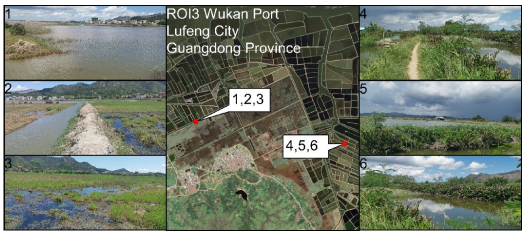


**Figure S1.** Wukan Port field survey photos

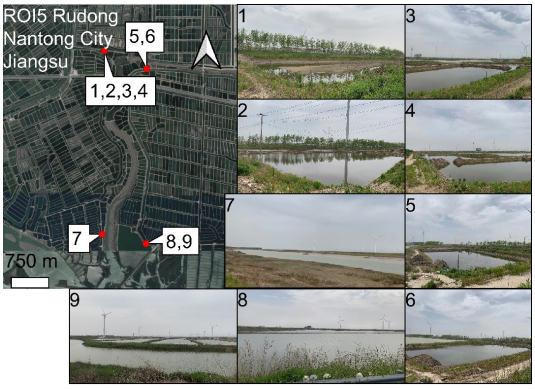


**Figure S2.** Rudong field survey photos

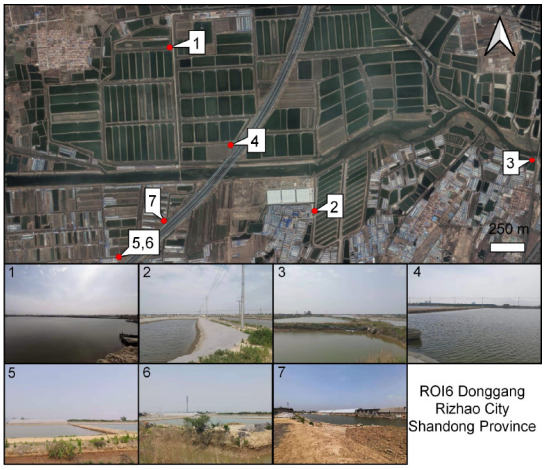


**Figure S3.** Donggang field survey photos

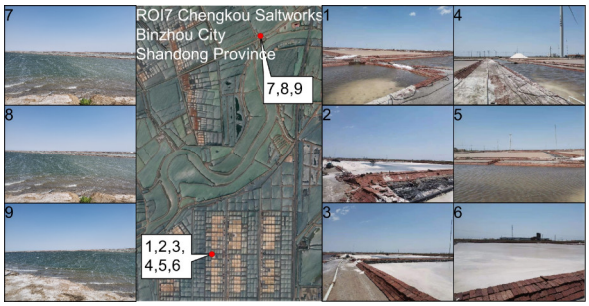


**Figure S4.** Chengkou Saltworks field survey photos


**Figure S5.** Hangu Saltworks field survey photos

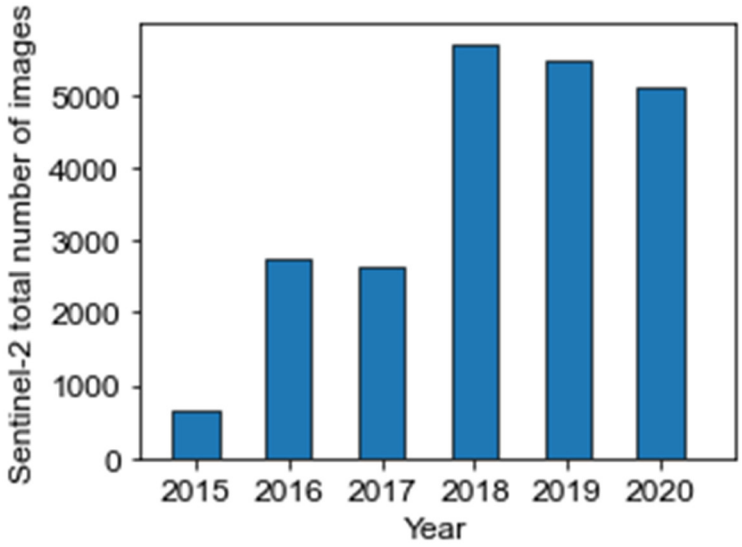


**Figure S6.** Number of Sentinel-2 remote sensing images used annually from 2015 to 2020.

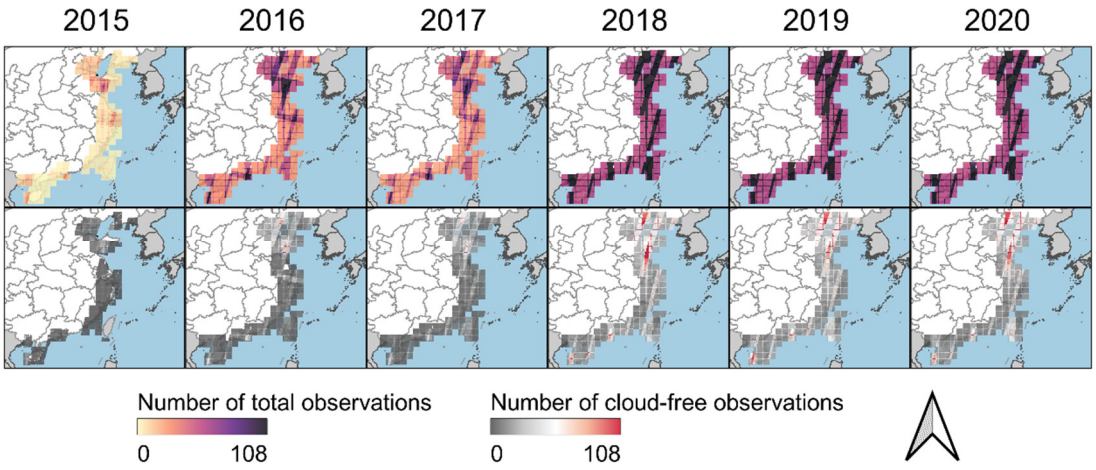


**Figure S7.** Availability of Sentinel-2 remote sensing imagery used annually from 2015 to 2020.

**Text S1**

Since both MNDWI (Equation 1) and Sentinel 1 are commonly used metrics to extract water bodies, we compare these two with NDWI to choose the most suitable metrics for making water body masks. After the S1 SAR VH band image is sharpened, the high noise is amplified, and the mask "snow screen" phenomenon is serious, although the sharpened VH image produces a relatively high-quality water object mask (Figure S1a vs S1b). The S2 SWIR band required to calculate MNDWI has a spatial resolution of 20m, so the water object mask calculated based on MNDWI has insufficient spatial resolution, and the coverage and separation are not significantly enhanced after sharpening (Figure S1e vs S1f). The water object mask produced based on the sharpened S2 NDWI image is significantly better than the previous two (Figure S1d). The panoramic view comparison of the water object mask produced based on S2 NDWI images is shown in Figure S1g and S1h.

$$\text{MNDWI}=\frac{\text{Green-MIR}}{\text{Green+MIR}} \tag{S1}$$

Where Green and MIR represent the Green and Mid-infrared band band of Sentinel-2 MSI imagery.

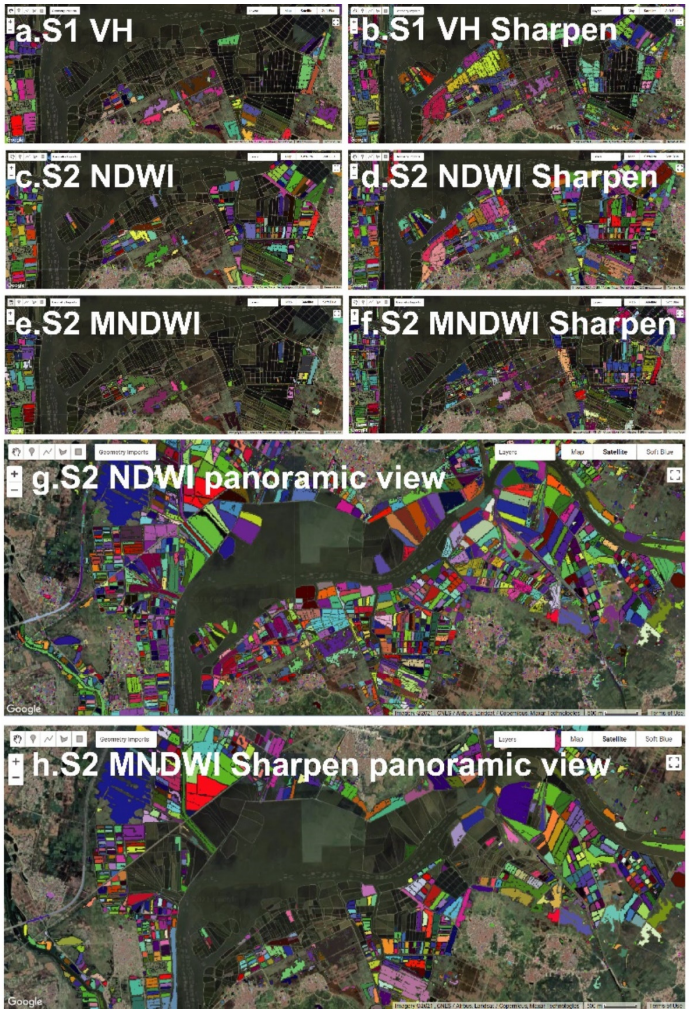


**Figure S8.** The water mask made by S1 VH, S2 NDWI, and S2MNDWI at test site 3, and the comparison of the sharpening effect.

**Table S1.** MF optimized from the four models located in the southern site and the southern model

| Index | Feature Importance Rank | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| 0 | s_Area | s_Compactness | s_LSI | s_Perimeter | w_2BDA |
| 1 | s_Area | s_Compactness | s_LSI | s_Perimeter | w_CDOM |
| 2 | s_Area | s_Compactness | s_LSI | s_Perimeter | w_MCI |
| 3 | s_Area | s_Compactness | s_LSI | s_Perimeter | w_NDCI |
| 4 | s_Area | s_Compactness | s_LSI | s_Perimeter | w_SABI |
| 5 | s_Area | s_Compactness | s_LSI | w_2BDA | w_NDCI |
| 6 | s_Area | s_Compactness | s_LSI | w_CDOM | w_MCI |
| 7 | s_Area | s_Compactness | s_Perimeter | w_2BDA | w_CDOM |
| 8 | s_Area | s_Compactness | s_Perimeter | w_2BDA | w_MCI |
| 9 | s_Area | s_Compactness | s_Perimeter | w_2BDA | w_NDCI |
| 10 | s_Area | s_Compactness | s_Perimeter | w_2BDA | w_SABI |
| 11 | s_Area | s_Compactness | s_Perimeter | w_CDOM | w_MCI |
| 12 | s_Area | s_Compactness | s_Perimeter | w_CDOM | w_NDCI |
| 13 | s_Area | s_Compactness | s_Perimeter | w_MCI | w_NDCI |
| 14 | s_Area | s_Compactness | s_Perimeter | w_NDCI | w_SABI |
| 15 | s_Area | s_Compactness | w_CDOM | w_MCI | w_SABI |
| 16 | s_Area | s_LSI | s_Perimeter | w_2BDA | w_NDCI |
| 17 | s_Area | s_LSI | s_Perimeter | w_2BDA | w_SABI |
| 18 | s_Area | s_LSI | s_Perimeter | w_CDOM | w_MCI |
| 19 | s_Area | s_LSI | s_Perimeter | w_NDCI | w_SABI |
| 20 | s_Area | s_LSI | w_CDOM | w_MCI | w_SABI |
| 21 | s_Area | s_Perimeter | w_2BDA | w_CDOM | w_NDCI |
| 22 | s_Area | s_Perimeter | w_2BDA | w_MCI | w_NDCI |
| 23 | s_Area | s_Perimeter | w_2BDA | w_NDCI | w_SABI |
| 24 | s_Area | w_2BDA | w_CDOM | w_MCI | w_SABI |
| 25 | s_Area | w_CDOM | w_MCI | w_NDCI | w_SABI |
| 26 | s_Compactness | s_LSI | s_Perimeter | w_2BDA | w_CDOM |
| 27 | s_Compactness | s_LSI | s_Perimeter | w_2BDA | w_NDCI |
| 28 | s_Compactness | s_LSI | s_Perimeter | w_CDOM | w_MCI |
| 29 | s_Compactness | s_LSI | s_Perimeter | w_CDOM | w_NDCI |
| 30 | s_Compactness | s_LSI | w_2BDA | w_CDOM | w_NDCI |
| 31 | s_Compactness | s_LSI | w_CDOM | w_MCI | w_SABI |
| 32 | s_Compactness | s_Perimeter | w_CDOM | w_MCI | w_NDCI |
| 33 | s_Compactness | w_2BDA | w_CDOM | w_MCI | w_SABI |
| 34 | s_Compactness | w_CDOM | w_MCI | w_NDCI | w_SABI |
| 35 | s_LSI | w_2BDA | w_CDOM | w_MCI | w_SABI |

| | | | | | |
|---|---|---|---|---|---|
| 36 | s_LSI | w_CDOM | w_MCI | w_NDCI | w_SABI |
| 37 | s_Perimeter | w_CDOM | w_MCI | w_NDCI | w_SABI |
| 38 | w_2BDA | w_CDOM | w_MCI | w_NDCI | w_SABI |
| 39 | s_Area | s_Compactness | s_LSI | w_MCI | w_NDCI |
| 40 | s_Compactness | s_LSI | s_Perimeter | w_MCI | w_NDCI |
| 41 | s_Compactness | s_LSI | w_CDOM | w_MCI | w_NDCI |
| 42 | s_LSI | s_Perimeter | w_CDOM | w_MCI | w_NDCI |

**Table S2.** MF optimized from the four models located in the northern site and the northern model

| Index | Feature Importance Rank | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| 0 | s_Area | s_Aspect_Ration | s_Compactness | w_CDOM | w_MCI |
| 1 | s_Area | s_Aspect_Ration | s_Compactness | w_CDOM | w_SABI |
| 2 | s_Area | s_Aspect_Ration | s_LSI | w_CDOM | w_MCI |
| 3 | s_Area | s_Aspect_Ration | s_LSI | w_CDOM | w_SABI |
| 4 | s_Area | s_Aspect_Ration | s_Perimeter | w_CDOM | w_MCI |
| 5 | s_Area | s_Aspect_Ration | s_Perimeter | w_CDOM | w_SABI |
| 6 | s_Area | s_Aspect_Ration | w_CDOM | w_MCI | w_SABI |
| 7 | s_Area | s_Compactness | s_LSI | s_Perimeter | w_2BDA |
| 8 | s_Area | s_Compactness | s_LSI | s_Perimeter | w_CDOM |
| 9 | s_Area | s_Compactness | s_LSI | s_Perimeter | w_NDCI |
| 10 | s_Area | s_Compactness | s_LSI | w_2BDA | w_CDOM |
| 11 | s_Area | s_Compactness | s_LSI | w_2BDA | w_NDCI |
| 12 | s_Area | s_Compactness | s_LSI | w_CDOM | w_MCI |
| 13 | s_Area | s_Compactness | s_LSI | w_CDOM | w_NDCI |
| 14 | s_Area | s_Compactness | s_LSI | w_CDOM | w_SABI |
| 15 | s_Area | s_Compactness | s_LSI | w_MCI | w_SABI |
| 16 | s_Area | s_Compactness | s_Perimeter | w_2BDA | w_CDOM |
| 17 | s_Area | s_Compactness | s_Perimeter | w_2BDA | w_NDCI |
| 18 | s_Area | s_Compactness | s_Perimeter | w_2BDA | w_SABI |
| 19 | s_Area | s_Compactness | s_Perimeter | w_CDOM | w_MCI |
| 20 | s_Area | s_Compactness | s_Perimeter | w_CDOM | w_NDCI |
| 21 | s_Area | s_Compactness | s_Perimeter | w_CDOM | w_SABI |
| 22 | s_Area | s_Compactness | s_Perimeter | w_MCI | w_SABI |
| 23 | s_Area | s_Compactness | w_2BDA | w_CDOM | w_NDCI |
| 24 | s_Area | s_Compactness | w_2BDA | w_MCI | w_NDCI |
| 25 | s_Area | s_Compactness | w_2BDA | w_NDCI | w_SABI |
| 26 | s_Area | s_Compactness | w_CDOM | w_MCI | w_SABI |
| 27 | s_Area | s_Compactness | w_CDOM | w_NDCI | w_SABI |
| 28 | s_Area | s_LSI | s_Perimeter | w_2BDA | w_CDOM |
| 29 | s_Area | s_LSI | s_Perimeter | w_2BDA | w_NDCI |
| 30 | s_Area | s_LSI | s_Perimeter | w_2BDA | w_SABI |
| 31 | s_Area | s_LSI | s_Perimeter | w_CDOM | w_MCI |
| 32 | s_Area | s_LSI | s_Perimeter | w_CDOM | w_NDCI |

| | | | | | |
|---|---|---|---|---|---|
| 33 | s_Area | s_LSI | s_Perimeter | w_CDOM | w_SABI |
| 34 | s_Area | s_LSI | s_Perimeter | w_MCI | w_SABI |
| 35 | s_Area | s_LSI | s_Perimeter | w_NDCI | w_SABI |
| 36 | s_Area | s_LSI | w_2BDA | w_CDOM | w_NDCI |
| 37 | s_Area | s_LSI | w_2BDA | w_CDOM | w_SABI |
| 38 | s_Area | s_LSI | w_2BDA | w_MCI | w_NDCI |
| 39 | s_Area | s_LSI | w_2BDA | w_NDCI | w_SABI |
| 40 | s_Area | s_LSI | w_CDOM | w_MCI | w_SABI |
| 41 | s_Area | s_LSI | w_CDOM | w_NDCI | w_SABI |
| 42 | s_Area | s_Perimeter | w_2BDA | w_CDOM | w_NDCI |
| 43 | s_Area | s_Perimeter | w_2BDA | w_CDOM | w_SABI |
| 44 | s_Area | s_Perimeter | w_2BDA | w_MCI | w_NDCI |
| 45 | s_Area | s_Perimeter | w_2BDA | w_NDCI | w_SABI |
| 46 | s_Area | s_Perimeter | w_CDOM | w_MCI | w_SABI |
| 47 | s_Area | s_Perimeter | w_CDOM | w_NDCI | w_SABI |
| 48 | s_Area | w_2BDA | w_CDOM | w_NDCI | w_SABI |
| 49 | s_Area | w_2BDA | w_MCI | w_NDCI | w_SABI |
| 50 | s_Aspect_Ration | s_Compactness | s_LSI | w_CDOM | w_SABI |
| 51 | s_Aspect_Ration | s_Compactness | s_Perimeter | w_CDOM | w_MCI |
| 52 | s_Aspect_Ration | s_Compactness | s_Perimeter | w_CDOM | w_SABI |
| 53 | s_Aspect_Ration | s_Compactness | w_CDOM | w_MCI | w_SABI |
| 54 | s_Aspect_Ration | s_LSI | s_Perimeter | w_CDOM | w_MCI |
| 55 | s_Aspect_Ration | s_LSI | s_Perimeter | w_CDOM | w_SABI |
| 56 | s_Aspect_Ration | s_LSI | w_CDOM | w_MCI | w_SABI |
| 57 | s_Aspect_Ration | s_Perimeter | w_CDOM | w_MCI | w_SABI |
| 58 | s_Aspect_Ration | w_2BDA | w_MCI | w_NDCI | w_SABI |
| 59 | s_Compactness | s_LSI | s_Perimeter | w_2BDA | w_CDOM |
| 60 | s_Compactness | s_LSI | s_Perimeter | w_2BDA | w_NDCI |
| 61 | s_Compactness | s_LSI | s_Perimeter | w_CDOM | w_MCI |
| 62 | s_Compactness | s_LSI | s_Perimeter | w_CDOM | w_NDCI |
| 63 | s_Compactness | s_LSI | s_Perimeter | w_CDOM | w_SABI |
| 64 | s_Compactness | s_LSI | s_Perimeter | w_MCI | w_SABI |
| 65 | s_Compactness | s_LSI | w_2BDA | w_CDOM | w_NDCI |
| 66 | s_Compactness | s_LSI | w_2BDA | w_NDCI | w_SABI |
| 67 | s_Compactness | s_LSI | w_CDOM | w_MCI | w_SABI |
| 68 | s_Compactness | s_Perimeter | w_2BDA | w_CDOM | w_NDCI |
| 69 | s_Compactness | s_Perimeter | w_CDOM | w_MCI | w_SABI |
| 70 | s_Compactness | w_2BDA | w_MCI | w_NDCI | w_SABI |
| 71 | s_LSI | s_Perimeter | w_2BDA | w_CDOM | w_NDCI |
| 72 | s_LSI | s_Perimeter | w_CDOM | w_MCI | w_SABI |
| 73 | s_LSI | w_2BDA | w_MCI | w_NDCI | w_SABI |
| 74 | s_Perimeter | w_2BDA | w_MCI | w_NDCI | w_SABI |
| 75 | w_2BDA | w_CDOM | w_MCI | w_NDCI | w_SABI |
| 76 | s_Compactness | s_LSI | w_2BDA | w_CDOM | w_SABI |

| | | | | | |
|---|---|---|---|---|---|
| 77 | s_Compactness | s_LSI | w_CDOM | w_NDCI | w_SABI |
| 78 | s_Compactness | s_Perimeter | w_2BDA | w_CDOM | w_SABI |

**Table S3.** The area of each year proposed by this research algorithm is compared with the pond area in the China Fishery Statistical Yearbook.

| | Probability | Year | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
| Shanghai | 0-25% | 720.87 | 374.92 | 381.88 | 372.15 | 444.32 | 436.39 |
| | 25-50% | 79.81 | 53.18 | 48.17 | 49.70 | 57.90 | 69.02 |
| | 50-75% | 23.19 | 22.31 | 17.30 | 17.99 | 16.58 | 21.37 |
| | 75-100% | 32.85 | 41.96 | 41.18 | 36.61 | 34.04 | 48.23 |
| | Yearbook | 174.68 | 170.88 | 141.17 | 116.62 | 104.63 | |
| Tianjin | 0-25% | 209.81 | 351.03 | 237.35 | 183.43 | 326.31 | 297.94 |
| | 25-50% | 259.76 | 130.39 | 147.12 | 165.88 | 112.52 | 183.73 |
| | 50-75% | 114.51 | 100.71 | 136.28 | 154.07 | 156.66 | 115.37 |
| | 75-100% | 397.17 | 374.05 | 422.04 | 471.00 | 383.33 | 434.84 |
| | Yearbook | 350.13 | 342.13 | 304.66 | 274.60 | 235.52 | |
| Shandong | 0-25% | 1465.00 | 2081.27 | 1351.11 | 1117.77 | 1054.62 | 1072.64 |
| | 25-50% | 503.54 | 497.72 | 597.73 | 539.62 | 583.79 | 508.67 |
| | 50-75% | 450.77 | 433.75 | 591.07 | 712.18 | 727.28 | 596.25 |
| | 75-100% | 762.04 | 435.79 | 944.81 | 1124.83 | 1137.46 | 1202.77 |
| | Yearbook | 2782.17 | 2491.68 | 2217.81 | 2275.15 | 2201.84 | |
| Guangdong | 0-25% | 1791.60 | 1983.70 | 1583.88 | 1441.76 | 1672.12 | 1725.41 |
| | 25-50% | 693.77 | 949.18 | 956.82 | 826.44 | 966.77 | 932.71 |
| | 50-75% | 362.56 | 502.69 | 604.70 | 538.63 | 610.02 | 578.19 |
| | 75-100% | 846.48 | 1492.41 | 1555.61 | 1515.28 | 1381.00 | 1297.11 |
| | Yearbook | 3530.36 | 3441.75 | 2958.30 | 3136.88 | 3125.26 | |
| Guangxi | 0-25% | 268.80 | 281.46 | 262.78 | 251.96 | 261.46 | 259.57 |
| | 25-50% | 88.16 | 111.67 | 121.70 | 126.65 | 120.95 | 115.86 |
| | 50-75% | 25.80 | 48.58 | 54.97 | 53.61 | 51.63 | 49.97 |
| | 75-100% | 35.24 | 88.62 | 121.53 | 99.77 | 125.58 | 106.87 |
| | Yearbook | 1026.10 | 1020.75 | 765.56 | 751.78 | 768.25 | |
| Jiangsu | 0-25% | 802.20 | 881.86 | 688.85 | 669.08 | 623.78 | 708.29 |
| | 25-50% | 315.31 | 370.85 | 363.70 | 324.69 | 305.65 | 336.97 |
| | 50-75% | 293.46 | 297.32 | 374.27 | 315.39 | 318.53 | 304.63 |
| | 75-100% | 950.74 | 729.90 | 1259.07 | 1235.88 | 1223.71 | 1157.84 |
| | Yearbook | 4230.54 | 4213.09 | 3342.00 | 3630.06 | 3402.28 | |
| Hebei | 0-25% | 354.74 | 722.46 | 455.21 | 316.95 | 333.85 | 311.68 |
| | 25-50% | 349.29 | 201.33 | 243.47 | 186.04 | 203.05 | 161.45 |
| | 50-75% | 217.06 | 210.91 | 264.73 | 303.07 | 246.39 | 252.49 |
| | 75-100% | 478.13 | 278.45 | 418.73 | 549.73 | 494.92 | 580.28 |
| | Yearbook | 559.78 | 545.67 | 435.74 | 469.04 | 500.83 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Zhejiang | 0-25% | 2556.71 | 1657.27 | 1393.36 | 1389.09 | 1465.24 | 1423.10 |
| | 25-50% | 679.42 | 373.89 | 356.66 | 365.95 | 374.33 | 368.16 |
| | 50-75% | 279.39 | 162.36 | 163.74 | 160.45 | 161.82 | 169.73 |
| | 75-100% | 518.90 | 392.92 | 326.97 | 344.70 | 341.04 | 444.09 |
| | Yearbook | 1041.84 | 990.72 | 962.77 | 1197.86 | 1201.73 | |
| Hainan | 0-25% | 457.59 | 411.63 | 411.63 | 329.81 | 359.03 | 304.09 |
| | 25-50% | 143.57 | 149.88 | 149.88 | 185.05 | 179.14 | 151.06 |
| | 50-75% | 57.52 | 50.86 | 50.86 | 47.63 | 43.40 | 54.04 |
| | 75-100% | 124.56 | 91.39 | 91.39 | 56.83 | 45.10 | 76.34 |
| | Yearbook | 369.98 | 379.02 | 341.04 | 345.53 | 365.43 | |
| Fujian | 0-25% | 1028.20 | 843.11 | 633.05 | 621.59 | 703.72 | 675.89 |
| | 25-50% | 312.44 | 258.12 | 229.18 | 224.37 | 240.63 | 220.83 |
| | 50-75% | 203.60 | 110.42 | 130.15 | 111.84 | 107.89 | 105.43 |
| | 75-100% | 410.88 | 184.44 | 258.59 | 166.42 | 210.80 | 188.22 |
| | Yearbook | 723.08 | 719.65 | 623.86 | 551.81 | 570.56 | |
| Liaoning | 0-25% | 687.70 | 796.06 | 694.17 | 714.51 | 624.23 | 610.08 |
| | 25-50% | 262.61 | 246.26 | 262.37 | 230.04 | 243.34 | 229.88 |
| | 50-75% | 193.91 | 457.00 | 500.58 | 497.15 | 499.21 | 440.27 |
| | 75-100% | 304.64 | 362.78 | 485.28 | 471.48 | 577.53 | 698.02 |
| | Yearbook | 1380.79 | 1352.32 | 1173.53 | 1237.06 | 1085.74 | |
| Taiwan | 0-25% | 78.85 | 932.07 | 568.39 | 506.91 | 543.27 | 437.94 |
| | 25-50% | 25.05 | 160.47 | 133.93 | 127.18 | 144.11 | 123.19 |
| | 50-75% | 8.41 | 67.63 | 72.95 | 78.20 | 69.89 | 67.62 |
| | 75-100% | 8.01 | 107.34 | 157.39 | 163.60 | 155.80 | 177.41 |