Covered Roads



Wet/Slush Roads

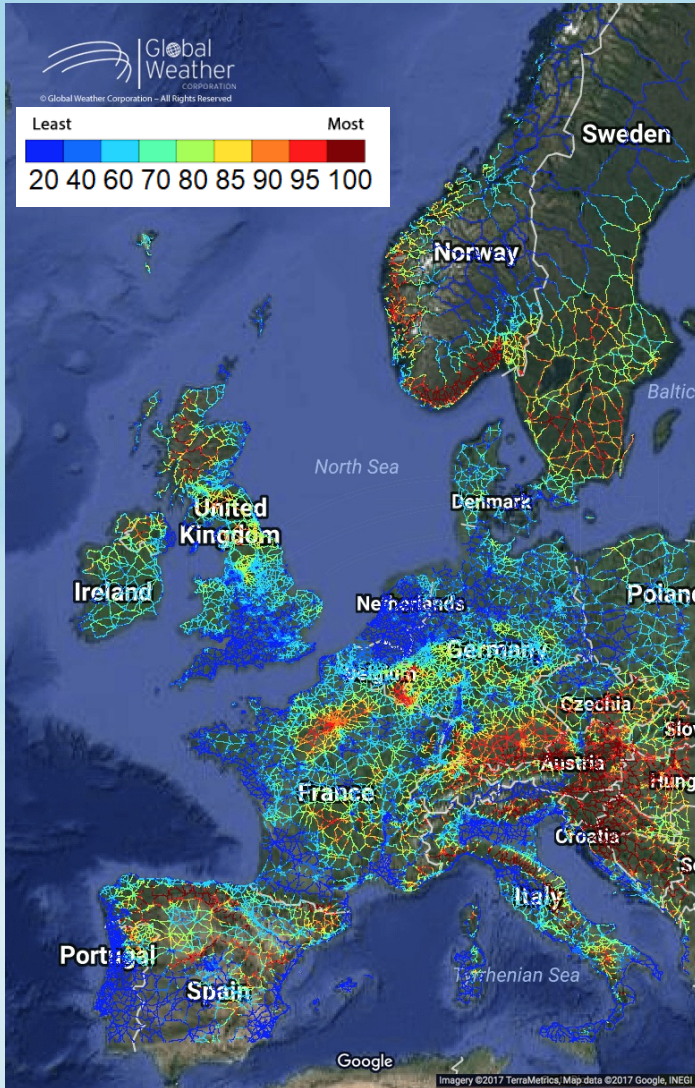


Snow/Ice Covered Roads

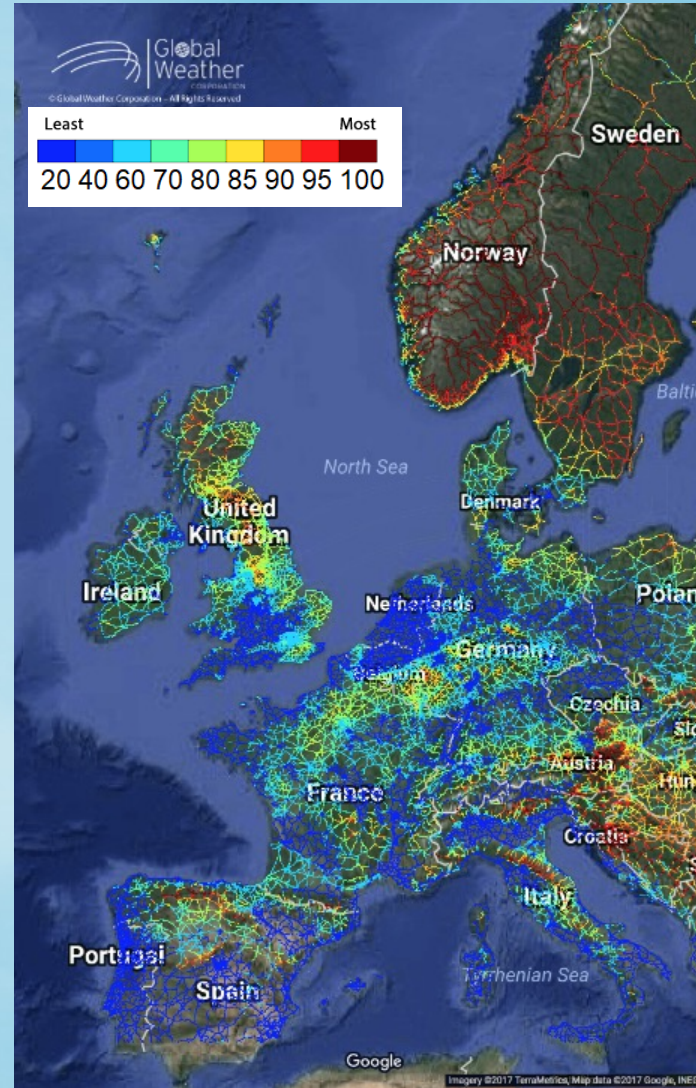
January  
2018



# Case 2: Wet/Slush Roads with Air T < 0C when QPE > 0 versus Snow/Ice Covered Roads



Wet/Slush Roads



Snow/Ice Covered Roads

February  
2018

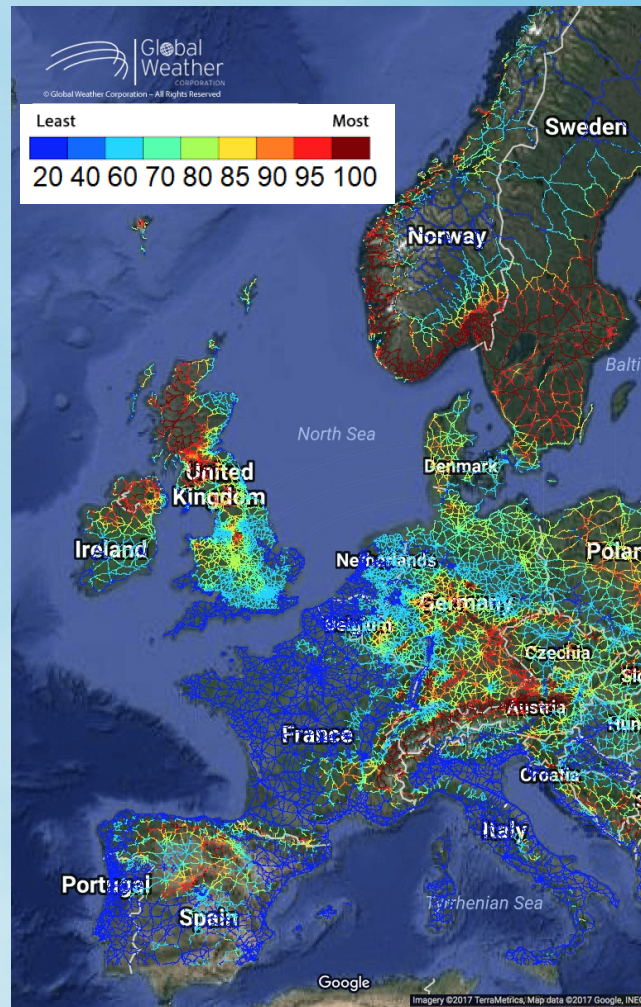


## Case 2: Wet/Slush Roads with Air T < 0C when QPE > 0 versus Snow/Ice Covered Roads

	Road State	Points/hour	Hits	Points/month	Percent Hits	
Jan	Snow/Ice	95881	1618315	71335464	2.269	
	Wet/Slush	95881	436659	64432032	0.612	370.6%
Feb	Snow/Ice	95881	1413279	71335464	2.193	
	Wet/Slush	95881	816973	64432032	1.270	173.0%

- This demonstrates the potential errors associated with mapping atmospheric conditions to the road surface.

# Case 3: Wet/Slushy Roads with Road T < 0C when QPE > 0

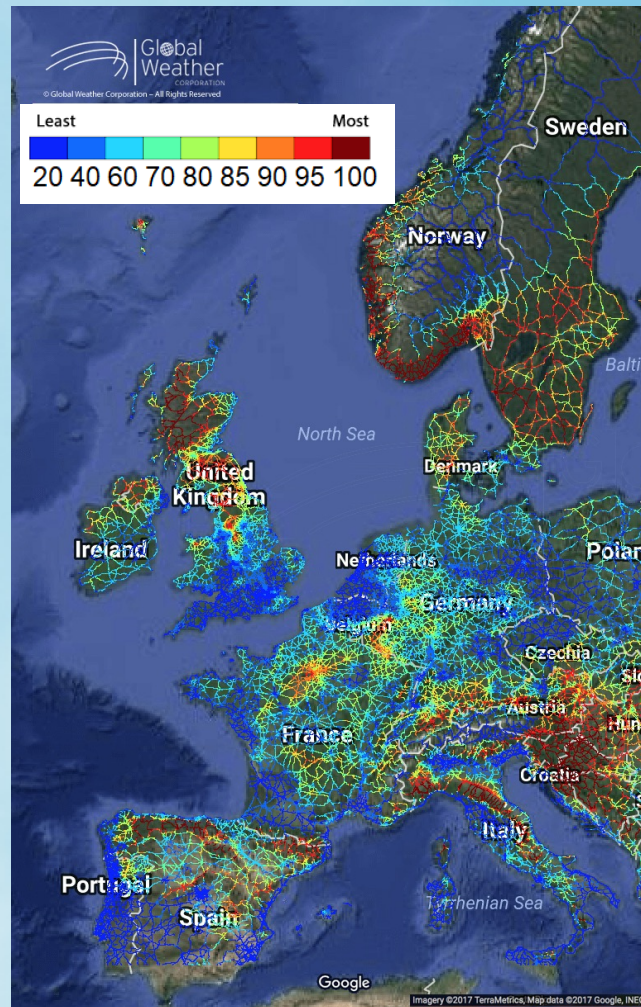


January 2018, counts below of 744 possible hours

	20th	40th	60th	70th	80th	85th	90th	95th	100th
Jan	0	0	6	11	18	24	33	52	153



# Case 3: Wet/Slushy Roads with Road T < 0C when QPE > 0



February 2018, counts below of 672 possible hours

	20th	40th	60th	70th	80th	85th	90th	95th	100th
Feb	0	2	6	9	15	19	25	37	164

# Case 3: Wet/Slushy Roads with Road T < 0C when QPE > 0

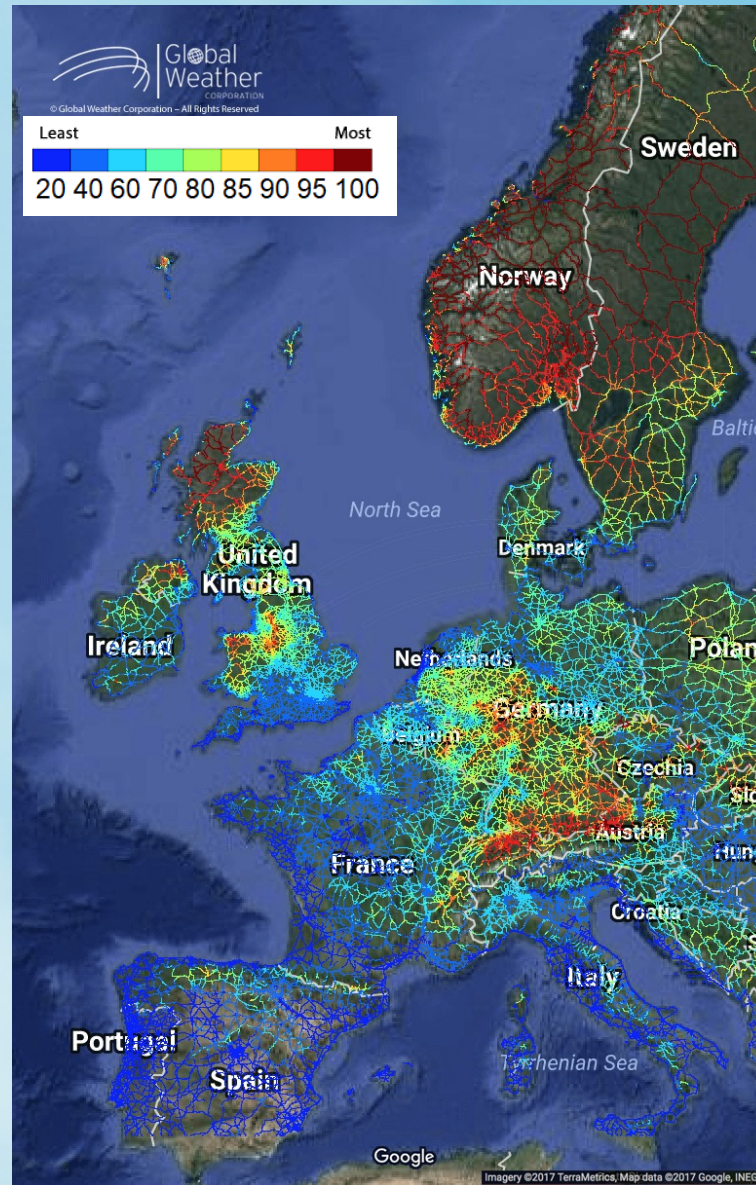
	Road State	Points/hour	Hits	Points/month	Percent Occurrence
Jan	Wet/Slushy	95881	1057801	71335464	1.483
Feb	Wet/Slushy	95881	1025651	64432032	1.388

	20th	40th	60th	70th	80th	85th	90th	95th	100th
Jan	0	0	6	11	18	24	33	52	153
Feb	0	2	6	9	15	19	25	37	164

- This demonstrates the impact of chemical treatment to the road surface.



# Case 4: Snow/Ice Covered Roads with QPE = 0



December 2017

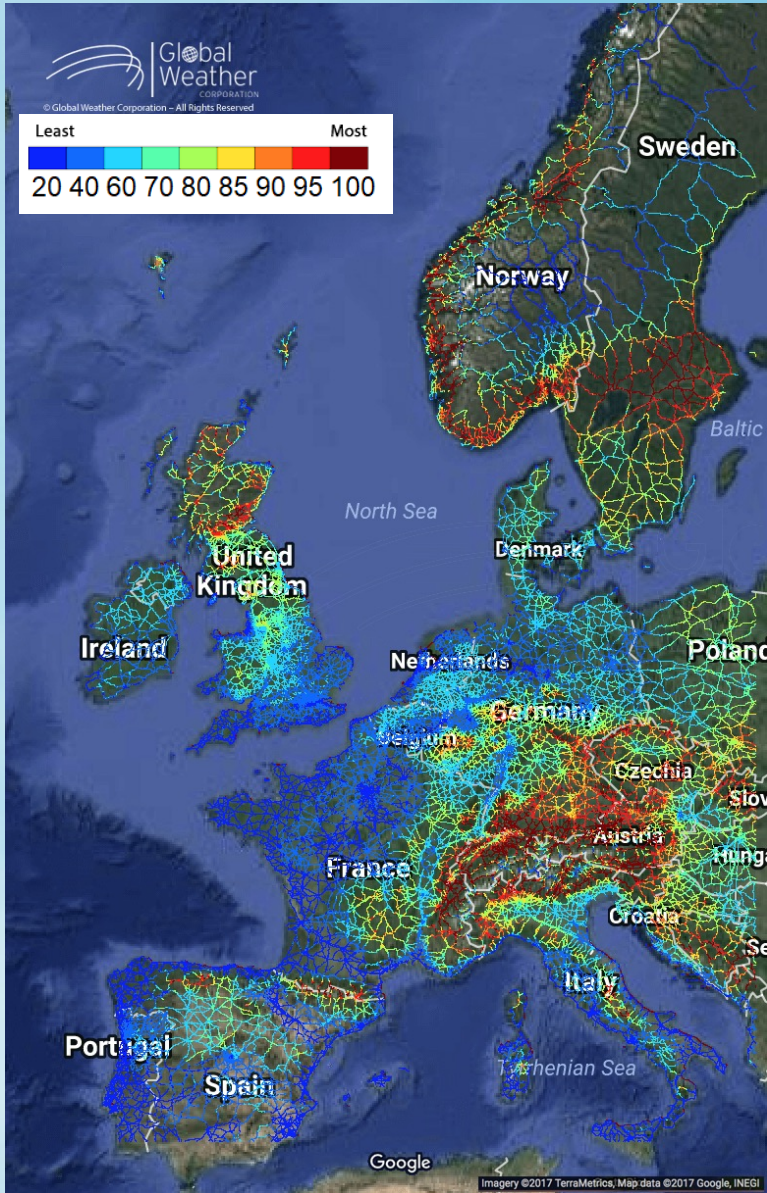
# Case 4: Snow/Ice Covered Roads with QPE = 0

	20th	40th	60th	70th	80th	85th	90th	95th	100th	Total Hours
March	0	0	0	1	5	8	14	24	108	744
April	0	0	0	0	1	2	4	9	58	720
May	0	0	0	0	0	0	0	0	16	744
June	0	0	0	0	0	0	0	0	9	720
July	0	0	0	0	0	0	0	0	7	744
August	0	0	0	0	0	0	0	0	12	744
Sept	0	0	0	0	0	0	0	0	6	720
Oct	0	0	0	0	0	0	0	8	74	744
Nov	0	0	3	6	11	18	33	54	150	720
Dec	0	10	24	34	47	59	79	116	353	744
Jan	0	3	14	22	34	44	73	118	238	744
Feb	2	8	15	20	29	37	53	74	297	672

- This demonstrates the impact of drying time and the potential errors associated with mapping atmospheric conditions to the road surface.



# Case 5: Air T and Road T on Different Sides of 0C



December 2017

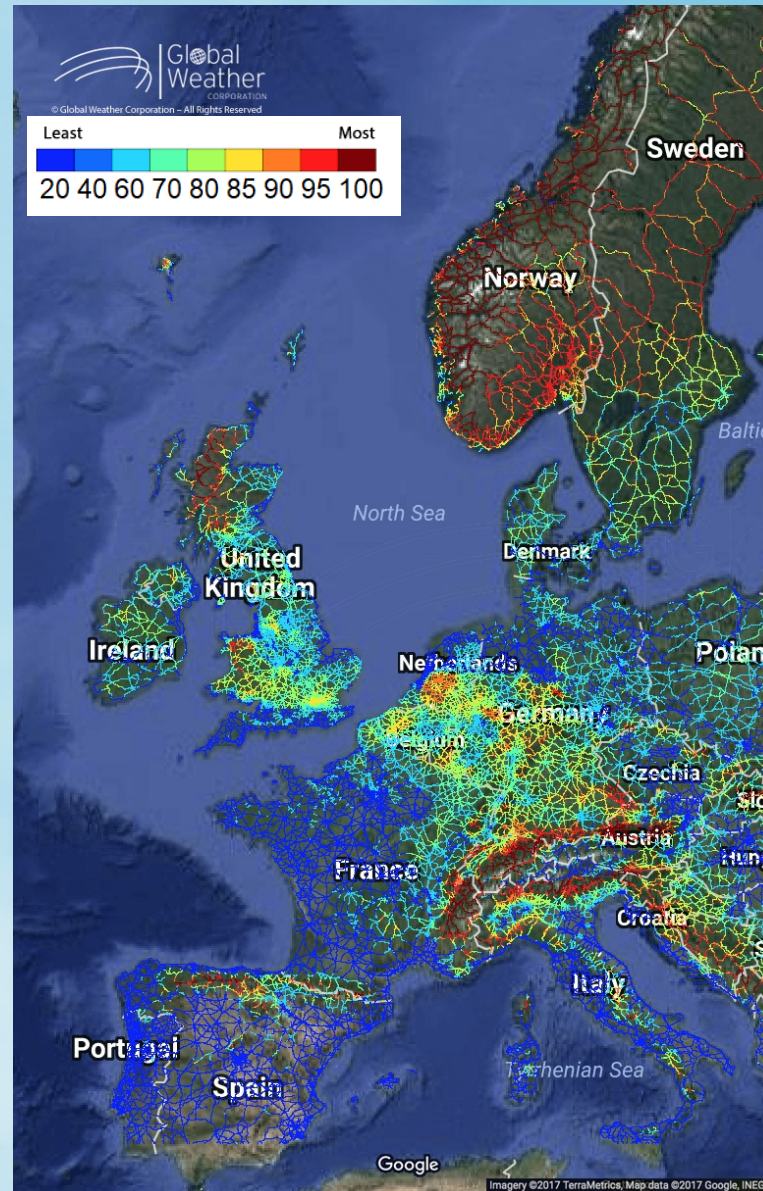
# Case 5: Air T and Road T on Different Sides of 0C

	20th	40th	60th	70th	80th	85th	90th	95th	100th	Total Hours
March	0	3	14	23	42	71	103	134	722	744
April	0	6	16	22	36	56	96	189	713	720
May	0	0	0	0	2	4	11	38	641	744
June	0	0	0	0	0	0	0	0	720	720
July	0	0	0	0	0	0	0	0	710	744
August	0	0	0	0	0	0	0	0	744	744
Sept	0	0	0	0	0	0	0	0	215	720
Oct	0	0	0	2	6	12	29	87	742	744
Nov	8	18	33	46	72	94	120	153	720	720
Dec	38	61	87	104	127	140	156	179	719	744
Jan	5	25	57	77	98	111	132	173	744	744
Feb	51	89	134	161	199	224	251	282	671	672

- This demonstrates the potential errors associated with mapping atmospheric conditions to the road surface.



# Case 6: Snow/Ice greater than 1mm on road



December 2017

# Observations and Future Research

- Many additional climatological quantifications are available.
- Mapping of atmospheric conditions to roads has potentially significant errors.
- The impact of road treatment can greatly change the expected road conditions.
- Air and road temperature are not good approximations for each other.
- Future research ideas are nearly infinite:
  - Better quantification of treatment by region
  - More variable comparisons
  - Regional data by season
  - High impact events





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**Thank you!**

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