

# Index

## A

- Absolute
  - extremum, 39
  - maximum, 44, 46
  - value, 41
- Adiabatic cooling, 84, 85
- Advection, 5, 8–10, 17, 18, 21, 30, 31, 84
- Advective circulation type, 20
- Airflow, 18, 20
- Air-mass advection, direction, 185
- Air-mass precipitation
  - frequency in anticyclonic situations, 203
  - frequency in cyclonic situations, 206
- Alps, 5, 9, 10, 16, 21, 53
- Altitude, 3, 15, 21
- Anaximander, 2
- Anomaly, 18, 19
- Anticyclone, 5
- Anticyclone situations, 10
- Anticyclonic type, 19
- Arithmetic mean, 14
- Armagh Observatory, 23
- Atlantic Ocean, 5, 7, 18, 110
- Atmosphere, 83
- Atmospheric
  - circulation, 2, 3, 8–13, 19–22, 29–31, 88, 185
  - front, 6, 12, 20, 22, 84, 85, 97
  - pressure, 186
  - stability, 84
- Atmospheric circulation 158, 162
- Azores high, 5, 105, 112

## B

- Band
  - narrow, 87
  - narrow cold-frontal, 86
  - prefrontal, 86
  - warm-frontal, 86
  - warm sector, 86
  - wide cold-frontal, 86
- Baroclinic, 185
- Baseline period, 52
- Bay of Biscay, 5
- Bay of Finland, 5
- Bergeron, 84
- Black Sea, 52, 110, 112
- Breeze effect, 5
- British Isles, 10, 11, 17, 19, 21, 108
- Buoyancy forces, 84

## C

- California, 15
- Carpathians, 53
- Caspian Sea, 5, 45, 48, 111
- Caucasus Mountains, 112
- Centre of action, 18
- China, 2
- Circulation index, 165
- Circulation type, 13, 20, 186
  - classification, 186
- Classification method, 187
- Climate, 27
  - continental, 84
  - temperate, 84

- Climate Prediction Center, 162
  - Climatic
    - conditions, 42
    - index, 42
  - Climatic seasons, 13
  - Climatology, 12, 17, 19, 22, 23, 29
  - CLIVAR, 42
  - CliWare, 24
  - Cloud, 15, 16, 83, 84, 88
    - comma, 86
    - convective, 86
    - cover, 84
    - cumuliform, 84
    - droplet, 83
    - dynamics, 83
    - orographic, 84
    - physics, 83
    - stratiform, 84
  - Cluster, 128
    - analysis, 128
    - centrum, 129
  - Cluster analysis, 6
  - Cold air, inflow, 112
  - Cold air-masses, 20, 86
  - Cold front, 4, 5, 8, 10, 15, 16, 22, 30
  - Cold front precipitation
    - frequency in anticyclonic situations, 225
    - frequency in cyclonic situations, 227
  - Complex relief, 21
  - Conditional probability, 13, 164, 170
  - Continental air, 5
  - Continental climate, 48
  - Convection, 4, 15, 16, 19, 84, 112
    - deep, 84
    - forced, 4, 84
    - free, 4, 15, 19, 84, 105, 111, 150
    - intensive, 17
    - low-intensity, 17
    - moderate, 17
    - old, 16
    - orographic, 188
    - strong, 17
  - Convective, 19
    - cells, 16
    - complexes, 19
    - precipitation, 15–18, 109
    - system, 15, 16, 87
  - Convergence zone, 105
  - Cool, 21
  - Cool air, 84
  - Crete, 109
  - Crimea Peninsula, 52
  - Criteria, 40
  - Criterion, 6, 129
  - Croatia, 45
  - Cumulonimbus, 84
  - Cumulus, 84
    - congestus, 84
    - humilis, 84
    - mediocris, 84
  - Cyclogenesis, 4, 6, 114, 119, 140, 147
  - Cyclone, 4, 8, 9, 18, 57, 84
    - life cycle, 116
    - track, 57
  - Cyclonic
    - activity, 4, 5
    - situation, 9–11, 18, 19
    - systems, 11, 15
    - troughs, 16
  - Cyclonic activity, 110
  - Cyprus, 45, 109
  - Czech Republic, 44
- D**
- Data
    - correction, 27
    - errors, 27
    - selection, 26
  - Definition
    - extreme weather, 41
  - Density, 84
  - Descriptive statistics, 14, 142, 188, 199, 209, 219, 232, 240, 248
  - Deutscher Wetterdienst, 25
  - Different fronts, 4
  - Different fronts precipitation
    - frequency in anticyclonic situations, 244
    - frequency in cyclonic situations, 247
  - Discontinuity line, 4, 6, 96, 97
  - Discriminative variable, 132
  - Droplet growth, 83
  - Drought, 14
  - Dynamic
    - low, 18
    - processes, 4, 12, 88
- E**
- Ecosystems, 2
  - e-klima, 23
  - Empirical statistical distribution function, 8, 54, 162, 163
  - Environmental factor, 2
  - Error value, 27
  - ETCCDI, 42

- Europe, 3, 6, 14, 16, 21, 25, 30, 31
  - Central, 5, 7, 30, 55, 59, 110, 112
  - continental, 5
  - Eastern, 7, 11, 46–48, 55, 59, 110
  - Northern, 6–8, 11, 46
  - south-eastern, 5
  - Southern, 4, 5, 7, 9, 46
  - Western, 3, 5, 6, 8, 11, 53, 59, 110, 112
- European Climate Assessment & Dataset, 23
- Event
  - extreme, 42
  - geomorphologic, 44
  - hydrological, 44
- Extratropical cyclones, 88
- Extreme
  - event, 40, 41
  - moderate, 40
- Extreme event, 39
  - criteria, 40
  - definition, 39
  - duration, 42
  - frequency, 40
  - intensity, 40
- Extreme precipitation
  - air-mass, 108, 122, 153, 154, 159
  - cold front, 152
  - criteria, 51–55
  - definition, 51, 58
  - extent, 100–110
  - frequency, 121, 187
    - in anticyclonic situations, 192
  - frontal, 111
  - heaviest, 58–59
  - index, 59
  - 95th percentile, 55–58
  - occluded front, 152, 155, 159
  - origin, 129
  - origin-based types, 88–89
  - orographic, 158
  - probability, 167
  - regionalisation, 127–160
  - seasonal pattern, 172
  - several fronts, 153–158
  - synoptic situation, 187
  - total, 59
  - type, 128, 186
  - variability, 44, 57
- Extreme values theory, 40
- Extremum, 39
  
- F**
- Flood risk, 3
  
- France, 5, 45
- Frequency, 11, 18, 21, 22
- Frequency distribution, 51
- Frequency in anticyclones
  - air-mass precipitation, 199
  - cold front precipitation, 220
  - different fronts precipitation, 241
  - extreme precipitation, 187
  - frontal precipitation, 210
  - occluded front precipitation, 250
  - warm front precipitation, 231
- Frequency in cyclones
  - air-mass precipitation, 199
  - cold front precipitation, 220
  - different front precipitation, 241
  - extreme precipitation, 187
  - frontal precipitation, 210
  - occluded front precipitation, 251
  - warm front precipitation, 231
- Front, 6
  - cold, 84, 85, 88, 159
  - occluded, 86, 159
  - polar, 86
  - speed, 123
  - stationary, 86
  - surface, 86
  - warm, 85, 86
  - weather, 88
- Frontal area, 85
- Frontal precipitation
  - frequency in anticyclonic situations, 212
  - frequency in cyclonic situations, 217
- Frontal system, 15, 99
- F statistic, 129–132
- Extreme precipitation
  - frequency in cyclonic situations, 195
  
- G**
- Gaps, 30
- Genoa lows, 16
- Geostrophic flow, 187
- Geostrophic wind, 186
- Germany, 45
- Global Historical Climatology
  - Network–Daily, 23
- Greece, 45
- Grid data, 187
- Grid point, 13
- Grouping
  - procedure, 129
  - process, 128
  - variables, 128, 159

Grouping variables, 6  
 Gulf of Finland, 108  
 Gulf of Riga, 108

## H

Hail, 2  
 High, 113  
 High-pressure ridge, 190  
 High-pressure systems, 19, 150  
 Histogram, 14  
 Homogeneity, 26, 29  
 Homogenization procedure, 26  
 Humid air mass, 51, 84  
 Humidity, 2, 15, 18, 51, 58, 85, 162  
 Hydrological cycle, 2  
 Hypothesis, 162

## I

Iberian Peninsula, 5, 9, 10, 14, 17–19, 22  
 Ice, 2  
 Ice crystals, 84  
 India, 2  
 Instability, 84  
 Instant, 86  
 Insurance sector, 53  
 Intertropical convergence zone, 16  
 Italy, 2, 18, 21, 45  
 Iteration, 128

## J

JCOMM, 42

## K

*k*-mean method, 6, 128  
 Kolmogorov–Smirnov test, 162  
 Koninklijk Nederlands Meteorologisch  
 Instituut, 23  
 Korea, 2

## L

Landmass, 5  
 Latitude, 13  
 Line  
   discontinuity, 89  
 Local circulation, 22  
 Location measure, 41  
 Longitude, 13  
 Lowland, 53  
 Low-pressure system, 5, 15, 18–21, 57, 85, 86,  
 111, 145, 147, 148

## M

Mann–Whitney U test, 162  
 Manual procedure, 97  
 Massif Central, 5  
 Material damage, 40, 53  
 Measuring times, 25  
 Median, 162  
 Mediterranean, 6, 16, 19, 20, 22, 28, 47, 59,  
 109, 110  
 Meridional flow, 18  
 Meteorological  
   data, 23–24  
   dataset, 23  
   element, 24  
   phenomena, 24  
 Meteorology, 15  
 Method  
   automatic, 97, 187  
   manual, 187  
   objective, 89  
   subjective, 97  
 Missing values, 25  
 Moderate latitudes, 12, 98  
 Moist air, 8, 15–17, 20, 21  
 Mountain barrier, 97  
 Mountainous areas, 5, 9  
 Mountain range, 17

## N

NAO, 8, 9, 13, 21, 22, 161–181  
   negative phase, 9  
   opposite phases, 167  
   positive phase, 8  
 NAO phase, 164, 170, 176  
   negative, 165, 167, 178  
   positive, 165, 167, 169–170, 173  
 Netherlands, 2  
 Nimbostratus, 86  
 Non-advective situation, 186  
 Non-parametric test, 162, 163  
 North-Atlantic lows, 22  
 Northern Hemisphere, 161  
 North Sea, 4, 5, 9, 11, 110  
 Norway, 30  
 Null hypothesis, 162  
 Number of days, 41

## O

Observation time, 89  
 Occluded front, 4, 11  
 Occluded front precipitation  
   frequency in anticyclonic situations, 253  
   frequency in cyclonic situations, 256

- Occlusion, 6, 19, 86  
 OGIMET, 27  
 Orographic  
   barrier, 4, 5, 16, 21, 51, 58, 97, 110, 112, 148  
   effect, 17  
   precipitation, 97  
   uplift, 20  
 Orography, 17, 18, 45  
 Outliers, 27, 138, 146, 148, 152–154, 156, 158  
 Overrunning movements, 4
- P**  
 Palestine, 2  
 Past weather, 24  
 Percentile, 3, 40, 51, 54, 59  
 Pettitt test, 26  
 Phenomena, 21, 24  
 Poland, 2, 10, 15, 24, 44, 45  
 Polar air mass, 86  
 Population, 162  
 Portugal, 45  
 Precipitation, 1, 2, 8, 18, 27, 29–31  
   accuracy, 52  
   air-mass, 3, 4, 7–9, 13, 83–123, 127, 148, 150, 151  
   annual cycle, 52  
   changes, 21  
   classification, 89  
   cold front, 5, 8, 10, 30, 86, 111–113  
   concentration, 45, 47  
   continuous, 86  
   convective, 15, 17, 84, 85  
   daily, 3, 30, 40  
   daily maximum, 46  
   development, 119  
   different front, 114–115  
   discontinuity line, 123  
   distribution, 86  
   duration, 85  
   extreme, 2, 3, 13, 19, 39–78, 98  
   formation, 84  
   frequency, 47  
   frontal, 3–5, 9–13, 19, 22, 29, 83–123, 127  
   heavy, 4, 15, 19, 20, 86, 87, 146, 186  
   high, 14  
   highest, 44–47  
   indices, 39–78  
   intensity, 40, 85  
   intensive, 85  
   maximum, 44  
   measurements, 2  
   mechanism, 15  
   moderate, 17, 86  
   monthly, 3  
   non-convective, 17  
   number of days, 47–51  
   occluded front, 4, 7, 11, 31, 116, 147, 148  
   origin, 3, 7, 10, 16, 20, 22, 89, 122, 162  
   orographic, 19, 148  
   records, 2, 3  
   regimen, 3, 14, 51  
   several fronts, 136, 146, 150–151  
   stationary front, 4, 123  
   storm, 17  
   thunderstorm, 86  
   torrential, 84, 100  
   trend, 14  
   type, 3–14, 17, 18, 22, 27, 29–31, 89, 122  
   variability, 13  
   various fronts, 5, 10, 31  
   warm front, 5, 19, 30, 85, 86, 113, 122, 149  
   zone, 4, 85, 119  
 Precipitation day, 24, 27  
 Precipitation type  
   air-mass, 88  
   cold front, 89  
   convective, 109  
   different front, 89  
   frontal, 110  
   occluded front, 89  
   orographic, 97  
   stationary front, 89  
   warm front, 89  
 Present weather, 24  
 Pressure  
   centre, 18  
   gradient, 6, 19, 20  
   system, 11  
 Pressure gradient, 114  
 Pressure system, 186  
 Probabilistic criteria, 44  
 Probability distribution, 42  
 Prognostic model, 15
- Q**  
 Quality control, 25
- R**  
 Radar, 15  
 Radar data, 17  
 Rain, 2  
   guage, 2  
 Rainbands, 85, 86

- Rainfall, 2, 16–18, 20–22, 44
  - torrential, 105
- Rain-free weather, 150
- Rainwater, 2
- Range test, 26
- Reference period, 30
- Region, 9, 129
- Regional group, 129, 160
  - autumn, 156
  - descriptive statistics, 144
  - location, 132
  - spatial distribution, 132–160
  - spring, 158
  - structure, 132
  - summer, 152
  - winter, 160
- Regional groups, 7, 11
- Regionalisation, 128
- Regular measurements, 47
- Relative frequency, 187
- Relief, 4, 8
- Russia, 44, 48
  
- S**
- Sample, 3, 30
- Satellite imagery, 16
- Scandinavian, 5
- Scandinavian Mountains, 7, 9, 11, 31, 47, 58, 110
- Scandinavian Peninsula, 7, 10, 11, 18, 45, 46, 56, 110
- Sea-level pressure, 187
- Showers, 85
- Significance level, 163
- Snow, 2
- Spain, 45, 52
- Spatial extent, 8
- Spatial order, 149
- Spatial relationship, 45
- Squall line, 84, 87, 97
- Standard deviation, 105
- Standard Normal Homogeneity Test, 26
- Stationary front, 4, 15, 19, 21
- Statistical distribution, 3, 40
- Statistical significance, 162
- Storm activity, 174
- Stratiformis*, 15
- Stratiformis* precipitation, 15, 16, 19
- Stratus, 84
- Subtropical high, 51
- Supercooled water, 84
  
- Surface chart, 187
- Surface synoptic charts, 25
- Surge, 86
- Sweden, 2
- Synoptic
  - chart, 88–90, 105
  - charts, 25
  - data, 29, 31
  - map, 4
  - meteorology, 15
  - report, 24
  - scale, 15
  - situation, 10, 11, 13, 16–18, 20, 25, 186
  - type, 18
  
- T**
- Teleconnection pattern, 161, 162
- Temperature, 5, 84
- Temperature gradient, 97
- Test F, 129
- Thales, 2
- Thermal
  - gradient, 6
  - low, 17
- Thermodynamic properties, 13, 186
- Threshold, 41, 59
  - fixed, 42, 47
  - magnitude, 52
  - relative, 42
- Thunderstorm, 85
- Time criteria, 25
- Topography, 21
- Total
  - annual, 42
  - daily, 41
  - five-day, 41
  - record breaking, 46
  - seasonal, 42
- Transformation, 51
- Troposphere, 20
- Trough, 17, 18, 21, 84, 86, 112
  
- U**
- U Mann–Whitney test, 162
- Uncertainty, 97
- United States, 15
- Unstable air, 85
- Upland, 4
- Upper winds, 20
- Upward movements, 83

**V**

- Variability, 7, 13, 15, 16
  - inter-cluster, 129
  - intra-cluster, 129
  - seasonal, 3
  - spatial, 3
- Variance, 105, 129
- Various fronts, 8, 10
- Von Neumann Ratio test, 26
- Vorticity equation, 186

**W**

- Warm
  - air, 15, 18
  - front, 4, 5, 19
- Warm air, 84
- Warm air sector, 84
- Warm front precipitation
  - frequency in anticyclonic situations, 235
  - frequency in cyclonic situations, 237
- Water
  - droplets, 84

- Water cycle, 2
  - Water vapour, 51
  - Weather, 15, 19, 23
    - chart, 27
    - forecasting, 12
    - front, 4–6, 12, 13, 19, 22, 29–31, 85, 185
    - hazardous, 40
    - station, 3, 6, 24, 25, 27, 28, 30, 46, 105, 162
    - type, 22
    - westerly circulation, 172
  - Wedge, 5
  - Weighted mean, 54
  - Western wind, 111
  - WMO, 42
- 
- Z**
  - Zonal circulation, 8, 163
    - intensity, 164
  - Zonal pattern, 123
  - Zone, prefrontal, 86