

Homework: Climate Change and Aviation

1) Create matrix to map Climate Change (rows) with Air Transportation Components (columns). See lists below.

Identify the cells in the matrix in which climate change has affected an Air Transportation System Component and describe the impact with a short phrase.

Climate Changes:

1. Temperature increase
2. Change in precipitation
3. Frequency and intensity of convective weather
4. Strengthening of Jet Stream
5. Changes in wind patterns
6. Sea-level rise
7. Increased storm surge

Air Transportation System Components

1. Infrastructure – Airports (runways, taxiways, gates)
2. Infrastructure – ANSP (surveillance “radar”, navigation aids, communication networks)
3. Aircraft Performance
4. Aircraft Safety/Passenger Travel Comfort
5. Local – Noise
6. Local – Air & Water Quality
7. Passenger Demand

2) Provide examples for 5 of the cells in the above matrix from news events. Provide brief description of news event.

Examples:

- The jet stream is strengthening at high altitudes, which means that once airborne, increased likelihood encounter turbulence.
- The jet stream is strengthening at high altitudes, which means flights from East to West (e.g. Europe to the United States) are against the jet stream and will take longer than today's trips
- As temperatures rise air becomes thinner, making it harder for wings to generate enough lift during takeoff. Getting rid of some weight—in other words, carrying fewer passengers or less cargo—makes it easier for a plane to become airborne. Long-haul flights will be particularly vulnerable since they have to carry full fuel loads, making them heavier.
- As temperatures rise, airports might run into trouble when blistering heat starts to literally melt the tarmac. In 2012, an airplane got stuck while trying to take off at Ronald Reagan Washington National Airport in Washington, D.C. The jet actually sank four inches into the runway.
- As temperatures rise, buildings designed for milder climates won't be able to keep cool during heat waves, overheating equipment and endangering workers.
- Increased frequency and magnitude of convective weather: During a powerful storm, high winds can damage control towers and other equipment
- Increased frequency and magnitude of convective weather: Floodwaters inundate airfields, terminals, and underground electrical facilities, causing power outages.
 - After Hurricane Sandy unleashed 100 million gallons of floodwater at LaGuardia in 2012, the Port Authority of New York & New Jersey began investing in better drainage and protections for electrical facilities for the airport.
 - After Hurricane Sandy JFK, which was flooded with salt water from Jamaica Bay and Bergen Basin during Sandy, is installing tide gates to protect its low-lying areas.
- Sea-level Rise: Low-lying areas may also become permanently flooded.

- The new terminal planned for Newark Liberty International Airport in New Jersey will be designed with projections for future sea levels in mind.
- The proposed third runway at Hong Kong International Airport will be protected by a 21-foot seawall and a drainage system designed for future floods
- In Norway, many of the airports operated by the state-owned company Avinor sit along the coastline; Avinor has decided to build future runways at least 23 feet above sea level.